DETAIL PROJECT REPORT

VISHWAKARMA YOJNA: VIII
AN APPROACH TOWARDS RURBANISATION

Kasumbad Village
Anand District

PREPARED BY

STUDENT NAME	BRANCH NAME	ENROLLMENT NO
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Knowledge Institute of Technology and Engineering

Prof. Divyesh Mandali
HOD of Civil department
KITE, Bakrol.

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/ Diploma Engineering successfully submitted

Detail Project Report for,

VILLAGE: Kasumbad

DISTRICT: Anand

Under

Vishwakarma Yojana: Phase-VIII

in partial fulfilment of the project offered by

GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA

during the academic year 2020-21.

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

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College Name:	**Knowledge Institute of Technology and Engineering**
College Stamp:	

ABSTRACT

Vishwakarma yojana provides the benefits of real work experience to engineering students and students can apply their technical knowledge in the development of infrastructure in rural development. Under this scheme, the villages are surveyed and this project was identified & selected for implementation. R-urbanization is the concept of providing villagers the basic amenities required along with keeping the village soul alive. This project gives new ideas for Development of rural villages. As a measure to strengthen the Panchayats in terms of functions, powers and finance. Gram Sabha, NGOs, Self-Help Groups have been accorded adequate role to make participatory democracy meaningful and effective. By this Vishwakarma yojana project government wants technical solution of the problems of villages from the engineering point of view.

According to the selection process, we have selected the Kasumbad village. It is located in Borsad taluka, Anand District. The Pin code of our village is 388540. The total population of our village is 3056, having Male population is 1562 and Female population is 1494. Total numbers of households are 668. Kasumbad village is located 14km towards south from the district headquarters and 107km from the state capital Gandhinagar. It has an elevation of 29m above sea level. The total geographical area of the village is 486 hectares. Out of these 421 hectares are used for the agricultural purpose and 65 hectares are used for the residential purpose.

Village is far from the Borsad having distance of 10km. the nearest villages are Pamol and Dahemi. The connecting roads were in good conditions. Regarding the transportation facilities people used their personal vehicles and Autorickshaw to travel. The problem was that the general market was far from the village. They have to visit borsad or Anand for buying the households things.

Our willingness is to provide proper and reliable facilities to them which will be beneficial to them in their living ways. Second thought about the enhancement of the village will be fulfilled by providing better environment, roads, new school building, Public water tap, Public toilet, garden, library, roads, drainage system, water supply system, agricultural facilities etc. This will lead to a prosperous village, where all love to live.

The students of the Vishwakarma Yojana are trying their best to handover the latest facilities to village of the Gujarat in the progress mission of India.

Key words: Idealized village, developed village, Sustainable village, educated village, Modern infrastructure, Natural energy sources, High living standard, R-urbanization, reduce migration, agricultural development.

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CONTENTS

List of Figure

List of tables

Chapter: 1 Ideal village visit from District of Gujarat State

1.1 Background, Study area and Location

1.1.1 Background

"R-urbanisation" 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 R-urbanisation 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.

We select the Gana village as an ideal village under the Vishwakarma yojana. Gana village is located in the Anand district. Gujarati is the local language of the Gana village. The village is located 10km from the Anand, 4km from Karamsad and 5km from Vallabh vidhyanagar. The village is elevated 45m above sea level. The Gana village has the all types of transportation facilities like, bus, railway, autorickshaw, educational facilities etc. the nearest railway station is Vallabh Vidhyanagar railway station. The Gana village has the bus station in the village. The village is well connected to the other villages by bitumen road constructed under the Pradhan mantri gram sadak yojana.

1.1.2 Study area of ideal village

For the purpose of Vishwakarma project, we have selected Gana village as an ideal village. We have visited Gana village and collected all data of village further used for development of our allocated village Kasumbad. All types of necessary facilities are provided in Gana village. It has good infrastructure facilities. Approach and main roads of village are of bitumen and internal street roads in the village are of R.C.C. and paver blocks. It is having good facility of education from primary education to higher secondary education. Various recreational facilities like public garden, gym center, volleyball ground etc. are available in the village. There are 1 bank and 1 ATM available in village.

It is having good facility for drinking water R.O. water purification plant. Underground drainage system is excellently working in the village. People of village are aware and utilizing various renewable sources like solar panel (for producing electricity), Rainwater recharging and bio-gas plant for producing gas.

1.1.3 Location of ideal village & map

Gana village is located 9km towards south from the district headquarters and 99km from the stare capital Gandhinagar. The nearby village is karamsad located 4km away.

Table 1 Location of Ideal village

Country	India
State	Gujarat
District	Anand
Taluka	Anand
Nearest Town	Anand (10km)
Local language	Gujarati
Geographical Area	344 hectares
Government	Gram Panchayat
Population	4079
No. of house holds	866
Total literacy rate	87.1%
Time zone	IST (UTC + 5:30)
Elevation	44m above seal level
Pin code	388540

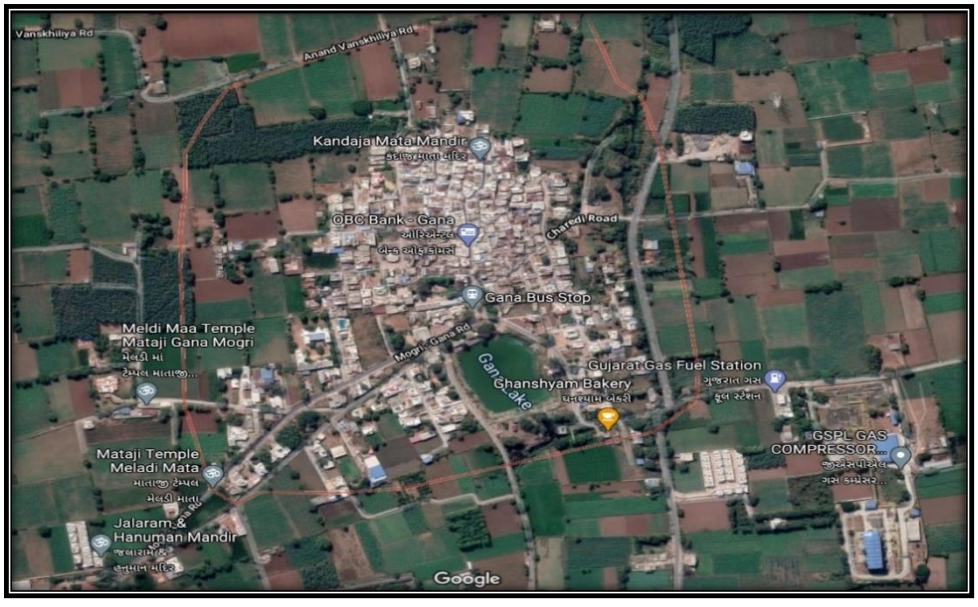


Figure 1 Gana village MAP

1.2 Concept of ideal Village, Normal village

1.2.1 Objects

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.

- Dwelling-houses:

The housing condition of the village is very good all the houses are pukka houses and very neat and clean. The dwellers of these houses look to the house sanitation and house-drainage. The houses have sufficient windows to let in light and air. All the houses are roofed by good tiles at least.

- Food and fodder:

The villagers grow food for themselves and fodder for their cattle. They eat fresh and healthy food. They grow good grass for fodder and also leave sufficient land for pasture.

- Drinking water:

An ideal village should have good supply of drinking water. There are enough tube-wells in an ideal village. There are separate ponds for men and cattle.

- Agriculture and Industry:

People of an ideal village are good farmers and good artisans. They grow food crops, commercial crops and oil-seeds. They take up improved method of farming. They do all kinds of home-industry including spinning and weaving.

- Educational facilities:

There are Primary schools, High schools and craft schools in an ideal village. Primary education is free and compulsory.

- Clinical facilities:

In an ideal village, there are clinical facilities for men and the domestic animals. Hence, there are dispensaries and veterinary dispensaries.

- Other facilities:

We can find post-office, public library, playground, gymnasium and club-house there.

- People:

People of an ideal village are very neat and clean. They are quite enlightened. They have a sense of discipline and co-operation. They have a spirit of service and sacrifice. They follow the principles of plain living and high thinking. They are active and cheerful.

- Conclusion:

An ideal village makes all possible provision for the all-round development of the people. It is our main duty that we should lift every village of India to much higher level.

1.2.2 Example/live case studies of ideal village of India/Gujarat

1. **Punsari village (Gujarat): -**

Punsari is a village located in Sabarkantha district in the state of Gujarat, India. Punsari is considered as **India's smartest village**. The village is located at about 80km from the state capital, Gandhinagar. Punsari is 20km from Parvati Hills. Parvati Hills is the largest table top land of India. The village has RO water treatment plant which serves 20 litre water to each household at Rs. 4 only.

2. **Chansad (Vadodara): -**

Chansad village located in Vadodara district (Gujrat). chansad village is first in Vadodara to updating of urban elements in rural area. chansad village is located 26 km from Vadodara district. chansad village won a prize in fastest growing village in Vadodara. population of this village is 2775.

3. **Kolavada (Gandhinagar): -**

Kolavada are located in Gandhinagar (Gujarat). kolavada is first **smart Village** of Gandhinagar district. In Kolavada village, the facility of road and water supply are awesome. physical infrastructure condition is good. This village clean and literacy of village up to 85 %. kolavada village is located 3.7 km from Gandhinagar.

4. **Hiware Bazar (Maharashtra): -**

Hiware bazar village in the Ahmednagar District of Maharashtra, India. It is noted for its **irrigation system and water conservation** program, with which it has fought the drought and drinking water problems. Village continuously faced a problem of water crisis then villager change an agriculture to horticulture and at present village have 54 millionaires in village.

5. **Odanthurai (Tamil Nadu): -**

Odanthurai, a panchayat situated in Mettupalayam taluka 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.

6. Ankapoor, (Telangana): -

Ankapoor is located in the Nizamabad district in the state of Telangana. Ankapoor has been globally recognized as a **"Model Agricultural Village"** for its achievements in introducing modern technologies in agriculture while ensuring the participation of all sections of the village community, particularly women. Organizations like the Indian Council for Agricultural Research (ICAR), International Rice Research Institute (IRRI), Manila and International Crops Research Institute for the Semi-arid Tropics (ICRISAT) have formally commended the developments in agriculture in the village.

Some of the important features of the agricultural model of the Ankapoor include:

- Peasant Association of the village coordinates various agricultural interventions
- The decision-making process is inclusive and based on consensus-building. Women have a dominant role in the utilization and supervision of labour.
- Focus on new sources of income, such as commercial cultivation of seeds, scientific crop rotation techniques.
- Sustainable agriculture with greater use of farmyard manure and lesser use of chemical fertilizers
- Village Market Yards facilitate the sale of agricultural produce with minimal wastage.

Since agriculture accounts for almost the entire economic output from many villages in India, participatory agriculture, with equal focus on irrigation, watershed management and technology-led cultivation should be the way forward.

1.2.3 The Idea of a model/ Smart village

The idea of an "Adarsh Gram" or model village has been explored earlier as well, mostly through the Pradhan Mantri Adarsh Gram Yojana, launched by the Central Government in 2009. 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.

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

The village in India holds a unique place, both in the social and economic spheres. There were 212.6 million people living in rural areas in 1901, in 2001 rural population has increased to 721.1 million naturally the density of population has increased, land under agriculture has diminished, affected the forests and exodus to urban areas accelerated agricultural labor continued to be exploited. The phenomenon of Rural Development is becoming more and more complex

despite technological advancement and availability of resources as well as continued efforts from the pre independence period. Rural Development has a long history in India.

the Idea of Rural Development in India:

In India as well as other developing countries the economic development strategies failed which turn our attention to 'Rural Development' as the main objective of development. The lessons of the development experiences were as follows:

1. The practice of identifying development with growth in terms of aggregate figures was not correct;
2. Economic growth had only selective impact which benefited the relatively developed areas and the relatively better off people;
3. The percolation theory of growth had failed;
4. If development is not viewed only as growth, then the creation of employment opportunities and deliberate distributive measures were required to achieve the objective of developing the 'forgotten majority' of rural poor in developing countries,
5. Development should cover larger dimensions of the 'quality of life' of the vast majority of the people;
6. The realization that the traditional method of agriculture in the developing countries could be transformed through modern technology and modern farming practices were other aspects of the rethinking on development.

Rural Development in pre independence period

Rural Development has never been a new concept for India it is rather interwoven in the heritage of Indian culture, mention of it has been made along with the history of mankind. Even in the famous epics and drams like Ramayana and Mahabharata the instances of rural governance in terms of welfare of the people, justice to the people has been made. The philosophy of governance in such literature gives hints of Rural Development. Rural Development traces back its history to the Seventeenth Centaury when voluntary efforts to serve the mankind were initiated. A religious society of people known as 'Friends' or 'Quakers' had emerged as a movement in this direction for the first time in England and then in the other parts of the world in rapid strides. It aimed at providing services to mankind transcending bonds of religion, territory and culture.

The nationalist movement and Rural Development:

With the entry of Mahatma Gandhi in to Indian Public life Rural Development received mass popular support. The Rural Development was perceived with the concept of Gram Swaraj, Swadesi, Khadi, Safai, Shram Dan etc. The Non-Cooperation movement, started by Mahatma Gandhi in 1920, was the first political attempt in India to mobilize the villagers. The Non-Cooperation Resolution, moved by Mahatma Gandhi and passed by the Indian National Congress in its Calcutta session of September 1920, articulated the approach to rural development by recommending 'hand-spinning in every house and handweaving on the part of millions of weavers who have abandoned their ancient and honorable calling for want of encouragement.

1.3 Detail study (Socio economic, physical, demographic and infrastructure details) of Ideal village / Smart Village with photograph

Figure 2 Panchayat Building

- 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 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.

Figure 4 Community hall Gana

- This is a community hall of village. It is known as "Gana Patidar Samaj Community Hall". It was constructed and maintain by Patidar Samaj. It is providing space and facilities for the different type of functions in the village.

Figure 5 Primary School building

- 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 6 Sarvajanik hospital

- 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”.

Figure 7 village entry Gate

1.4 SWOT Analysis of Ideal Village

Strength

- Banking facilities available
- Better natural resources
- Availability of enough agriculture land.
- Good educational status of the villagers.
- Good road network

Weakness

- No re-creational in village.
- Water sources are dry in summer season.
- The village should repair roads

Opportunities

- Use of modern technique in agriculture and develop new cropping patent
- Development of waste lands
- Develop WI-FI network in the village.
- Use of renewable energy sources

Threats

- Animal damaged the crop
- Population of village is decreasing

1.5 Future prospects of Development of the Ideal village

In the future, the village should focus on the smart learning system. The students are learnt from the online platform and improve their knowledge. The village planned to establish higher educational facilities in the village and all the class are less with high-tech projector.

In the future, due to the development of Anand city the development of the Gana village will increase and the area of the city become spreads so that the ideal village will include in the city area and it will make a portion of the Anand city. Also, the Gana village is nearest to the industrial area so, in future the Gana village is developed like a city.

1.6 Benefits of the visits of Ideal village

The benefits of visiting village are given below,

- Improved our communication skills and we came to know how to interact with the people.
- We get idea about how to develop our village.
- To know the strength and weakness of village.
- We see some different type of little requirements of village.
- We discussed the good and bad thing about village from village people.
- We saw all type of basic and primary amenities available.
- Getting experience as a surveyor
- Know the behaviour of the people.

1.7 Ideal village concept

The word Swaraj is a sacred word, a Vedic word, meaning self-rule and self-restraint, and not freedom from all restraint, which ‘independence’ often means. Real Swaraj will come not by the acquisition of authority by a few but by the acquisition of the capacity by all to resist authority when it is abused. In other words, Swaraj is to be obtained by empowering the masses to a sense of their capacity to regulate and control authority. The Gandhian vision of an ideal village or village Swaraj is that it is a complete republic, independent of its neighbors for its own wants and yet interdependent for many others in which dependence is necessary.

According to Gandhiji, the making of an ideal village is very simple.

He says: “An ideal Indian village will be so constructed as to lend itself to perfect sanitation. It will have cottages with sufficient light and ventilation built of a material obtainable within a radius of five miles of it. The cottages will have courtyards enabling householders to plant vegetables for domestic use and to house their cattle. The village lanes and streets will be free of all avoidable dust. It will have wells according to its needs and accessible to all.

It will have houses of worship for all, also a common meeting place, a village common for grazing its cattle, a co-operative dairy, primary and secondary schools in which industrial education will be the central fact, and it will have Panchayats for settling disputes. It will produce its own grains, vegetables and fruit, and its own Khadi. This is roughly my idea of a model village.

I am convinced that the villagers can, under intelligent guidance, double the village income as distinguished from individual income. There are in our villages' inexhaustible resources not for commercial purposes in every case but certainly for local purposes in almost every case. The greatest tragedy is the hopeless unwillingness of the villagers to better their lot. My ideal village will contain intelligent human beings. They will not live in dirt and darkness as animals. Men and women will be free and able to hold their own against anyone in the world."

Gandhiji made it very clear that concentration of either economic or political power would violate all the essential principles of participatory democracy and thereby of Swaraj. To promote decentralization, Gandhiji suggested the institution of village republics both as institutions of parallel politics and as units of economic autonomy. Village being the lowest unit of a decentralized system, politically a village has to be small enough to permit everyone to participate directly in the decision-making process. It is the basic institution of participatory democracy.

Panchayat Raj is a system and process of good governance. The Ministry of Panchayati Raj has issued specific guidelines to make Gram Sabha a vibrant forum for promoting planned economic and social development of villages in a transparent way. It offers equal opportunity to all citizens including the poor, the women and the marginalized to discuss and criticize, approve or reject proposals of the Gram Panchayat and also assess its performance.

According to Mahatma Gandhi, utilization of local resources is quite fundamental to the development of the Panchayat Raj system. The Panchayats with the Gram Sabha should be so organized as to identify the resources locally available for development in the agricultural and industrial sectors. The Gram Panchayat elected annually by adult villagers, male and female, possessing minimum prescribed qualifications, will conduct the Government of the village.

The Gandhian ideas of Gram Swaraj and Panchayat Raj system can become vehicles for ushering in much-needed social and political change by including all the stakeholders in the process of decision-making and public policy formulation. As Gandhi said, "Panchayat Raj represents true democracy realized. We would regard the humblest and the lowest Indian as being equally the ruler of India with the tallest in the land." Therefore, concerted, systematic and sustained endeavours are needed on the part of those for whom Gram Swaraj remains a cherished dream for the empowerment of people and for a participatory democracy.

Chapter: 2 Literature Review

2.1 Introduction: Urban & Rural area Concept

2.1.1 Urban area

Figure 8 Urban area

"Urban area" can refer to towns, cities, and suburbs. An urban area is the region surrounding a city. Most people of urban areas have non- agricultural jobs. Urban areas are very developed, meaning there is a density of human structures such as houses, commercial buildings, roads, bridges, and railways. Many urban areas are called metropolitan areas, or "Greater" as 'Greater Noida' in Uttar Pradesh, India.

For the Census of India 2011, the definition of urban area is a place having a minimum population of 5,000 of density 400 persons per square kilometres (1,000/sq.m) or higher, and 75% plus of the male working population employed in non-agricultural activities. Places administered by a municipal corporation, cantonment board or notified town area committee are automatically considered urban areas.

2.1.2 Rural area

A rural area is an open swath of land that has few homes or other buildings, and not very many people. A rural areas population density is very low. Many people live in a city or urban area. Their houses and businesses are located very close to one another. Rural areas may develop randomly based on natural vegetation and fauna available in a region, but urban settlements are proper, planned, built up according to a process called urbanization. Rural people have low living standards and they lack of basic physical amenities.

Figure 9 Rural Area

2.2 Importance of the Rural development

To make the 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 Panchayats 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.

2.3 Ancient Villages / Definition of: Rural Urban Villages

A rural area is an open swath of land that has few homes or other buildings, and not very many people. A rural areas population density is very low. Many people live in a city or urban area. Their houses and businesses are located very close to one another. Rural areas may develop randomly based on natural vegetation and fauna available in a region, but urban settlements are proper, planned, built up according to a process called urbanization. Rural people have low living standards and they lack of basic physical amenities.

Planning Commission:

Defines A rural area is a town with a maximum population of 15,000 is considered rural in nature.

National geographic society:

Defines A rural area is an open swath of land that has few homes or other buildings and not very many people.

United states development of agriculture:

Defines rural areas as any area other than a city or town that has a population of greater than 50,000 inhabitants and the urbanized areas contiguous and adjacent to such town or a city.

2.4 Scenario: Rural / Urban village of India population Growth

- **Population of India as per census 2011**
  - Total population in India = 1210.2 million. (1210,193,422)
  - The Rural Population = 833.1 million. (833,087,662)
  - The Urban Population = 377.1 million. (377,105,760)
  - The Growth rate of population of India = 17.64%.
  - Rural Population = 68.84 %.
  - Urban Population = 31.16 %.

Table 2 Demographical data of India

	Rural	**Urban**
Population	68.84 %	31.16 %
Total Population	833,087,662	377,105,760
Male Population	427,917,052	195,807,196
Female Population	405,170,610	181,298,564
Population Growth	12.18%	31.80%
Sex ratio	947	926
Literacy	68.91	84.98

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

- Population of Gujarat as per census 2011

  - Total population in Gujarat = 60,439,692
  - The Rural Population = 34,694,609
  - The Urban Population = 25,745,083
  - The Growth rate of population of Gujarat = 19.28%.
  - Rural Population = 57.40 %.
  - Urban Population = 42.60 %.

Table 3 Demographical data of Gujarat

	Rural	**Urban**
Population	57.40 %	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	71.71 %	86.31 %

2.6 Rural Development Issues - Concerns – Measures

2.6.1 Development Issues

- Less income opportunity
- Low literacy rate
- Market unavailable
- Hygiene
- Water problem
- Sewage system
- Poor Health services
- Migration to urban areas
- Lower living standards
- No transportation facility
- Less awareness

2.6.2 Measures

- Sustainable development
- Higher living standards
- Provides proper irrigation facilities
- Enough basic physical amenities
- Sanitation facilities
- Higher education
- More job opportunities

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

Table 4 Infrastructure Facilities as per UDPFI norms

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	0

Technical Training Institute	Per 100,000 Population	0
Agriculture Research Centre	Per 100,000 Population	0
Medical Facilities		
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 Facilities		
Water facilities		1
Over Head Tank	1/3 For Demand	1
U/G Sump	2/3 For Demand	1
		1
Public Latrines	Each Village	1
Cremation ground (smashan)	For 20,000 Population	1
Post Office	For 20,000 Population	1
Gram Panchayat Building	Each individual/group Panchayat	1
APMC	Per 100,000 Population	0
Fire Station	Per 100,000 Population	1
Police Station	Per 15,000 Population	1
Community Hall	Per 10,000 Population	1

2.8 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 on them. Essentially, the shift in emphasis is from delivering services directly, to service management and coordination. The roles and responsibilities of the partners may vary from sector to sector.

Following are the projects/schemes by Govt. Sector:

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

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

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

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

2. Pradhan Mantri Gram Sadak Yojana (PMGSY):

Pradhan Mantri Gram Sadak Yojana (PMGSY) was launched on 25th December 2000 as a fully funded Centrally Sponsored Scheme to provide all weather road connectivity in rural areas of the country. The program envisages connecting all habitations with a population of 500 persons and above in the plain areas and 250 persons and above in hill States, the tribal and the desert areas. According to latest figure's made available by the State Governments under a survey to identify Core Network as part of the PMGSY program, about 1.67 lakh Unconnected Habitations are eligible for coverage under the program. This involves construction of about 3.71 lakh km. of roads for New Connectivity and 3.68 lakh km. under up gradation.

The President of India, in his address to Parliament on 25th February, 2005 announced a major business plan for rebuilding rural India called Bharat Nirman. The Finance Minister, in his Budget Speech of 28th February, 2005, identified Rural Roads as one of the six components of Bharat Nirman and has set a goal to provide connectivity to all habitations with a population of 1000 persons and above (500 persons and above in the case of hilly or tribal areas) with an all-weather road. A total of 59564 habitations are proposed to be provided new connectivity under Bharat Nirman. This would involve construction of 1, 46,185kms of rural roads. In addition to new connectivity, Bharat Nirman envisages up gradation/renewal of 1, 94,130kms of existing rural roads. This comprises 60% up gradation from Government of India and 40% renewal by the State Governments.

3. Pradhan Mantri Awas Yojana (PMAY):

Pradhan Mantri Awas Yojana Mission launched on 25th June 2015 which intends to provide housing for all in urban areas by year 2022. The Mission provides Central Assistance to the implementing agencies through States/Union Territories (UTs) and Central Nodal Agencies (CNAs) for providing houses to all eligible families/ beneficiaries against the validated demand for houses for about 1.12 cr. As per PMAY guidelines, the size of a house for Economically Weaker Section (EWS) could be up to 30 sq. mt. carpet area, however States/UTs have the flexibility to enhance the size of houses in consultation and approval of the Ministry.

To address these gaps in the rural housing program and in view of Government's commitment to providing **"Housing for All''** by the scheme 2022, the of has IAY has been re-structured into Pradhan Mantri Awaas Yojana (PMAY) w.e.f. 1st April 2016.

PMAY aims at providing a pucca house, with basic amenities, to all houseless householder and those households living in kutcha and dilapidated house, by 2022. The immediate the objective is to cover 1.00 crore household living in kutcha house/dilapidated house in three years from 2016-17 to 2018- 19. The minimum size of the house has been increased to 25 sq.mt (from20sq.mt) with a hygienic cooking space. The unit assistance has been increased from Rs. 70,000 to Rs. 1.20 lakh in plain and from Rs75,000 to Rs 1.30 lakh in hilly states, difficult areas and IAP district. The beneficiary is entitled to 90.95-person day of unskilled labour from MGNREGS. The assistance for construction of toilet shall be leveraged though convergence with SBM-G, MGNREGS or any other dedicated the source of funding. Convergence for piped drinking water, electricity connection, LPG gas connection etc. different Government programmers are also to be attempted.

4. Indira Awas Yojana (IAY):

Public housing programme in the country started with the rehabilitation of refugees immediately after independence and since then, it has been a major focus area of the Government as an instrument of poverty alleviation. Rural housing programme as an independent programme started with Indira Awaas Yojana (IAY) in January 1996. Although IAY addressed the housing needs in the rural areas, certain gaps were identified during the concurrent evaluations and the performance Audit by Comptroller and Auditor General (CAG) of India in 2014. These gaps, i.e., non-assessment of housing The shortage, lack of transparency in selection of beneficiaries, low the quality of the house and lack of technical supervision, lack convergence, loans not availed by beneficiaries and weak the mechanism for monitoring was limiting the impact and outcomes of the programme.

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

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

Chapter: 3 Smart (Cities / Village) Concept Idea and its Visit

3.1 Introduction: Concepts, Definitions and Practices

Making a village "smart" is evolving as a strategy to ease the problems generated by the urban population growth and speedy urbanization. Yet little hypothetical research has sparingly discussed the phenomenon. To close the gap in the literature about smart cities and in response to the increasing use of the concept, this paper proposes an agenda to understand the concept of smart cities. Based on the exploration of a wide and extensive array of literature from various disciplinary areas we identify eight critical factors of smart city initiatives: management and organization, technology, governance, policy context, people and communities, economy, built infrastructure, and natural environment.

- Strategic planning
- Mobility
- Wi-fi
- E – transportation
- Technological resiliency
- Cyber defense
- Renewable energy

Introduction of Dharmaj village

We have selected the Dharmaj village as a smart village under the Vishwakarma yojana. It is located in Petlad taluka, Anand District. The Pin code of our village is 388430. The total population of our village is 10,429, having Male population is 5,380 and Female population is 5,049. Total numbers of households are 2232. Dharmaj village is located 27km towards west from the district headquarters and 107km from the state capital Gandhinagar. It has an elevation of 32m above sea level. The total geographical area of the village is 1,444 hectares. Out of these 1,275 hectares are used for the agricultural purpose and 154.11 hectares are used for the residential purpose.

Village is far from the Petlad having distance of 12km. the nearest villages are Kaniya and Jogan. The connecting roads were in good conditions. Regarding the transportation facilities all types of local transportation facilities are available within the village. The present facilities are available in the village is 24x7 electricity, sewage system, water supply system, post office, panchayat office, overhead water tank, sahakari dudh mandli, all types of banks, RO water treatment plant. etc. the village has educational facilities up to graduate / post graduate. There is many schools, English medium schools, engineering collage, pharmacy collage etc.

3.2 Vision-Goals, Standards and Performance Measurement Indicators

Table 5 Benchmark for Smart village

Sr. no	Parameter	Benchmark
A	Transportation	• Maximum travel time of 30 minutes in small & medium size cities and 45 minutes in metropolitan areas. • Continuous unobstructed footpath for 2 m wide on either side of all street with Row 12 m more. • Dedicated and physically segregated bicycle tracks with width of 2 m or more, one in each direction, should be provided on all streets with carriage way larger than 10 m • High quality and high frequency mass transport within 800 m (10-15-minute walking distance) of all residences in areas over 175persons / hect. of built area
B	Spatial Planning	• 175 persons per Hect. along transit corridors. • 95% of residences should have daily needs retail, parks, primary schools and recreational areas accessible within 400m walking distance. • 95% residences should have access to employment and public and institutional transport or bicycle or walk. • At least 20% of all residential units to be occupied by economically weaker sections in each Transit Oriented Development Zone 800m from Transit Stations. • At least 30% residential and 30 commercial /institutional in every TOD Zone within 800m of Transit Stations.
C	Water supply	• 24 x 7 supply of water. • 100% household with direct water supply connections. • 135 liters of per capita supply of water. • 100% metering of water connections. • 100% efficiency in collection of water related Charges.
D	Sewerage & Sanitation	• 100% households should have access to toilets. • 100% schools should have separate toilets for girls. • 100% households should be connected to the waste water network.

		• 100% efficiency in the collection and treatment of waste water. • 100% efficiency in the collection of sewerage network.
E	Solid management	• 100% households are covered by daily door-step. • 100% collection of municipal solid waste. • 100% segregation of waste at source, i.e. biodegradable and non-degradable waste 100% recycling of solid waste.
F	Storm storage	• 100% coverage of road network with storm water drainage network. • Aggregate number of incidents of water logging reported in a Year must be zero. • 100 % rainwater harvesting.
G	Electricity	• 100% households have electricity connection 24 x 7 supply of electricity. • 100% metering of electricity supply. • 100% recovery of cost. • Tariff slabs that work towards minimizing waste.
H	Telephone connections	• 100% households have a telephone connection including mobile phone.
I	Wi-Fi connectivity	• 100% households have a Wi-Fi internet connection or internet in mobile phone.
J	Health care facilities	• Availability of telemedicine facilities to 100% residents. • 30 minutes' emergency response time. • 1 dispensary for every 15,000 residents. • Nursing home, child, welfare and maternity. • Centre - 25 to 30 beds per lakh population. • Intermediate Hospital (Category B) - 80 beds per lakh population. • Intermediate Hospital (Category A) - 200 beds per lakh population. • Multi-Specialty Hospital - 200 beds per lakh population. • Specialty Hospital - 200 beds per lakh population. • General Hospital - 500 beds per lakh population.

3.3 Technological Options

The technological options for smart villages are given below,

- Smart energy
- Smart mobility
- Smart infrastructure
- Smart public services
- Smart care

3.4 Road map and Safe Guards

Smart Maps capture a broad range of detailed data, such as roads (with details including lanes, speed limits, and turn restrictions), shops, (types, user ratings), and other information (bike and transit routes, building shapes, etc.) Smart Maps are designed so that users can quickly and intuitively interact with them despite having virtually no training, ensuring that information reaches the widest possible audience. Smart Maps are built to update quickly and correctly as cities change and evolve. For example, Lusail City in Qatar, Masdar City in the UAE, and Songdo in South Korea are all making digital technology, networks, and apps a central part of how they operate and interact with citizens. By contrast, existing or brownfield metropolitan areas face clear challenges inmoving up the ICT maturity ladder, as they need to modernize their existing infrastructure with embedded sensors and control systems and retrofit old buildings a complicated and expensive process.

3.5 Issues & Challenges

While most everyone can agree that smart technology has the power to make our lives much simpler especially in highly populated urban areas implementing that technology must be done in a carefully planned and highly secure manner. Rather than just focusing on what the solution can do, developers and tech companies must also consider how it will affect the people that come into contact with it. When technology, city governance, and communities of people come together to improve the quality of life for everyone involved, that’s when a city truly becomes “smart.”

- Technology challenges with coverage and capacity.
- Digital security.
- Legislation (Laws) and policies.
- Lack of confidence shown by citizens (lack of clarity around benefits).
- Funding and business models.
- Existing infrastructure for energy, water and transportation systems.

3.6 Smart Infrastructure – Intelligent Traffic System

Responds intelligently to changes in its environment, with the ability to influence and direct its own delivery, use, maintenance and support. Smart Information and Communications Technology (smart ICT) has the potential to transform the way we plan and manage infrastructure. New developments in computer hardware, new applications and software are changing the face of the infrastructure sector, and society more generally; driving greater efficiency, increasing productivity, and greatly simplifying construction processes and life-of-asset maintenance.

- Smart building
- Smart mobility
- Smart energy
- Smart waste management
- Smart health

Traffic Management System is one of the many domains of a Smart City wherein significant research can be seen. It is an area of work which has answers to many current day problems pertaining to traffic management of smart cities. We propose a novel Intelligent Traffic Management System for Smart Cities which facilitates Wire-less Sensor Networks, Internet of Things, Cloud Computing and Data analytics. The work discusses the ways in an optimum route is suggested to the end user. The optimum route turns out to be beneficial than the shortest route in most cases in terms of fuel cost and total travel time. Through our research, we were successful in generating an optimum route along with making predictions regarding traffic congestion levels. The system also talks about events of accidents and how they may have an impact on the traffic flow of a region. Levels of precipitation, an occurrence of an accident, concept of a green corridor, the rate of fuel consumption, % flow of traffic and use of machine learning algorithms are some of the novel features of our work. In future, we intend to introduce the vehicle-to-vehicle communication and impact of speed breakers on traffic flow and congestion.

3.7 Cyber Security

Cyber security is concerned with the security of data, and the applications and infrastructure used to store, process and transmit the data. It is understood as the process of protecting data and info by preventing, detecting and responding to cyber security events. Such that events, which include intentional attacks and accidents, are changes that may have an impact on organizational operations.

Cyber security in the context of Smart Cities is a hot topic. The objective of Smart Cities is to optimize the city in a dynamic way to offer a better quality of life to the citizens through the application of information and communication technology (ICT). The range of areas where cities can become smarter is extensive: it is an evolution of “Connected Cities” with the prevalence of data exchange at a larger scale.

The benefits of Information and Computing Technologies (ICT) in a Smart City and of the Internet of Things are tremendous. Smart energy meters, security devices, smart appliances for

health and domestic life: these and more offer unprecedented conveniences and improved quality of life. City infrastructures and services are changing with new interconnected systems for monitoring, control and automation. These may include water and sanitation to emergency responders and disaster recovery.

- Methodology

Several paradigms and categorical structures may be applied in analysing the benefits and detriments of this data environment. An applicable paradigm used for this analysis is that of IBM that the Smart City, its components and its citizens are

- Instrumented
- Interconnected
- Intelligent.

3.8 Retrofitting- Redevelopment- Greenfield Development District Cooling

In the Southeast, air conditioners are almost crucial pieces of equipment for home comfort. However, it can be difficult to find the right air conditioner for your home, one that will provide enough cool air in the summer to cool your home without driving your energy costs through the roof. we can help you choose the perfect air conditioner for your home, install it professionally, and even maintain/repair it in the years ahead.

Green building or sustainable building- is the practice of increasing the efficiency with which buildings and their sites use energy, water, and materials, and of reducing impacts on human health and the environment for the entire life cycle of a building. Green-building concepts extend beyond the walls of buildings and include site planning, community and land-use planning issues as well. Green buildings are designed to meet certain objectives such as protecting occupant health; improving employee productivity; using energy, water, and other resources more efficiently and reducing the overall impact to the environment. Pollution's devastating effects on the environment have become more obvious in recent years, sparking a movement to promote energy efficiency, less reliance on fossil fuels, and a reduction in air and water pollution.

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 livable. 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 smartcity.

This strategy may also be completed in a shorter time frame, leading to its replication in another part of the city.

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 material. 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. In India, they are particularly suitable for the small and medium 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 centers and the practical application of the technologies.

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 How to implement other Countries smart villages projects in Indian village

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.

1. Promoting mixed land use in area-based developments

Planning for 'unplanned areas' containing a range of compatible activities and land uses close to one another in order to make land use more efficient. The states will enable some flexibility in land use and building bye-laws to adapt to change.

2. Housing and inclusiveness: - Expand housing opportunities for all.

3. Creating walkable localities

Reduce congestion, air pollution and resource depletion, boost local economy, promote interactions and ensure security. The road network is created or refurbished not only for vehicles and public transport, but also for pedestrians and cyclists, and necessary administrative services are offered within walking or cycling distance

4. Preserving and developing open spaces

Parks, playgrounds, and recreational spaces in order to enhance the quality of life of citizens, reduce the urban heat effects in areas and generally promote eco-balance.

5. Promoting a variety of transport options

Transit oriented development (TOD), public transport and last mile para-transport connectivity.

6. Making governance citizen

Friendly and cost effective-increasingly rely on online services to bring about accountability and transparency, especially using mobiles to reduce cost of services and providing services without having to go to municipal offices. Forming e-groups to listen to people and obtain feedback and use online monitoring of programs and activities with the aid of cyber tour of worksites.

7. Giving an identity to the main locality

Based on its main economic activity, such as local cuisine, health, education, arts and craft, culture, sports goods, furniture, hosiery, textile, dairy, etc.

3.14 Infrastructure of Dharmaj village

Figure 10 Dharnaj Gram Panchayat

- This building is Ambalal Gangadas Patel Panchayat Gruh. It is known as Panchayat Kacheri of Dharmaj. This panchayat building is established in 1992. Gram panchayat office of the village was fully computerized with personal for operation for each section. All forms and certificates were given immediately on payment of fee through computer.

- This is the picture of clock tower of Dharmaj village. This tower is located at the centre of the village and at the main market area. This clock shows the time as per the Indian standards. This tower creates the rich image of the village.

Figure 11 Clock tower Dharmaj

Figure 12 V.N. Secondary and Higher secondary school

- This is V.N. Secondary and Higher Secondary High School. It is located in proper dharmaj village. The school is taught in grade 1st to 12th standard. I.T.I. course is also taught in this building.

Figure 13 V.N. Vyayam mandir

- This is V. N. Vyayam Mandir, playground and Gym centre. It was developed and maintained by Dharmaj Kelavni Mandal. It was established in 16/10/1926.

- There is total 11 banks in dharmaj village. The Bank of Baroda, Canara Bank, Central Bank of India, Corporation Bank, Dena Bank, HDFC Bank, ICICI Bank, and State Bank of India are established in Dharmaj village.

Figure 14 BOB bank

Figure 15 RO water treatment plant

- This is water purification system. Is treated normal water to R.O. Water. It is located outer side of dharmaj village. It is distributing throughout village via piping system.

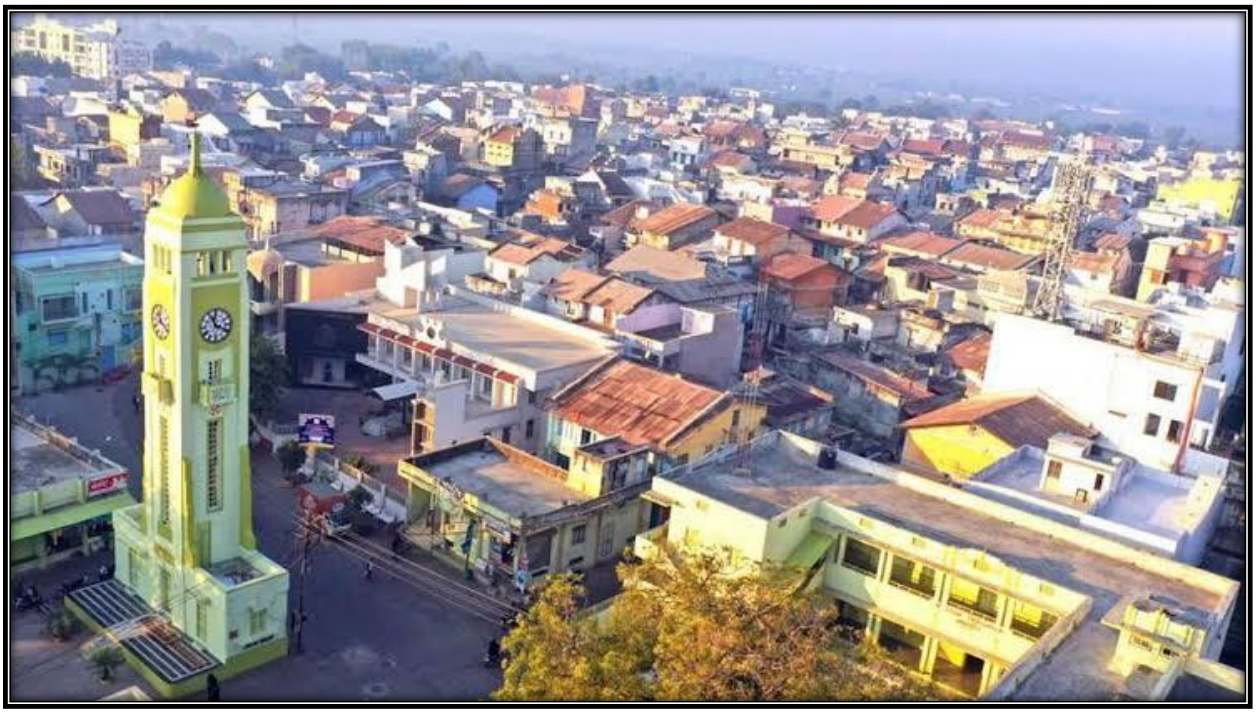


Figure 16 Areal view of Dharmaj village

Figure 17 Surajba Park Dharmaj

Figure 18 IPCO Wala Engineering collage Dharmaj

Figure 19 Hotel in Dharmaj village

Chapter: 4 Allocated Village - Kasumbad

4.1 Introduction

4.1.1 Introduction about Kasumbad Village

We have selected the Kasumbad village for the development. It is located in Borsad taluka, Anand District. The Pin code of our village is 388540. The total population of our village is 3056, having Male population is 1562 and Female population is 1494. Total numbers of households are 668. Kasumbad village is located 14km towards south from the district headquarters and 107km from the state capital Gandhinagar. It has an elevation of 29m above sea level. The total geographical area of the village is 486 hectares. Out of these 421 hectares are used for the agricultural purpose and 65 hectares are used for the residential purpose.

Village is far from the Borsad having distance of 10km. the nearest villages are Pamol and Dahemi. The connecting roads were in good conditions. Regarding the transportation facilities people used their personal vehicles and Autorickshaw to travel. The problem was that the general market was far from the village. They have to visit borsad or Anand for buying the households things. The present facilities are available in the village is 24x7 electricity, sewage system, water supply system, post office, panchayat office, overhead water tank, sahakari dudh mandli, etc.

There is no public transportation facilities are available in the village, the villagers are use their own vehicle to go to out of the village and there is private transportation like autorickshaw and chhakada are available. The village is well connected with nearby villages by the bitumen road. The nearest railway station is Adas which is 8.6 km away from the village, nearest bus station is Khadol which is 3 km away from the village. The main occupation of the village is agriculture. Most of the villagers (70%) are conducted with the farming, about 20% are conducted with the job and the remaining villagers are do business.

4.1.2 Need of the study

Vishwakarma Yojana is one of the initiatives towards R-urbanization 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.

- To reduce migration from rural to urban areas.
- To provide basic and sustainable facilities to rural area to reduce the pressure on urban areas.
- Giving urban touch to the rural soul.
- To uplift the living standard of rural people by providing facilities and better infrastructure.
- For making the village source of income for other nearby villages.

4.1.3 Study Area

We have visited Kasumbad village and got information. All type of necessary facilities is not available in village. It has poor infrastructure; roads facility is inadequate in this village. Anganwadi facility existing in village but it's need maintenance. Primary school building is required re-construction early as possible. Recreational facilities like public gardens is not available in the village. Public health centre, ATM service, pubic latrine blocks and other necessary facilities are not available in village. It is not having facility for R.O. drinking water. Underground drainage system is working in the village. For village approach transportation facilities are not available. Regarding the transportation facilities people were having their personalized vehicles to travel and also have autorickshaw to go nearby places.

4.1.4 Objectives of the study

- To provide basic amenities in the village, like transportation, sanitation, educational, health care facilities, recreational facilities etc.
- To reduce migration
- To promote integrated development.
- To provide sustainable development.
- To analyze the existing conditions
- To find out the problems of village.
- To solve the problems of village.

4.1.5 Scope of the Study

- By the analysing the present conditions we can improve the basic amenities and facilities like agriculture facilities, milk cooperative facility, education facility, recreational Facility.
- To Improve life style of villagers by helping them to develop their skill by assisting them income generating activities in close coordination and cooperation with national and international organizations.
- From the Gap analysis, development tactics for village development will be proposed and planning suggestions for physical infrastructure, social infrastructure and renewable energy source will be suggested for the village. This study will focus on the development of the village.
- From survey from we have idea about what actual facility need in a village so we propose a that facility with our full Gard work and try to improve that facility in village.

4.1.6 Methodology Frame Work for development of your village

Figure 20 Methodology

4.2 Study Area Profile

4.2.1 Study area Location

Table 6 Study Area Location of Allocated village

Country	India
State	Gujarat
District	Anand
Taluka	Borsad
Nearest Town	Borsad (10km)
Area	486 hectares
Government	Gram Panchayat
Population	3056
Time zone	IST (UTC + 5:30)
Pin code	388540

4.2.2 Base Location map, Land Map, Gram Tal Map

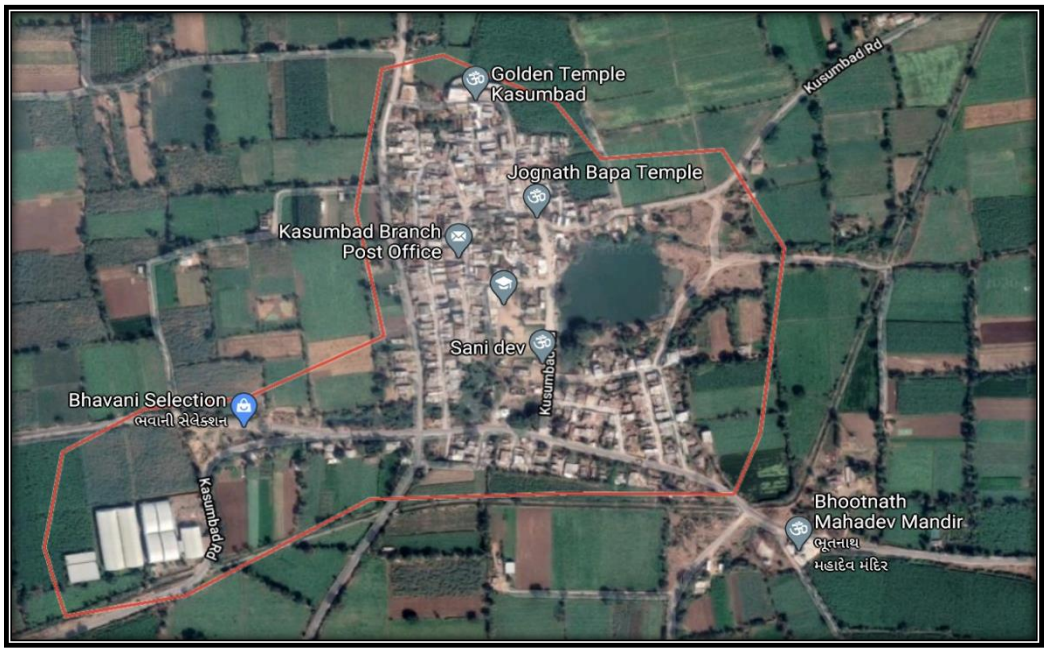


Figure 21 Kasumbad Village MAP

Figure 22 Kasumbad MAP

4.2.3 Demographical growth of village

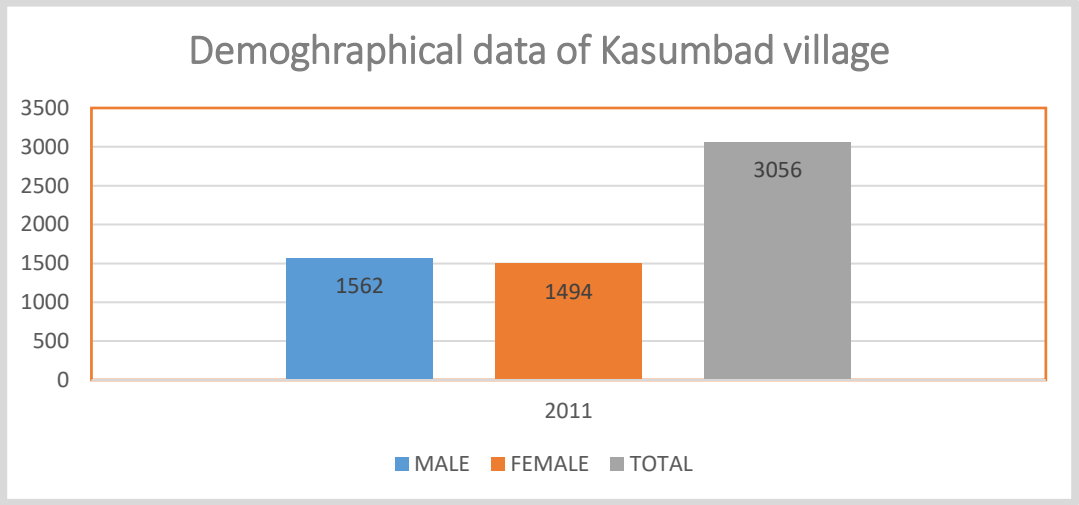


Figure 23 Demographical chart

4.2.4 Economic generation profile / Banks

About the economic profile of this village, many citizens work interest is farming and labor work. The village doesn't have any better facilities regarding infrastructure but has good electrification system which distributed 24x7 hours for domestic use and 8 hours for agricultural use. Village has a good drainage system but not the roads. The road which is connected the gram-tal to main village is not in good condition and the other interior roads are also in bad condition. Dairy and milk production is also the prime source of income.

4.2.5 Actual Problem faced by Villagers and smart solution

In the village, the villagers are facing many problems like,

- There is no primary health centre in the village, so they have to go to nearby village for the treatment or health check-up. Right now, they were going to Davol village for the treatment or health check-up.
- There are RCC road is provided in the main village but in gram-tal, road is not provided so the villagers who lives in gram-tal are not arrives in the village easily.
- Public toilet is provided in the village but it required reconstruction, the existing toilets is not in good condition.
- The problem of surface water resources, the village has many ponds but some of them are totally dry, they are only fill in the monsoon season. So, the solution is creating a path to drain all the rain water as well as the village water (water used for the cleaning) in the pond.

4.2.6 Social scenario -Preservation of traditions, Festivals, Cuisine

It was found that all the people of this village are not very much connected with today's technology environment rather than their main major working area. The major crops produced in the village are banana, tobacco and bajara. The major population is got income through the farming and there are no other job opportunities. The education is limited to primary school. people are also connected with another village and stay connected with culture. people are belonging to Hindu religion and celebrate all Hindu festival with good spirit like Diwali, Navratri, Uttrayan, Janmashtami, Mahashivrartri, Holi etc.

4.2.7 Migration Reasons / Trends

The most common reason for migration is to live better life, to get better education, to get many opportunities of work and sometimes crops failure. Due to these reasons the villagers are migrates to cities. Because of migration the villagers are live advance / better life for them and their future families.

4.3 Data collection- Kasumbad village

4.3.1 Describe Methods for data collection

Our data collection method is survey of village, questionnaires with the villagers, sarpanch and gram Sevak, observation of village, documents and records of village. At first, we visited the village. Before starting the survey, we met the sarpanch and explained the purpose of village surveying, also explained VY yojana of GTU. Then they are agreed and give the permission to do survey in the village. A complete baseline survey was undertaken which involved household census survey, Bio-physical survey and Village level data collection from Sarpanch. This gave in the details of the demographic profile of the village, the literacy percentage, SC/ST population, cattle population and net consumption rate in the village, average milk production of the cattle and various schemes running and their benefits. Bio-physical survey was undertaken to identify various natural resources available in the village. It included the soil typology, well in the area, crop taken in the field, cropping pattern, fertilizer used and various sources of irrigation in the field.

4.3.2 Primary details of Kasumbad village

Kasumbad village is located in Borsad taluka, Anand District. The Pin code of our village is 388540. The village is far from the Borsad having distance of 10km. It is located 14km towards south from Anand district headquarters and 107km from the state capital Gandhinagar. It has an elevation of 29m above sea level. The nearest two villages are Dahemi & Pamol within 4-5 km distance. The connecting roads are in good conditions and made up of bitumen under "Pradhan Mantri gram sadak yojana".

The village has 3056 population as per the census data (2011). In which male population is about 1562 and female population is 1494. Total no.of households are 668. Total literacy rate is 74.7 %. The major occupation of the villagers is farming. Total area of village is 486 hectares. Out

of these 421 hectares are used for the agricultural purpose and 65 hectares are used for the residential purpose.

There is no public transportation facilities are available in the village, the villagers are use their own vehicle to go to out of the village and there is private transportation like autorickshaw and chhakada are available. but village is well connected with nearby villages by the bitumen road. The nearest railway station is Adas which is 8.6 km away from the village, nearest bus station is Khadol which is 3 km away from the village. The main occupation of the village is agriculture. Most of the villagers (70%) are conducted with the farming, about 20% are conducted with the job and the remaining villagers are do business.

4.3.3 Average size of the House & No of Human being in One House

In the Kasumbad village the total no. of households are 668 and The average size of the one house is 800-1200 sft. On an average 4 -5 members are live in one house.

4.3.4 Material available locally in the village and Material Out Sourced by the villagers

The main occupation of the village is farming and village has no any industrial plant to produce the materials so, the village is depended to other cities for material. The houses are made up of bricks, clay, concrete (cement, sand, aggregate). These materials are not available locally the villagers are bought from the nearby city Borsad or Anand. There are most if houses are pukka house.

4.3.5 Geographical Detail

The village is located in borsad taluka, district Anand. The code number of the village is 517077. The geometric area of village is 486 hectares. In which the 40 % land is allotted to agriculture zone, 20% land allotted to residential zone and remaining land is used for the other purposes.

Table 7 Geographical data of village

Country	India
State	Gujarat
District	Anand
Taluka	Borsad
Nearest Town	Borsad (10km)
Area	486 hectares
Government	Gram Panchayat
Population	3056
Time zone	IST (UTC + 5:30)
Pin code	388540

4.3.6 Demographical Detail

Table 8 Demographic detail of Kasumbad village

	Total	Male	Female
Total households	668	-	-
Population (2011)	3056	1562	1494
Child population (2011)	428	223	205
Literacy rate	74.7 %	80 %	60 %`
ST population	0	0	0
SC population	115	-	-
Child (0-6)	428	-	-
Girl child (0-6)	205	-	-

4.3.7 Occupational Detail

In the Kasumbad village, the most of the villagers are getting income from the farming about 60 % to 70 % villagers are conducted with farming, 10 % are conducted with the milk production and the remaining villagers are worked on daily wages. So, we can say that the main source of income in the village is farming.

4.3.8 Agricultural Details

The main occupation and income of source is farming. The village has approx. 200 hectares land as a agriculture land. In the village, the main crops are Musa (Banana), Tobacco and Bajra. The farmers are mostly used flood irrigation system.

4.3.9 Physical Infrastructure Facilities

The physical infrastructures in the village are,

- Overhead water tank
- Sahkari dudh mandali
- Bitumen road for approach
- Sewage system
- Panchayat building
- Community hall
- Primary school

4.3.10 Tourism development available in the village for attracting the tourist

There are no tourism places.

4.4 Infrastructure Details of Kasumbad village

4.4.1 Drinking water

The village has good & pure water for drinking. There are two overhead water tanks are in the village 1 for the main village and 1 for the gram-tal. The main overhead water tank has a storage capacity of 1 lakh litres, it is enough to providing the drinking water in the village daily 4 hours supply. And the another one has the capacity of 50K litres.

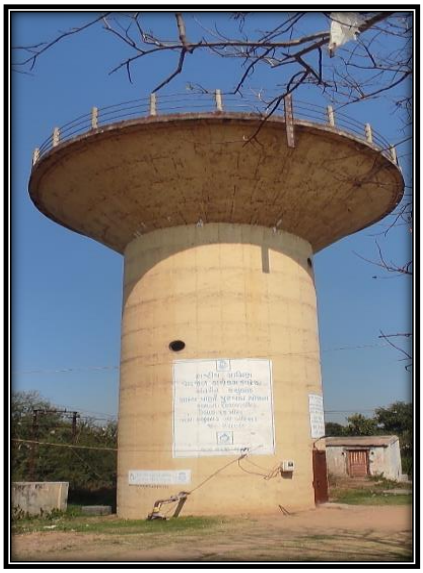


Figure 24 Water Tank

4.4.2 Drainage network

Village drainage line are construct before 4 or 5 yrs. The village has proper drainage network and it is discharge in to the nearby water bodies.

4.4.3 Transportation & road network

Figure 25 Street Road

There is no public transportation facility available in the village. For the transportation the villagers are used Autorickshaw or their own vehicle. The villagers should get the S.T Bus from the Khadol bus station and the train from the Adas railway station.

The village has good road network. It is connected by the bitumen road to the major cities or nearby villages. The internal street roads are not available at some places.

4.4.4 Housing condition

There is total 668 households are in the village in which the 80 % houses are made up of the bricks and concrete, and the remaining houses are made up of clay and shades. 80 % are kuccha house and 20 % are pukka house.

Figure 26 Housing Condition

4.4.5 Social Infrastructure Facilities

- Health facilities

  In the village there is no government health centre. The villagers have to go to the Davol village for their health check-up.

- Education facilities

  There is only primary education is available, for higher education the student has to go to the borsad. There are Aanganwadi and primary school are available.

Figure 27 School building

- Community hall

  The community hall is available in the village. The villagers are used it for the family function or any kind of celebration. But now, this community hall is too small for villagers so, they wanted to have large and full facilitated community hall.

- Library

  There is no public library in the village. The villagers are wanted to have library in the village for the students as well as for the people.

4.4.6 Existing condition of the public building

There only one public building that is panchayat building. Other public building like, bus stop, recreational buildings, post office etc. are not available in the village.

i. Panchayat Building

- The panchayat building of kasumbad village is located at the entrance of the village. The sarpanch Mr. Jitendrabhai Rabari is handles very nicely. All the government work are done in the panchayt building by the gram sevak.
- There is no postoffice in the village so, the panchayat building is also used as a postoffice. Birth and death certificate also issue by the gram panchayat.

Figure 28 Panchayat Building

ii. Milk co-operative society

- This building is milk co-operative society of Kasumbad Village. The building is always cleanliness and hygiene. You can also see in the photo.
- the hygiene of the building is daily maintained by the gram panchayat so, the milk in the dairy does not get infected. The milk that collected here is sold to the villagers and some quantity of milk delivered to the AMUL dairy.

Figure 29 Milk co-operative Society

iii. Kasumbad Entrance gate

Figure 30 Kasumbad Entry Gate

- This is the image of Kasumbad Entry gate which is constructed in 2016 by the Y.R.Comnstruction.
- This gate was constructed by the y.r.construction and the cost of the gate was funded by Mr. Ranjitsinh Chauhan.

iv. Pond

- The Kaumbad vilage many ponds some of them filled with water and some of dry. The pond shown in this image is located in the middle of the village. And it fully filled with the water.
- The geographical area of the pond is 8.70 hectare. This the only pond which is filled with the water so, the villagers wants to re-develope this pond.

Figure 31 Pond

v. Gornment Grocery Store

Figure 32 Govt. Grocery store

- In the Kasumbad villlage the govrmnment grocery store located near the sahkari dudh mandali.
- The store gives Grocery to the villagers on the basis of their Rashan card. The charges of this store is smaller than the market.

vi. Canal

Figure 33 Canal

- This is the image of canal which is passing through the village. This canal is used for the irrigation purpose. All the farmers are used this canal as source of the water.

- The geographical area of the canal in the village is 29.34 hectares. This canal divides the main village and the gram-tal of the village.

vii. Irrigation facilities

- There are proper irrigation facilities in the Kasumbad village. The total agricultural land area of the village is 426 hectares. In the village most of the villagers are dependent on the agriculture. 70% villagers are getting income from the farming.

Figure 34 Agricultural land

Figure 35 Irrigation by the Tube-well

- The major crops taken by the farmers are Banana, Tobacco and Bajara. The village has Canal and borewell for the irrigation and also get 8 hours of electricity daily for the irrigation.

Figure 36 Warehouse

Figure 37 Brick Manufacturing Plant

Figure 38 Temple

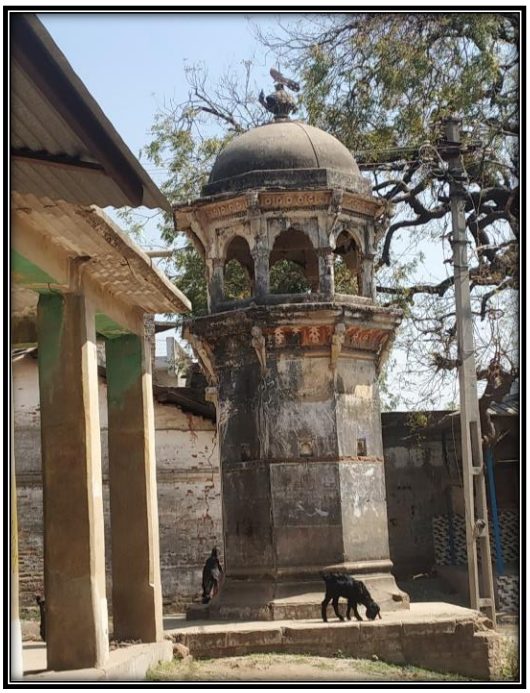


Figure 39 Chabutra

4.4.7 Maintenance of existing Public Infrastructures

The below mentioned infrastructures are required renovation or new construction,

- Community hall
- Roads
- Primary school
- Public toilets etc.

4.4.8 Technology Mobile / WIFI/Internet Usage Details

After the survey of village, we came to know that about 60-70 % villagers have smartphone and they use internet. they are aware about the technology. Most of the house has a cable tv connection. There is WIFI connection in the panchayat building.

4.4.9 Sports activity as a Gram panchayat

There is no any Sports activity as a gram panchayat.

4.4.10 Socio-Cultural facilities

- Public garden/park
  There is no public garden/park is available in the village.

- Playground
  There is no playground in the village for the sports activity.

- Pond
  There are approx. 12 ponds in the village in which 4 ponds are filled with water and remaining are dry.

Figure 40 Interaction with Sarpanch and Talati

Figure 41 Photo with Sarpanch of Kasumbad village

Photo with sarpanch (Mr. Jitendrabhai M. Rabari) of Kasumbad village

Chapter: 5 Sustainable Technical Options with Case Studies

5.1 Advance Construction Technology

1. Pile method:

Composting is a simple way to add nutrient-rich humus which fuels plant growth and restores vitality to depleted soil. It's also free, easy to make and good for the environment.

Starting Your Compost Pile:

Layering:

Layer 1-

The organic materials layer can be vegetable wastes, sod, grass clippings, leaves, hay, straw, chopped corncobs, corn stalks, untreated sawdust, twigs less than ½ inch in diameter, or garden debris. Remember the proper C: N ratio and mix accordingly. Your bulkier organic materials do best in the first ground level layer. As your pile settles, these items tend to allow for more air spaces. Shred or chop up materials for greater surface area. The organic layers should be between 6-8 inches thick. Materials that tend to mat such as grass clippings should be either mixed in or placed in 2-3-inch layers within this 6-8-inch layer.

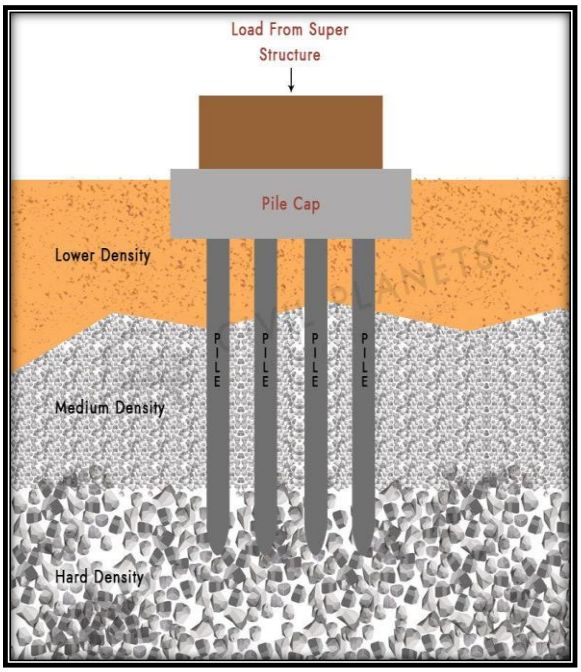


Figure 42 Pile foundation

Layer 2 –

Animal manures, fertilizers or starters serve as activators that accelerate the ignition or initial heating of your pile. They all provide a nitrogen source for the microbial community. Some provide proteins and enzymes. If manure from a grain eating animal is available, add 1-2-inch layer. If this is not available, add one cup of 10-10-10 or 12-12-12 commercial fertilizer per 25 square feet. If using a commercial starter, follow label directions.

Care:

Temperature plays an important role in the composting process. Decomposition occurs most rapidly between 110° to 160°F. Within two weeks,

a properly made compost pile will reach these temperatures. Now, you will notice your pile settling which is a good sign that the pile is working properly.

2. Low-cost house construction methods in Kerala

Low-cost housing construction is possible with the use of low-cost building materials and planning. Techniques for low-cost housing construction with its speedy construction. Kerala, God's own country with its tropical climate, is the destination for many a person who decides to make his home. The natural greenery along with the modern amenities and services available make Kerala an idyllic place to construct a home.

1. Select Load-bearing structures:

For significantly reducing the construction cost, without compromising on the quality of constitution, consider constructing load-bearing structures, rather than using the framed structures. As it needs a lesser volume of construction materials it will keep the construction cost within a reasonable extent. Eminent builders of flats in Kochi are adapting this method of construction.

2. Foundation:

The standard foundation depth usually stands to the extent of 3 to 4 feet, but you can reduce it to half the usual depth, to reduce the overall construction cost. Luckily, Kerala has top quality soils with good load bearing capacity. Hence, even after reducing the depth of the foundation, the quality of construction will not get affected.

3. Load bearing walls:

Opting for hollow concrete blocks for the load-bearing walls is one of the best methods if you are considering Low-cost house construction in Kerala. Only half the construction material is required and hence, you can cut down the construction costs by a significant amount. Many new apartments in Kochi have gone for load bearing walls construction technique and found it effective. 4. Staircase: If you consider going for the precast version, the construction can be carried out quickly and that too for minimal expenses. Being a non-labour intensive construction technique, you will require only the minimum labourers to execute this construction and hence, save a considerable amount.

5. Windows and doors:

Always opt for prefabricated doors & windows as it increases the speed of construction and has lesser expenses as well. Many new apartments in Kochi follow this method and have considerably reduced their construction costs. You can keep the expenses under control if you are embracing these techniques and construct your dream home without compromising on the quality of construction. We at Asset Homes, eminent builders of flats in Kochi suggest that you should focus on points like the structural design, budgeting & cost cutting method as well as the use of materials. By maintaining the right balance between these elements, you can keep the construction expenses within your budget & the quality of construction stays attuned to the construction

standards. We hope that this Guide to Low-Cost House Construction Methods in Kerala is quite useful to you if you plan to have your home in Kerala.

CONCLUSION

In the present study various technologies have been studied such as Prefabrication, Economical Walling System, Rat Trap Bond and Filler Slab Technology. Mass housing targets can be achieved by replacing the conventional methods of planning and executing building operation based on special and individual needs and accepting common denominator based on surveys, population needs and rational use of materials and resources. Adoption of any alternative technology on large scale needs a guaranteed market to function and this cannot be established unless the product is effective and economical. Partial prefabrication is an approach towards the above operation under controlled conditions.

List of suggestions in this study for reducing construction cost is of general nature and it varies depending upon the nature of the building to be constructed, budget of owner, geographical location where the house is to be constructed, availability of the building material, good construction management practices etc. however it is necessary that good planning and design methods shall be adopted by utilizing the services of an experienced engineer or an architect for supervising the work, thereby achieving overall cost effectiveness to the extent of 25 % in actual practice. The main causes of delay that affect construction project. The most important causes identified were: delay in payment by the head office, frequent change of staffs, poor site management, improper management of the engineers, delay in supply of material and lack of manpower. Similarly, the effects of these delays are time

5.2 Soil liquification case study

"**Liquefaction**" is the phenomena when there is loss of strength in saturated and cohesion-less soil because of increased pore water pressures and hence effective stress is reduce due to dynamic loading.

During liquefaction the water pressure become high enough to counteract the gravitational pull on the soil particles and effectively float or suspend the particles. Then soil particle move freely with respect to each other. due to this the strength of soil decreases and the ability of a soil deposit to support foundations for buildings and bridge is reduce.

Figure 43 Soil liquification

Type of liquefaction: -

Flow liquefaction: -

Flow liquefaction is a phenomenon in which the static equilibrium is destroyed by static or dynamic loads in a soil deposit with low residual strength. It occurs when the static shear stresses in the soil exceed the shear strength of the liquefied soil.

Cyclic mobility: -

Cyclic mobility is a liquefaction phenomenon, triggered by cyclic loading, occurring in soil deposits with static shear stresses lower than the soil strength. ¬ Deformation due to cyclic mobility develop incrementally because of static and dynamic stresses that exist during an earthquake.

Effects of liquefaction: -

Loss of bearing strength: - The ground can liquefy and lose its ability to support structure.

Lateral spreading: -

The ground can slide down very gentle slopes. It is mainly caused by cyclic mobility. Lateral spreading causes damage to foundations of buildings, pipelines, railway lines and cause shaking at pile due to increased lateral loads.

Sand boil: -

Sand-laden water can be ejected from a buried liquefied layer and erupt at the surface to form sand volcanoes. The surrounding ground often fractures and settles.

Flow failures: -

Flow failures are the most catastrophic ground failures caused by liquefaction. These failures commonly displace large masses of soil laterally. Flows develop in loose saturated sands or silts on relatively steep slopes.

Ground oscillation: -

Where the ground is flat or the slope is too gentle to allow lateral displacement, liquefaction at depth may decouple overlying soil layers from the underlying ground, allowing the upper soil to oscillate back and forth and up and down in the form of ground waves. These oscillations are usually accompanied by opening and closing of fissures fracture of rigid structures such as pavements and pipelines.

Flotation: -

Light structure that are buried in the ground (like pipeline sewers and nearly empty fuel tanks) can float to the surface when they are surrounded by liquefied soil. Manhole Lifted up manhole.

Settlement: -

Liquefied ground reconsolidates during an earthquake, the ground surface may settle and the underlying liquefied soil become denser.

Methods to reduce liquefaction

Avoid liquefaction-susceptible soil: -

The first possibility is to avoid construction on liquefaction susceptible soil.

Build liquefaction-resistant structures: -

It may be possible to make the structure liquefaction resistant by designing the foundation elements to resist the effects of liquefaction. Structure that possesses ductility, has the ability to accommodate large deformations, adjustable supports for correction of differential settlements.

Shallow foundation aspects: -

It is important that all foundation elements in a shallow foundation are tied together to make the foundation move or settle uniformly, thus decreases the amount of shear force induced in the structural elements resting upon the foundation. A stiff foundation mat is a good type of shallow foundation. Which can transfer loads form locally liquefied zone to adjacent stronger ground.

Deep foundation aspect: -

Liquefaction can cause large lateral loads on pile foundations. Piles driven through a weak, potentially Soil layer to a stronger layer not only have to carry vertical loads form the superstructure, but must also be able to resist horizontal loads and bending moments induced by lateral movements if the weak layer liquefies. Piles of larger dimensions and/or more reinforcement can achieve sufficient resistance.

Soil improvement techniques against liquefaction: -

The main objective of soil improvement techniques used for reducing liquefaction hazards is to large increases in pore water pressure during earthquake shaking by improving the strength, density, and drainage characteristics of soil.

Vibro-compaction: -

Vibro-compaction involves the use of a vibrating prone that can penetrate granular soil to depths of over 100 feet. The vibration of the probe causes the grain structure to collapse thereby densifying the soil surrounding the probe.

Compaction grouting: -

Compaction grouting is a technique whereby a slow-flowing water/sand/cement mix is injected into loose sand under high pressure. Gout does not enter soil but forms a bulb that compact and densify the soil by forcing it to occupy less space.

Dynamic compaction: -

Densification by dynamic compaction is performed by dropping a heavy weight of steel or concrete in a grid pattern form height of 30 to 100 feet.

Stone column: -

Stone columns are columns of gravel constructed in the ground. Stone columns can be constructed by the vibro-compaction method. In this approach the steel casing is driven into the soil and gravel is filled in from the top and tamped with a drop hammer as the steel is successively withdrawn.

Conclusion

- The analysis is carried out on four liquefaction susceptible sites and the suitable remediation is designed for each site.
- The two sites with less deep active zone around 6m are remediated through dynamic compaction with specifications as above mentioned.
- The other two sites with active zone extending up to around 18m is remediated through vibro stone columns with specifications.
- Sites are being improved in its bearing capacity and the settlement is also reduced by remediation's.

5.3 Practicing zero waste management in Vellore, Tamil Nadu:

Urbanization brings prosperity but at the same time creates environmental problems like pollution, accumulation of solid waste and poor sanitation. Use of tetra packs, plastic plates, cups and bags, tin cans and similar throw-away items has increased in the last decade as has the amount of organic waste. In many Indian states, rural areas are fast catching up with urban areas in generating solid waste. Lack of proper waste collection, segregation and management systems and poor sanitary conditions in both urban and rural areas are aggravating health problems. In this context, solid waste management is an area of challenge and of innovation for urban planners and city corporations. Small and big pilots, with different degrees of sustainability and success, are operational in many parts of the country. A zero-waste management (ZWM) project by NGO Exnora Green Cross and the District Rural Development Agency (DRDA), initially piloted with UNICEF, in Tamil Nadu's Vellore district is an example of a successful solid waste management programme and its benefits.

The Vellore solid waste management project1 is now managed by village Panchayats supported by Residential Welfare Associations and SHGs. Each family pays Rs 20/- and each shop pays Rs 50/- as waste collection charge. The funds collected from monthly subscriptions and sale of inorganic waste and organic manure are used for paying the street beautifiers and supervisors. Gandhi Nagar village Panchayat generated an income of Rs 10,646/- during the financial year 2005-06 by selling organic waste and Rs 1,62,289/- from inorganic waste. The pilots in Vellore district are successful because informed communities are willing to pay for a clean environment managed by local youth who take pride in beautifying their street and get paid for it too. Equally crucial to the success is the full involvement of local bodies and their commitment to making a difference.

5.3.1 E – waste disposal / Any West disposal

Case Study of Mumbai: Decentralized Solid Waste Management

Mumbai Metropolitan Region (MMR), spread over 4,355sq. km is home to seven municipal corporations. All Municipal Corporations in India are mandated to look into solid waste management in their functional domains under the 74th Constitutional Amendment. At present, all the seven municipal corporations depend upon centralized means of managing waste which is dumped at assigned landfills post collection. Apart from the corporation, there are multiple players who play a crucial role in managing the waste. Much of this is managed by informal sector and now emerging recyclers who are setting up processes for decentralized waste management.

The city of Mumbai is spilt into two parts- Greater Mumbai and the region surrounding it. The entire region called the Mumbai Metropolitan Region (MMR) is governed by a group of Municipal Corporations. The various municipal corporations in MMR are Municipal Corporation of Greater Mumbai (MCGM), Thane Municipal Corporation (TMC), Navi Mumbai Municipal Corporation, Ulhas Nagar Municipal Corporation, Kalyan – Dombivili Municipal Corporation, Bhiwandi-Nizampur Municipal Corporation and Vasai-Virar Municipal Corporation. All municipal corporations look after the basic sanitation facilities provided to the citizens under the 74th Constitutional Amendment that gives municipal corporations these powers. This paper looks at examples from MCGM and TMC. The city interacts with all its stakeholders to manage the waste effectively. The nexus between the government agencies, technology, recyclers, citizens/residents, waste pickers create the circle for effective waste management of the city in a centralized and/or decentralized manner.

Centralized mechanisms have known to fail at scale, largely because of the complexity that this linear system poses. From door-to-door collection to mere dumping of waste in over-flooded landfills leaves very little space for effective management of mixed waste. In simpler terms, the linear system of waste dumping highlights that waste is in fact, mismanaged. This system is also largely characterized by tenders floated for collection and the rising price spent on transportation. **MCGM budgets INR 2232 Cr.** for waste management in the current FY 2015-2016.

Methodology:

In this paper, we explore the case study of Mumbai and adjoining area of Thane, where various attempts are made by citizens and organizations to make an effort to manage their waste in a decentralized manner. The sampling of the report has case studies of one active citizen; two housing complexes (that have 25 and 210 flats respectively); a 50 flat apartment complex (that has flourished to growing their own food); an industrial colony (with their own residential space); a college (that efficiently segregates examination papers); and a Bio-Medical Waste Management Plant (that funds sustainability projects). Each of them is lessons to prove that the notion of decentralized waste management is not just a thought of academia but of practice.

Solid Waste Management in Mumbai has a coastal stretch of 603 sq km. Geographically, the city of Mumbai can be divided into three sections, namely, the island city (or main city), the western suburbs and the eastern suburbs. These are also known for administrative purposes as

Division I, Division II and Division III, respectively. The total population of the city amounts to nearly 13million that is increasing on a daily basis. Such a huge habitat obviously generates a huge amount of waste of many kinds the management of which is a massive task for the local administration.

Waste Generation

Mumbai generates waste to the tune of approximately 7,025tonnes per day. The waste consists of:

- 5,025tonnes of mixed waste (bio-degradable and recyclable)
- 2,000tonnes of debris and silt.

The biodegradable waste (wet waste) is made up of vegetable and fruit remainders, leaves, spoiled food, eggshells, cotton, etc. Recyclable (dry waste) consists of newspapers, thermocol, plastic, battery cells, wires, iron sheets, glass, etc. Debris includes construction waste, renovation waste, demolition waste, etc. Silt comprises earth and clay from drains and road corners. It is estimated that by 2008 such waste will aggregate 9,000tonnes per day due to increase in the city's population.

Average Generation of Waste by a Citizen of Mumbai

The generation of waste by an individual depends on the socio-economic conditions to which the person belongs. For example, a rich family will generate nearly four to five kg of mixed waste per day; a middle-class family will generate between one to three kg of mixed waste per day and a poor family, in slums, will generate close to 500grams per day.

Figure 44 E-Waste Management cycle

Management of Waste

The Municipal Corporation of Greater Mumbai (MCGM) is formally responsible for the management of waste in the city. The prevailing approach has been one of collection and disposal that is, garbage is collected from communities by the municipal authorities and disposed of at the three main dumping sites that are currently servicing the city.

Garbage collectors employed by various housing societies manually collect the waste generated at the household level and dump it in the garbage bin at specified street corners. There are around 5,800 community bins in the city. In case of South Mumbai, trucks collect garbage from the garbage bins and transport it to a transfer station which is located in Mahalakshmi. A separate transport is arranged for transferring the garbage from Mahalakshmi to the northern part of Mumbai where the dumping grounds are situated. From all other parts of the city, garbage is sent directly to the dumping grounds. Nearly 95% of the waste generated in the city is disposed off in this manner. This largely manual operation involves 35,000 personnel employed by the MCGM and is collected by a fleet of 800 vehicles, including vehicles hired from private contractors, that work in shifts each day. MCGM spends about Rs15-20lakh per day on collecting and transporting garbage and debris with municipal and private vehicles making about 2,000 trips every day

5.4 Various types of Roads / Intelligent transport system

Designing Pavement for a Typical Village Road in India

The Extension of rural road network is of vital importance for bringing the social amenities, education and health within reasonable reach of villagers/tribal and for the expeditious transportation of agricultural produce from tribal villages to market yards and distribution centers. There are 72407 habitations in the state of Andhra Pradesh, of which only 41619 habitations are connected by all-weather roads. The total length of road network in the state is about 146944 kms (91307 miles). Of the total road length of 146944 kms, the length of BT road is 8819 kms, WBM is 34226 kms and Gravel road is 60768 kms. There are 6824 unconnected habitations of which 6134 are having a population of 100 and above. The existing soils, climate and terrain conditions in Srikakulam district of Andhra Pradesh state in India are suitable for the development of Agricultural, Sea and Horticulture Products.

Road Inventory Survey

Detailed road inventory surveys were carried out to collect details of all existing road and pavement features along the existing road sections. The data collected included, but not limited to - Terrain (flat, rolling mountainous), Land-use (agricultural, commercial, forest, residential etc.), Carriageway width, surfacing type, Shoulder surfacing type and width, Subgrade/local soil type (textural classification), Horizontal curve: Vertical curve, Cross road type and details, Road intersection type and details, Location of water bodies (lakes and reservoirs), Height of embankment or depth of cutting, Land width - Row (if available), Culverts, bridges and other structures (type, size, span arrangement and location), Roadside arboriculture, Existing utility services on either side within Row, General drainage conditions, etc.

Pavement Condition Survey

Condition of the pavement was evaluated based on the field measurements. In case of Bituminous surface roads, primary pavement surface distress indicators like cracking (narrow and wide), patching, ravelling, rutting and potholing were estimated visually coupled with physical measurements, and in case of gravel/ WBM roads apart from cracking and potholes, depressions, corrugations and material loss have been estimated. The extent of each distress has been visually estimated for every 200m length of the road in terms of percentage area affected and then averaged for a kilometer length. Edge breaking was also noted in terms of percentage length of road affected and shoulder drop off in terms of depth in millimetres.

Alignment

Utmost care has to be taken in deciding the proposed road alignment as it plays a pivotal role with regards to the total cost of construction. Due consideration has to be given to the following items which economize the cost of construction.

- As far as possible the alignment must pass along the ridges, for easy drain off.
- The alignment must pass through minimum cross drains, must be straight and plain to avoid the horizontal and vertical curves.
- The alignment must preferably pass through the out skirts of the habitation rather than passing through the midway of the habitation.

Land Acquisition

Generally, in Rural Areas, the alignment of the proposed roads in predetermined, because of existing earmarked tracks. The existing tracks will generally have a minimum width equal to length of one Ginter's chain i.e., 33"-0" or one length of Engineer's chain i.e., 66"-0". In some rare occasions only, where there are no such pre-existing tracks, for their convenience in transportation of the agriculture products, the farmers on either side of the existing pavement, donate some of their land for a nominal width of the track i.e. up to a maximum width of 20"-0" only. Hence, in such cases only when the proposed road has to pass through the fields land acquisition problem arises. As the present road project is for up gradation only and having sufficient existing road width, land acquisition problem is not anticipated.

Test Pits

Sub grade soil samples were collected by digging test pits at the interface of the carriageway and shoulder so that both the pavement and the shoulder composition could be known. To determine the field density, core cutter was used. Following tests were conducted on the soil samples collected from the field.

The pavement layers were measured and logged

- The field moisture content was determined by rapid moisture meter at site
- Grain size analysis and Atterberg's limits were determined in the laboratory for classification of soils
- The Maximum Dry Density and Optimum Moisture Content were‟ determined as per IS 2720 Part 7
- CBR testing was carried out on the specimens compacted at OMC at 3 different energy levels, on specimens both for un soaked and 4 day soaked
- CBR of samples remoulade at field moisture density. The test results are produced

CONCLUSIONS:

Pavement Design

Based on the field work, the traffic studies, reviewing various IRC codes for Rigid and Flexible pavement design, sub grade CBR and keeping the economics in consideration, the following composition has been suggested for the project under study.

Rigid pavements have a high compressive strength, which tends to distribute the load over a relatively wide area of soil. Other advantages include - Low maintenance costs, Long life with extreme durability, High value as a base for future resurfacing with asphalt, decreasing base and sub grade requirements, Ability to be placed directly on poor soils, No damage from oils and greases and Strong edges.

5.4.1 Concept of Different types of mode of transportation

There are a range of different types of transport available to us; the type we choose to use will depend on the purpose for 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 final 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.

Train

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.

5.5 Various type of Environmental Factors

5.5.1 Indoor Air Quality in Rural Residential Area - Case Study

While most media attention has focused on outdoor air pollution in the last few years, indoor air pollution is typically underreported and less regulated than its counterpart (Ott and Roberts, 1998; Smith 1996a, 1993). A cursory glance at news reports and government reports in recent years on buildings with poor Indoor Air Quality (IAQ) suggests that the number of IAQ-related health complaints, and therefore, the costs of insurance and litigation to redress these problems, is significant, and perhaps rising. Environmental Protection Agency studies of human exposure to air pollutants indicates that indoor levels of pollutants may be 2 5 times, and occasionally more than 100 times, higher than outdoor levels. These levels of indoor air pollutants may be of particular concern because most people spend about 90% of their times indoor. Research has shown greater exposure to indoor air pollutants in economically developing countries based on income and in some cases greater occupational exposure to air pollutants for those in lower income brackets.

Materials and Methods

Exclusive review of the earlier studies, the literature and the protocol helped in revealing that rural households depend upon various fuel sources. A micro level reconnaissance survey for understanding the fuel types and usage patterns in the study area was undertaken. Most of the families of that area are used unprocessed biomass as fuel like Dung cakes, wood, agricultural

residue etc. Some people also use kerosene stoves and gas burners. About 70% of families use challah for cooking. Enlightening three types of cooking media i.e. chullah, stove, and gas burner. These cooking media mainly uses wood, cow dunk, kerosene, and liquefied petroleum gas (LPG) as fuel. Some families use mechanical ventilation system likes ceiling fans or exhaust fans for ventilation in their homes; it also affects the indoor air quality during sampling period. Here in a cross-sectional, time-waited pollution monitored and interviewer administered survey; the sample size was selected considering logistics, random variation in the analytical procedure, feasibility, cost effectiveness and the occurrence of a constituent at a point of sampling.

Statistics

Descriptive analysis of household area, cooking fuel usage, smoking status, particulate concentrations and other covariates were performed initially. Also, probability distribution of particulate concentration was estimated using descriptive with 95% confidence interval for mean and histogram. Subsequently, our main goal was to determine whether improvements in air quality were associated with cooking fuel usage. Empirical relationship between risk factors and particulate matter was determined. Analyses were conducted with the use of SPSS software.

P values less than 0.05 and P values less than 0.01 were interpreted as statistically significant.

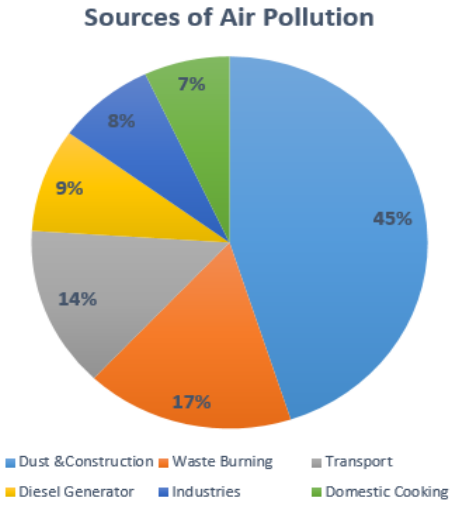


Figure 45 Static diagram Air Pollution in India

Results and Discussion

Amongst all the air pollutants emitted from cooking fuel and predominantly from biomass, the one that has shown the maximum amount of adverse health effects is particulate matter. Cooking indoors has higher exposure levels to biomass smoke than outdoor. Whereas separate kitchen do not make any significant difference to the overall exposure of the cook, it significantly reduces exposure to other members in house. Of the participants, 39% were using challah as cooking media and firewood, cow dung as cooking fuel. Over 30% of the study households used clean fuels such as kerosene and liquefied petroleum gas. Rest of 15% households use more than two fuels for cooking, and were grouped as mix fuel users. Frequency of biomass-fuel use in households with access to clean fuels varied depending upon availability of clean fuels, the economic situation of the household, and occasional social considerations. But for the most part these households used biomass fuels, as there was no direct cost involved in procuring the fuels locally. Rural areas here are largely dependent on biomass fuel as primary source for bulk of population. This dominance is highly dictated by the sub type and quantity of fuel. Distribution of study household characteristics in on an average 4.4 people live in study household and area varies from 64 ft2 to 138 ft2. Average per capita biomass consumption was reported to be 39.4kgs of fire wood and that of cow dung was slightly higher i.e. 45.3kgs; whereas cleaner fuels account for just 3.6kg of LPG and 2.3 kg of kerosene. Five households have smokers, smoking hand rolled bidi. According to primary data collection on an average 22.7 bodies were being smoked over a month.

5.5.2 Disaster management in natural calamities

Disaster Management: A Case Study of Uttarakhand

A disaster may strike any given destination without warning, this being one of the many aspects that hamper a destinations image and the locals as well as tourist sense of safety, so to avoid raising any such concerns, in a given situation any destination must be well equipped to combat the catastrophe. In light of the disaster that occurred in Uttarakhand, were a cloud burst caused flash floods that swept the state, resulting in massive destruction, loss of life and left thousands of tourists stranded.

The vulnerable nature of global tourism is one of the major concerns for contingency management. Disaster management is an important aspect for any tourism destination (especially in the face of a crisis). The specific contingencies such as war, terrorism, crime waves, epidemic and natural disasters have devastating impacts on any community, region, state or nation. Any potential destination is exposed to one or more of the above threats, which can question the safety of residents, tourists and can hamper the market perception of that destination. Consequently, it is crucial for all destination stakeholders to analyze and develop contingency plans to respond to varying levels of threats.

At the peak of the monsoon season the northern state of Uttarakhand was face to face with floods caused due to the cloud burst that hit three of the four famous Char Dham pilgrim sites, “2013 North India floods” (n.d.) leaving tens and thousands of inhabitants as well as pilgrims stranded or swept away due to the floods, and not to mention the damage cause to life, property and business. The famous Char Dham pilgrimage is now discontinued for three years for repair and restoration ("Plan ahead", 2013). The National Institute of Disaster Management (NIDM), in one of its first reports on the Uttarakhand floods, has blamed “climatic conditions combined with haphazard human intervention” in the hills for the Disaster”.

Steps in Disaster Management

One of the many means of avoiding extensive damage caused by disasters is by being well prepared to face them. So as to ready the state of Uttarakhand with ways of combating unexpected disasters, an effective disaster management plan is to be implemented. The following are some of the steps that can be taken toward framing a disaster management plan.

The Pre-Disaster Stage

- Preparedness
- The Warning of Disaster
- Response and Relief Measures

The Post – Disaster Stage

- Revival / Resurrection
- Development

Figure 46 Disaster Management Diagram

5.6 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure

An Innovative Approach to Control Steel Reinforcement Corrosion by Self-Healing (At Hajira Port)

The corrosion of reinforced steel, and subsequent reinforced concrete degradation, is a major concern for infrastructure durability. New materials with specific, tailor-made properties or the establishment of optimum construction regimes are among the many approaches to improving civil structure performance. Ideally, novel materials would carry self-repairing or self-healing capacities, triggered in the event of detrimental influence and/or damage. Controlling or altering a material's behavior at the nano-level would result in traditional materials with radically enhanced properties.

Reinforced concrete is a durable material, capable of withstanding a variety of adverse environmental conditions. It is a highly alkaline composite, where the pH of the pore solution ranges between 12.7 and 13.5. The cementitious matrix in reinforced concrete acts as a physicochemical barrier and assures the passivity of the steel reinforcement, hence it usually provides corrosion protection for the steel surface. However, the open pore structure of the concrete cover (and matrix), allows aggressive substances to penetrate into the bulk material, initiating steel corrosion. The onset of steel corrosion is due to carbonation (a pH drop < 9 in the bulk matrix) or chloride contamination.

Figure 47 Corrosion in Concrete

Novel solutions for new cement blends, steel grades, novel coatings, self-healing approaches, etc., have been reported to show great potential. Nevertheless, these methods, although claiming corrosion delay as a final outcome, aim only at the quality of the cement-based material. They do not consider the overall complex electrochemistry that governs the corrosion process itself or the phenomena within corrosion control. For instance, the involvement of nanomaterials (e.g., polymeric nanoparticles, inorganic nanoparticles, etc.) in cement-based systems was reported to result in increased compressive strength, matrix densification, resistance to the penetration of aggressive substances, etc. A comprehensive review of nanotechnology in concrete material science gives a detailed overview of the application of nanomaterials for altered properties of cement-based systems. The majority of the literature reports, however, deal separately with either only the cement-based bulk matrix or the steel surface.

Steel Passivity, Passivity Breakdown and Matrix Carbonation

1) Steel Passivity in Reinforced Concrete:

Corrosion of the steel reinforcement in reinforced concrete is an electrochemical corrosion process. Although concrete is referred to as a solid material, the pore water in the concrete bulk matrix is an aqueous medium. Hence, the pore water in contact with the steel reinforcement allows for oxidation and reduction reactions on the steel surface to be initiated and to progress over time.

$$2Fe \rightarrow 2Fe2+ + 4e$$

$$O2 + 2H2O + 4e- \rightarrow 4OH$$

$$Fe2+ + 2OH- \rightarrow Fe\ (OH)2$$

$$Fe\ (OH)2 + 1\ 4\ O2 \rightarrow \gamma\text{-}FeOOH + 1\ 2\ H2O$$

2) Passivity Breakdown:

In conditions when chlorides are present in the pore water, the cement layers adjacent to the steel surface, or in the case of matrix carbonation (CO_2 penetration, resulting in a pH drop of the pore water), soluble complexes are formed from the originally available ferrous oxides.

$$6Fe\ (OH)2 + CO3\ 2- + 2H2O \rightarrow [Fe4\ 2+\ Fe2\ 3+(OH)12]\ [CO3 \cdot 2H2O] + 2e-$$

$$4Fe\ (OH)2 + Cl- \rightarrow [Fe3\ 2+\ Fe3+(OH)8Cl] + e-$$

3) Matrix Carbonation—Steel-Corrosion-Related Aspects:

Chemically bound chlorides can participate in the corrosion process if a pH drop in the pore solution occurs, as in the case of carbonation, for example. Carbonation is the process by which atmospheric CO_2 slowly propagates in the depth of the bulk concrete. According to the simplified sequence of a carbonation process, CO_2 penetrates the concrete cover, dissolves in the pore solution and reacts with Ca-bearing phases, e.g., $Ca(OH)_2$, silicates and aluminates, which are all constituents of the cementitious bulk matrix.

$$Ca(OH)2 + CO2 \rightarrow CaCO3 + H2O$$

$$2SiO2 \cdot 2CaO \cdot 2H2O + 3CO2 \rightarrow 2SiO2 + 3CaCO3 + 3H2O$$

$$4CaO \cdot Al2O3 \cdot 13H2O + 4CO2 \rightarrow 2Al(OH)3 + 4CaCO3 + 10H2O$$

$$CaCO3 + H2O + 2CO2 \rightarrow Ca(HCO3)2$$

Besides resulting in changes of the pH of the pore water, the dissolution of Ca-bearing phases due to carbonation exerts alterations in the original matrix composition. Uniform (general) corrosion on the steel surface will be the result of lowering the pH of the pore water. In cases when both carbonation and chloride ingress are at hand, general corrosion would co-exist with chloride-induced, localized corrosion on the steel surface.

Conclusions and Outlook

The purpose of this contribution was to present the concept of an approach to employ polymeric nanoparticles to control reinforced concrete degradation. The originality of the approach to control reinforced concrete degradation via specific nanoparticles is in the targeted simultaneous improvement of both steel and concrete properties, prior to any degradation, and to repair damage later on, in the event of impaired properties. The advantage of the utilization of nanoparticles in the discussed manner, is that these particles, initially introduced in the system to improve the mechanical and microstructural performance of the bulk cementitious material and the steel/cement paste interface, will further participate in a self-healing process in terms of corrosion protection or product layer repair on the steel reinforcement. Conclusive statements can be made on two main aspects: the implementation of tailor-made nanoparticles and autonomous self-healing. The former (tailored particles) have so far proven to be a feasible approach for corrosion control, evidenced by the significant influence of the minimal concentration of these on the material properties, namely achieved corrosion delay, superior steel product layer characteristics and contribution to increased passivity, rather than only enhanced barrier effects. The latter (self-healing aspects) are justified by (at the very least) the corrosion performance of steel when in contact with “empty” or Ca-bearing nanoparticles. For the former case, corrosion delay is only relevant, but no evidence of an improved electrochemical response was observed. For the latter case, corrosion propagation was not observed, which together with the improved stability of the product layer after an initially more active state, shows the possibility for self-healing or self-repair on the steel surface.

5.6.1 Causes Prevention and Repair of Cracks in Building / rectification of building tilt / rehabilitation techniques

Case Study of Gohana Village

Figure 48 Cracks in concrete

Cracks in a building are of common occurrence. The first and most common reason of crack development is the stress component exceeding its strength component which can be associated to the externally applied loads (forces) such as dead, live, wind or seismic loads, or foundation settlement or stresses developed internally due to thermal movements, moisture changes and/or chemical action, etc. Most buildings crack at some time during their service life. The appearance of cracks is a symptom of distress within the structure of the building. Often the cracking is of little consequence and once it is established as static, simple repair by filling or re-pointing is all that is required. However, a crack maybe the first sign of a serious defect which may affect the serviceability or the stability of the building. Modern structures are comparatively tall and slender, have thin walls, are designed for higher stresses and are constructed speedily. These structures are, therefore, more liable to cracks

as compared with old structures which used to be low, had thick walls, were lightly stressed and were built at a slow pace.

Cracks develop due to deterioration of concrete or corrosion or reinforcement bars due to poor construction or inappropriate selection of constituent material and by temperature and shrinkage effects. Internally induced stresses in building components lead to dimensional changes and whenever there is a restraint to movement as is generally the case cracking occurs. According to IS: 456 2000, the surface width of crack should not exceed 0.3mm in members where cracking is not harmful and does not have any serious adverse effects upon the preservation of reinforcing steel, nor upon the durability of the structures. In the members where cracking in tensile zone is harmful either because they are exposed to moisture or in contact of soil or ground water, an upper limit of 0.2mm is suggested for maximum width of crack.

Causes of Cracks

- Moisture Movement
- Thermal Movement
- Elastic Deformation
- Movement due to Creep
- Movement Due to Chemical Reaction
- Foundation Movement and Settlement of Soil
- Cracking Due to Vegetation

Prevention of cracks

1. Select materials having small moisture movement e.g. bricks, lime stones, marble etc.
2. Plan for less richer cement content, larger size of aggregates and less water content.
3. Pores aggregates (from sand stone, clinker etc.) prone for high shrinkage.
4. Plan for offsets in walls for length of more than 600 mm.
5. Use of composite cement-lime mortar of 1:1:6 mix or weaker for plastering work.
6. Plan for proper expansion/control/slip joints.

5.7 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 treatment is the process of removing contaminants from municipal wastewater, containing mainly household sewage plus some industrial wastewater. Physical, chemical, and biological processes are used to remove contaminants and produce treated wastewater (or treated

effluent) that is safe enough for release into the environment. A by-product of sewage treatment is a semi-solid waste or slurry, called sewage sludge. The sludge has to undergo further treatment before being suitable for disposal or application to land.

Treatment Steps

Step 1: Screening and Pumping.
Step 2: Grit Removal.
Step 3: Primary Settling.
Step 4: Aeration / Activated Sludge.
Step 5: Secondary Settling.
Step 6: Filtration.
Step 7: Disinfection.
Step 8: Oxygen Uptake.

Step 1: Screening and Pumping

The incoming wastewater passes through screening equipment where objects such as rags, wood fragments, plastics, and grease are removed. The material removed is washed and pressed and disposed of in a landfill. The screened wastewater is then pumped to the next step: grit removal.

Step 2: Grit Removal

In this step, heavy but fine material such as sand and gravel is removed from the wastewater. This material is also disposed of in a landfill.

Step 3: Primary Settling

The material, which will settle, but at a slower rate than step two, is taken out using large circular tanks called clarifiers. The settled material, called primary sludge, is pumped off the bottom and the wastewater exit the tank from the top. Floating debris such as grease is skimmed off the top and sent with the settled material to digesters. In this step, chemicals are also added to remove phosphorus.

Step 4: Aeration / Activated Sludge

In this step, the wastewater receives most of its treatment. Through biological degradation, the pollutants are consumed by microorganisms and transformed into cell tissue, water, and nitrogen. The biological activity occurring in this step is very similar to what occurs at the bottom of lakes and rivers, but in these areas the degradation takes years to accomplish.

Step 5: Secondary Settling

Large circular tanks called secondary clarifiers allow the treated wastewater to separate from the biology from the aeration tanks at this step, yielding an effluent, which is now over 90%

treated. The biology (activated sludge) is continuously pumped from the bottom of the clarifiers and returned to the aeration tanks in step four.

Step 6: Filtration

The clarified effluent is polished in this step by filtering through 10 micron polyester media. The material captured on the surface of the disc filters is periodically backwashed and returned to the head of the plant for treatment.

Step 7: Disinfection

To assure the treated wastewater is virtually free of bacteria, ultraviolet disinfection is used after the filtration step. The ultraviolet treatment process kills remaining bacteria to levels within our discharge permit.

Step 8: Oxygen Uptake

The treated water, now in a very stabilized high-quality state, is aerated if necessary, to bring the dissolved oxygen up to permit level. After this step, the treated water passes through the effluent outfall where it joins the Oconomowoc River. The water discharged to the river must meet stringent requirements set by the DNR. Pollutant removal is maintained at 98% or greater.

Areas in a Sewage treatment Plant

1. **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.

2. **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.

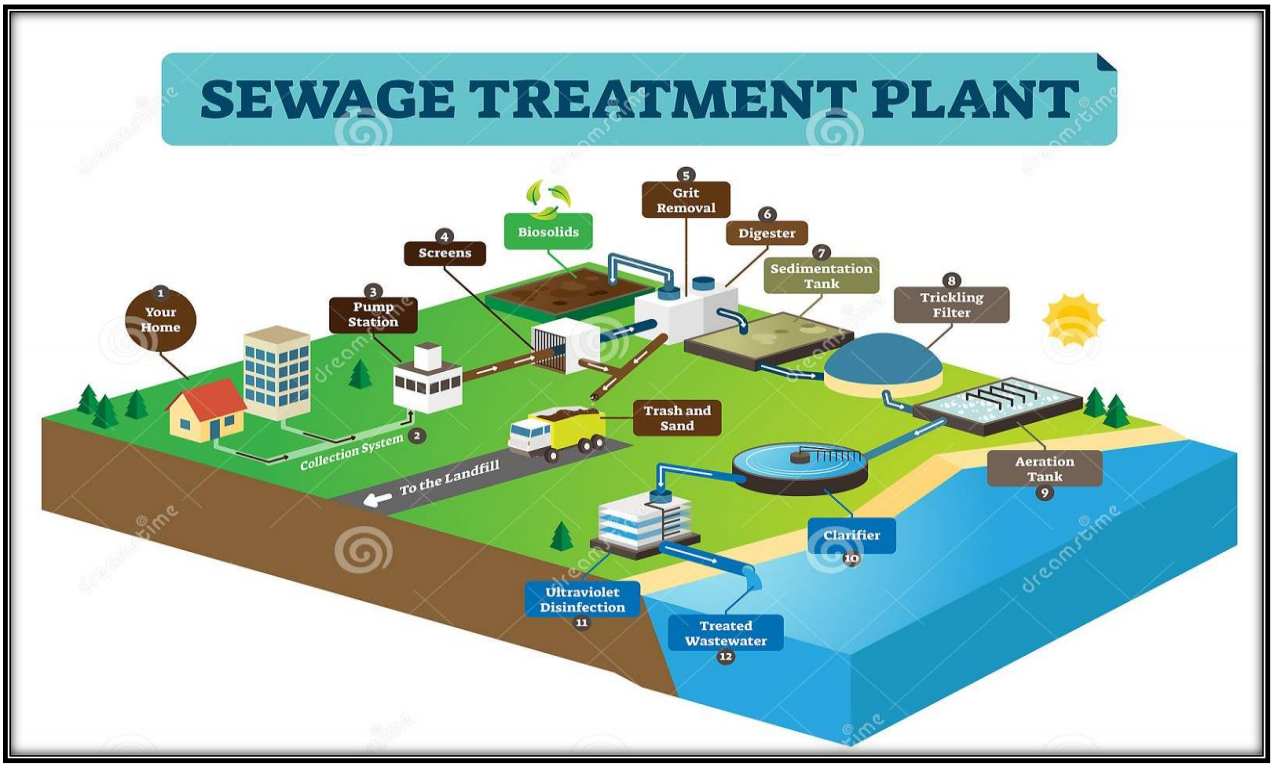


Figure 49 Process of Sewage Treatment Plant

Secondary treatment is divided into two different treatment processes:

- **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.

In this process, aerobic bacteria digest the pollutants. To establish an aerobic bacterial colony, you must provide air for the bacteria to breathe. In a sewage treatment plant, air is continuously supplied to the Biozone either by direct Surface Aeration using Impellers propelled by pumps which whisk the surface of the liquid with air, or by Submerged Diffused Aeration using blowers for air supply through bubble diffusers at the bottom of the tank. (The most modern aerobic sewage systems use natural air currents and do not require electricity, though these are only used for small scale sewage systems at the moment. Once again, the general public leads the way!) Aerobic conditions lead to an aerobic bacterial colony being established. These achieve almost complete oxidation and digestion of organic matter and organic pollutants to Carbon Dioxide, Water and Nitrogen, thus eliminating the odour and pollution problem above. The effluent produced by this process is non-polluting and can be discharged to a watercourse

Conventional sewage water treatment involves either two or three stages, called primary, secondary and tertiary treatment. Before these treatments, preliminary removal of rags, cloths, sanitary items, etc. is also carried out at municipal sewage works.

- **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.

Sewage is partly decomposed by anaerobic bacteria in a tank without the introduction of air, containing oxygen. This leads to a reduction of Organic Matter into Methane, Hydrogen Sulphide, Carbon Dioxide etc. It is widely used to treat wastewater sludge and organic waste because it provides volume and mass reduction of the input material to a large extent. The methane produced by large-scale municipal anaerobic sludge treatment is currently being examined for use in homes and industry, for heating purposes. Septic tanks are an example of an anaerobic process, but the amount of methane produced by a septic tank (it is only the SLUDGE at the bottom that produces methane) serving less than 100 people is miniscule. In addition to this, septic tank effluent still contains about 70% of the original pollutants and the process smells very badly, due to the Hydrogen Sulphide, if not vented correctly. The effluent produced by this process is highly polluting and cannot be discharged to any watercourse. It must be discharged into the Aerobic layer of the soil (within the top meter of the ground) for the aerobic soil bacteria to continue the sewage treatment via the aerobic process below.

3. 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. For example, if we need potable water then filtration and disinfection are implemented to process wastewater.

Figure 50 Sewage Treatment Plant

5.7.1 Low-cost PVC drainage system in Amarapur

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.
- Child are consistently 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). Amarapur 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.

Chapter: 6 Swachh Bharat Abhiyan

6.1 Introduction

"A clean India would be the best tribute India could pay to Mahatma Gandhi on his 150th birth anniversary in 2019," said Shri Narendra Modi as he launched the Swachh Bharat Mission at Rajpath in New Delhi. On 2nd October 2014, Swachh Bharat Mission was launched throughout length and breadth of the country as a national movement. The campaign aims to achieve the vision of a 'Clean India' by 2nd October 2019.

The Swachh Bharat Abhiyan is the most significant cleanliness campaign by the Government of India. Shri Narendra Modi led a cleanliness pledge at India Gate, which about thirty lakh government employees across the country joined. He also flagged off a walkathon at Rajpath and surprised people by joining in not just for a token few steps, but marching with the participants for a long way.

We organized Cleanliness programme under Swachh Bharat-Swasth Bharat Abhiyan Programme. The main purpose of this programme was to create awareness among the villagers regarding Cleanliness and its benefits.

As a part of Swachh Bharat Abhiyan in Kasumbad village, we decided to clean primary school compound. The one sweeper of school also wanted to help us. We picked booms and started cleaning the compound of school. We are total 6 students are joined in this mission 4 students are swipe the garbage and collect at one particular place and the other students are picked up the garbage and filled in the trolly and after the collection of all garbage we are throwing the garbage in to the main dustbin.

6.2 Guidelines for the process of the keep village clean

These are the following Guidelines for the keep village clean.

- While traveling doesn't throw any wrapper, paper or any dry waste on road.
- Keep it in your bag or pocket (as it is a dry waste you can keep them in your bag/pocket).
- Keep paper bags with yourself to store wet waste and throw them in dustbin only.
- Spitting on roads (as it can be the reason of viral disease).
- Avoid chewing Pan-Masala, Gutka and Tobacco.
- Avoid use of plastic bag.
- Follow government's rules and regulations.
- If someone is breaking the rule then make them aware of it.
- Stop your friends if they are making such mistakes.
- Spread awareness to keep our village clean.

Figure 51 Swachhta Abhiyan in Kasumbad village

Figure 52 Swachhta Abhiyan

Figure 53 Swachhta Abhiyan with my team-mates in Kasumbad village

Chapter: 7 Village condition due to COVID-19

7.1 Step taken by the village related to existing situation

Nowadays The whole country is fighting with this corona virus. For prevent the spreading of virus, the government of India issue the guidelines that we have to follow strictly.

- Wear facemask
- Wash your hand for minimum 20 second.
- Do not touch any ware
- Maintain social distancing up to 6 ft
- Sanitize your hand
- Use alcohol-based sanitizer
- Check oxygen level in the body
- Check temperature of body
- Sanitize your house and your workplace regularly etc.

To prevent spreading of COVID-19 virus the sarpanch of the village takes precaution steps in the village. The sarpanch goes to door to door with the team of doctors for the health check-up of each and every villager. The team of doctors check the temperature and oxygen level of villager and also take sample for the lab test.

The sarpanch and gram sevak distribute facemask and hand sanitizer in the village and spreading awareness of COVID-19 virus.

Village is sanitized regularly and the villagers are support the sarpanch in this pandemic situation by the taking proper precaution.

7.2 activity done by the students

We are the student of Knowledge institute of technology and engineering collage bakrol, we are visited the village and spread awareness of COVID-19 virus. We distribute face mask and the pamphlets of precaution should take daily. Like,

- Wear facemask
- Sanitize your hand
- Maintain social distance
- Do not directly contact with the others
- Avoid gathering
- Boost your immunity by eating healthy food etc.

Figure 54 Mask distribution in Kasumbad village

Figure 55 Mask distribution in Kasumbad village 1

Figure 56 Mask distribution in village with sarpanch (Mr. Jitendrabhai Rabari)

Chapter: 8 Sustainable Design planning proposal part 1

8.1 Observation and Brief write up about the existing design

There is no any renewable / sustainable infrastructure facilities in the village. It is very important to provide sustainable infrastructure for boosting up economy of village. It will be economical and eco-friendly. we can provide Sustainable Infrastructure like Solar street lights, Biogas plant, Rain Water Harvesting System, solar energy plant etc.

We can provide Solar Street Lights which uses solar energy to generate electricity. It is the most efficient system for the street lights. Street lights catches the sun rays to the solar panel and generate the electricity and stored which can be used at night. There are no solar street lights in the Kasumbad village.

Rain Water Harvesting system is fitted in to the Public Building to store the rain water and also transferring to ground through borewell. In the current scenario 90% buildings are constructed with their own borewell. So, we can transfer the water in to the borewell.

There is any recreational facility in the village. So, we give the design of the public park where the villagers can spend their time and become stress-free and also provide small area for children to play.

8.2 Reason of recommending these designs

- The Solid Waste Management system of the village must be improved for the sake of the cleanliness and health of the people of village because there is no provision for disposal of solid waste generated. People through it out in open land areas.
- Recreational facilities can be provided like public garden, playground etc. for the recreational purpose because there are no such provisions made in the village.
- Renewable energy sources can be used for energy conservation and to reduce load on conventional energy sources.
- Rain Water Harvesting system can be implemented for individual as well as public buildings such as panchayat building or schools.

8.3 Suggestions of designs

- Public library for improving knowledge
- Primary school for provide batter education
- Rainwater harvesting for recharging the ground water
- Water tank
- Solid waste management

- Public toilet for maintaining hygiene
- Paver block in street for better and efficient transportation to the village
- Public garden for spending time with family and friends and also for exercise.
- Development of pond
- PHC for health facility
- Community hall for the celebrating functions
- Public water taps for drinking water
- Aanganwadi
- Post office
- Cremation ground etc.

8.4 GAP analysis between villages

Table 9 GAP Analysis

Sr.no	Facilities	Smart village Dharmaj	Ideal village Gana	Allocated village Kasumbad
1.	Overhead Tank	Adequate	Adequate	Adequate
2.	External road	Bitumen	Bitumen	Bitumen
3.	Internal road	Bitumen	R.C.C.	R.C.C
4.	Aaganwadi	Yes	Yes	Yes
5.	Primary school	Yes	Yes	Yes
6.	Secondary school	Yes	No	No
7.	Power supply	MGVCL	MGVCL	MGVCL
8.	Renewable energy source	Yes	Yes	No
9.	Public latrine blocks	Yes	Yes	No
10.	Community hall	Yes	Yes	No
11.	Re-creational center	Yes	No	No
12.	Bus stand	Yes	Yes	No
13.	ATM	Yes	Yes	No
14.	Banks	Yes	Yes	No

15.	Post office	Yes	Yes	No
16.	Solid waste management	Yes	No	No
17.	Chabutro	Yes	Yes	Yes
18.	Government clinic	Yes	No	No
19.	Public health centre	Yes	Yes	No
20.	Cinema hall	Yes	No	No

8.5 Design proposal of the Public library with plan, elevation, section and costing

- 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.

- There are five fundamental characteristics shared by public libraries: they are generally supported by taxes (usually local, though any level of government can and may contribute); they are governed by a board to serve the public interest; they are open to all, and every community member can access the collection; they are entirely voluntary in that no one is ever forced to use the services provided; and they provide basic services without charge.

- We design public library for the readers who are fond of reading & wants to improve their knowledge also for students. in that, we provide a large reading hall, number of book shelves and also a computer room for reading e-books.

- Here, we give Drawings, Measurement sheet and Abstract sheet of Public library and the cost of the library is approximately 4.83 lakhs.

Table 10 Measurement sheet of Public library

Project: Library								
Measurement Sheet								
No	**Item**	**No**	**Length (ft)**	**Breadth (ft)**	**Depth (ft)**	**Quantity**	**Total**	**Unit**
1	**Earth Work**							
A)	**Excavation Work**							
	i) LW 1	2.00	30.75	3.25	4	799.50		
	ii) SW1	3.00	13.5	3.25	4	526.50		
						Total	**1,326.00**	**cft**
B)	**Rubble soiling**							
	i) LW 1	2.00	30.75	3.25	0.75	149.91		
	ii) SW1	3.00	13.5	3.25	0.75	98.72		
						Total	**248.63**	**cft**
C)	**P.C.C**							
	i) LW 1	2.00	30.75	3.25	0.5	99.94		
	ii) SW1	3.00	13.5	3.25	0.5	65.81		
						Total	**165.75**	**cft**
D)	**Brick masonry up to GL**							
	i) LW 1							
	27"	2.00	29.75	2.25	0.58	77.65		
	23"	2.00	29.42	1.92	0.58	65.52		
	18"	2.00	29	1.5	0.58	50.46		
	14"	2.00	28.67	1.16	1	66.51		
	ii) SW1							
	27"	3.00	14.5	2.25	0.58	56.77		
	23"	3.00	14.83	1.92	0.58	49.54		
	18"	3.00	15.25	1.5	0.58	39.80		
	14"	3.00	15.58	1.16	1	54.22		
						Total	**460.48**	**cft**
E)	**Refilling in to trench**							
	(Excavation - construction)					**Total**	**451.15**	**cft**
F)	**Soil filling in floor**	1.00	412		2	**824.00**		**cft**

2	**P.C.C Work**							
	i) LW 1	2.00	30.75	3.25	0.5	99.94		
	ii) SW1	3.00	13.5	3.25	0.5	65.81		
	iii) @floor	1.00	412		0.5	206.00		
						Total	**371.75**	**cft**
3	**Brick masonry**							
A)	**Up to plinth**							
	LW 1							
	27"	2.00	29.75	2.25	0.58	77.65		
	23"	2.00	29.42	1.92	0.58	65.52		
	18"	2.00	29	1.5	0.58	50.46		
	14"	2.00	28.67	1.16	2	133.03		
	9"	2.00	28.25	0.75	1	42.38		
	SW1							
	27"	3.00	14.5	2.25	0.58	56.77		
	23"	3.00	14.83	1.92	0.58	49.54		
	18"	3.00	15.25	1.5	0.58	39.80		
	14"	3.00	15.58	1.16	2	108.44		
	9"	3.00	16	0.75	1	36.00		
						Total	**659.59**	**cft**
B)	**Up to slab**							
	i) LW 1	2.00	28.25	0.75	9.25	391.97		
	ii) SW1	3.00	16	0.75	9.25	333.00		
	iii) partition wall	1.00	10		9.25	92.50		
	Deduction							
	D (3')	2.00	3	0.75	7	31.50		
	D1 (4')	1.00	4	0.75	7	21.00		
	W (3'X4')	4.00	3	0.75	4	36.00		
	W1(4'X4')	1.00	4	0.75	4	12.00		
						Total	**716.97**	**cft**
C)	**Parapet**							
	i) LW 1	2.00	28.25	0.75	3	127.13		
	ii) SW1	2.00	16	0.75	3	72.00		
						Total	**199.13**	**cft**
4	**R.C.C work**							
A)	**Coping**							
	i) LW 1	2.00	28.25	0.75	0.5	21.19		
	ii) SW1	3.00	16	0.75	0.5	18.00		
						Total	**39.19**	**cft**

B)	**Plinth beam**	1.00	10	0.375	1	**3.75**		**cft**
C)	**Lintel**							
	i) LW 1	2.00	28.25	0.75	0.5	21.19		
	ii) SW1	3.00	16	0.75	0.5	18.00		
	iii) partition wall	1.00	10	0.375	0.5	1.88		
						Total	**41.06**	**cft**
D)	**Chhajja**							
	Total L	1.00	35	2	0.25	**17.50**		**cft**
E)	**Beam**							
	i) LW 1	3.00	28.25	0.75	0.75	47.67		
	ii) SW1	3.00	16	0.75	0.75	27.00		
						Total	**74.67**	**cft**
F)	**Slab**							
	total area 495sft	1.00	495		0.42	**207.90**		**cft**
5	**Plaster**							
A)	**Inside wall**							
	i) reading room	4.00	16		10	640.00		
	deduction							
	D (3')	0.50	3		7	10.50		
	W (3'X4')	2.00	3		4	24.00		
						Total	**605.50**	**sft**
	ii) computer room	2.00	10		10	200.00		
		2.00	6		10	120.00		
	deduction							
	D (3')	0.50	3		7	10.50		
	W1 (4'X4')	0.50	4		4	8.00		
						Total	**301.50**	**sft**
	iii) Librarian room	2.00	10		10	200.00		
		2.00	9.63		10	192.60		
	deduction							
	D1 (4')	0.50	4		7	14.00		
	D (3')	1.00	3		7	21.00		
						Total	**357.60**	**sft**

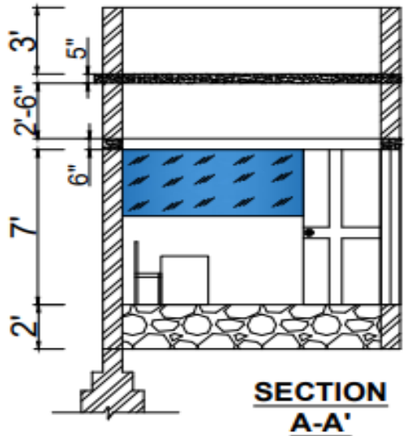
B)	**Ceiling**							
	i) Reading room	1.00	16	16		256.00		
	ii) computer room	1.00	10	6		60.00		
	iii) librarian room	1.00	10	9.63		96.30		
						Total	**412.30**	**sft**
C)	**Outside wall up to parapet**							
	i) LW 1	2.00	28.25		15	847.50		
	ii) SW1	2.00	17.5		15	525.00		
	deduction							
	D1 (4')	0.50	4		7	14.00		
	W1 (4'X4')	0.50	4		4	8.00		
	W (3'X4')	2.00	3		4	24.00		
						Total	**1,326.50**	**sft**
D)	**Chhajja**							
	i) Ch1 (over 3' window)							
	Top / Bottom	4	12		2	96.00		
	Side: - 12+ 2.0+2.0=16	2	16		0.25	8.00		
	ii) Ch2 (over 4' window)							
	Top / Bottom	2	6		2	24.00		
	Side: - 6+2+2=10	1	10		0.25	2.50		
	iii) Ch3 (over4' door)							
	Top / Bottom	2	5		2	20.00		
	Side: - 5+2+2=9	1	9		0.25	2.25		
						Total	**152.75**	**sft**
6	**Flooring**							
A)	Reading room	1.00	16	16		**256.00**		**sft**
B)	Computer room	1.00	10	6		**60.00**		**sft**
C)	Librarian room	1.00	10	9.63		**96.30**		**sft**
D)	Terrace	1.00	26.75	16		**428.00**		**sft**
9	**Colour**							
A)	Inside Wall					**1,264.60**		**sft**
B)	Outside Wall					**1,326.50**		**sft**
C)	Inside parapet	1.00	85.5		3	**256.50**		**sft**
D)	Inside ceiling					**412.30**		**sft**

Table 11 Abstract sheet of Public library

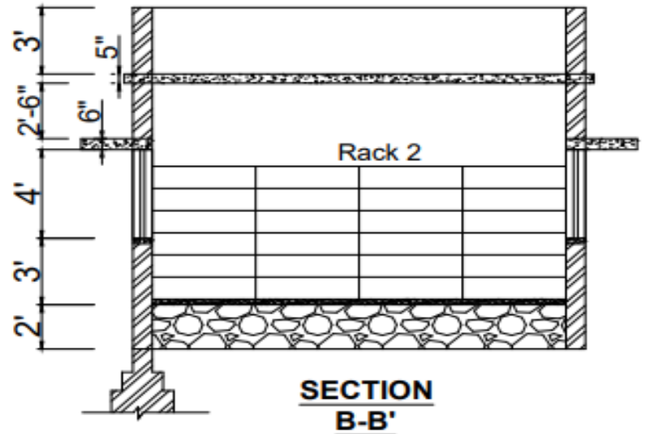
Project : Library					
ABSTRACT SHEET					
No	**Item**	**Quantity**	**Rate (rs)**	**Per (cft)**	**Amount (rs)**
1	**Earthwork**				
	A) Excavation	1,326.00	7	cft	9,282.00
	B) Soil filling in trench	451.15	4	cft	1,804.59
	C) soil filling in plinth	824.00	4	cft	3,296.00
				Total	**14,382.59**
2	**Metal & PCC**				
	A) Rubble soiling	248.63	32.16	cft	7,995.78
	B) P.C.C. Foundation	165.75	85.97	cft	14,249.53
	C) PCC at floor	206.00	78	cft	16,068.00
				Total	**38,313.31**
3	**Brick masonry up to plinth (1:6)**				
	A) up to plinth	659.59	68.26	cft	45,023.37
	B) up to slab	716.97	68.26	cft	48,940.29
	C) Parapet	199.13	68.26	cft	13,592.27
				Total	**1,07,555.93**
4	**R.C.C Work (1:2:(2+1))**				
	A) Coping	39.19	121.74	cft	4,770.69
	B) Plinth beam	3.75	121.74	cft	456.53
	D) G.F Lintel	41.06	121.74	cft	4,998.95
	E) G.F Chhajja	17.50	121.74	cft	2,130.45
	F) G.F Beams	74.67	121.74	cft	9,090.55
	G) G.F Slab	207.90	121.74	cft	25,309.75
	Total	384.07		**Total**	**46,756.91**
5	**Plaster Work (12 mm, 1:4)**				
A	Inside Ceiling	412.30	24.78	sft	10,216.79
B	Inside Wall	1,264.60	24.78	sft	31,336.79
C	Outside Chhajja	152.75	24.78	sft	3,785.15
D	Outside Wall	1,326.50	24.78	sft	32,870.67
E	Inside Parapet Plaster	256.50	24.78	sft	6,356.07
				Total	**84,565.47**

6	**Colour**				
A	Inside Wall	1,264.60	25.00	sft	31,615.00
B	Outside Wall	1,326.50	25.00	sft	33,162.50
C	Inside parapet	256.50	25.00	sft	6,412.50
D	Inside ceiling	412.30	25.00	sft	10,307.50
				Total	**81,497.50**
7	**Flooring**				
A	Tiles	840.30	100.00	sft	84,030.00
				Total	**84,030.00**
9	**Electric**			**Total**	**25,000.00**
			Total Amount		**4,82,101.70**

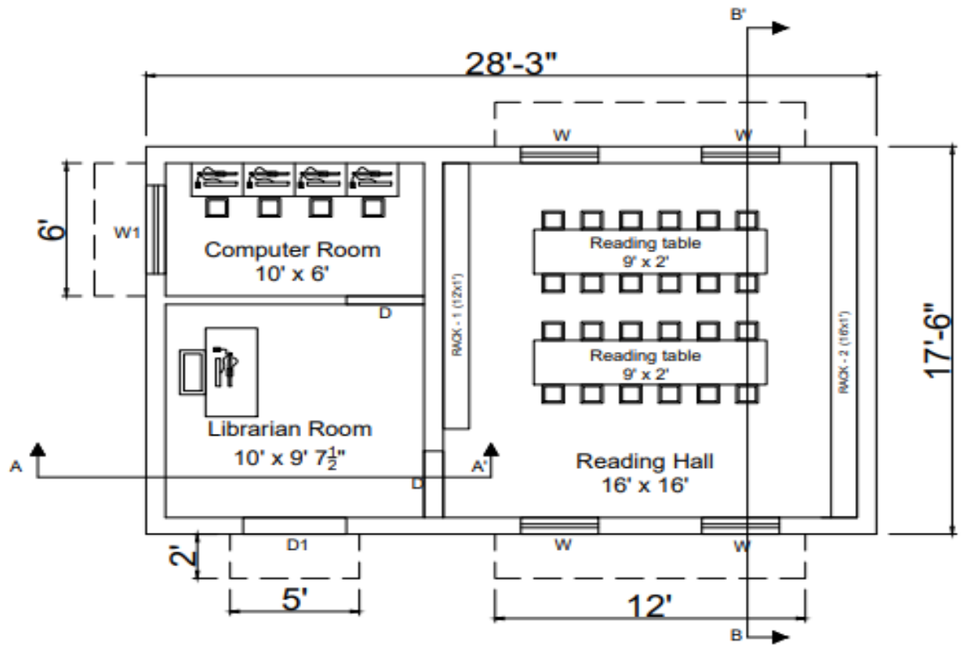
ELEVATION



SECTION A-A'



SECTION B-B'



PLAN

OPENING TABLE

D	3'.0" X 7'.0"
D1	5'.0" X 7'.0"
W	3'.0" X 4'.0"
W1	4'.0" X 4'.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) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL
   :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN
   :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 8"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.

DESIGN PROPOSAL FOR LIBRARY

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	LIBRARY
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

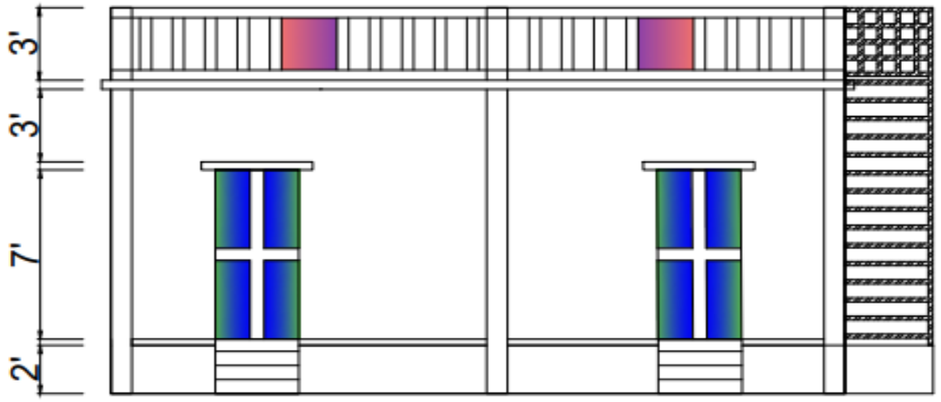
8.6 Design proposal for Public toilet with plan, elevation, section and costing

- A public toilet is a room or small building with toilets (or urinals) and sinks that does not belong to a particular household.
- The toilet is available for use by the general public, customers, travellers, employees of a business, school pupils, prisoners etc.
- Public toilets are commonly separated into male and female facilities, although some are unisex, especially for small or single-occupancy public toilets.
- As an "away-from-home" toilet room, a public toilet can provide far more than access to the toilet for urination and defecation. People also wash their hands, use the mirrors for grooming, get drinking water (e.g., refilling water bottles), attend to menstrual hygiene needs, and use the waste bins.
- 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. By letting people get out of their cars and onto their feet, bicycles and mass transit, public toilets can contribute to improved environmental health. Mental well-being is enhanced when people are out with families and friends and know a place "to go" is available.
- 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.
- The proposed toilet to be constructed in the main village near the community hall.
- Here, we give Drawings and Abstract sheet of public toilet and the cost of the toilet is approx. 5.08 lakhs.

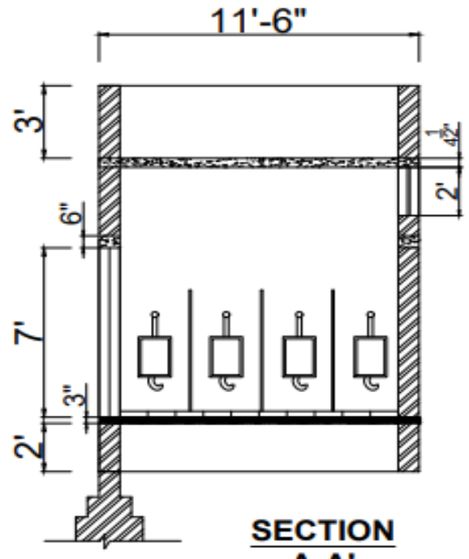
Table 12 Abstract sheet of Public toilet

Project : Public toilet					
ABSTRACT SHEET					
No	**Item**	**Quantity**	**Rate (rs)**	**Per cft**	**Amount (rs)**
1	**Earthwork**				
	A) Excavation	1,043.25	7	cft	7,302.75
	B) Soil filling in trench	679.27	4	cft	2,717.07
	C) soil filling in plinth	245.00	4	cft	980.00
				Total	**10,999.82**
2	**Metal & PCC**				
	A) Rubble soiling	195.61	32.16	cft	6,290.80
	B) P.C.C. Foundation (1:4:8)	130.41	85.97	cft	11,211.03
	C) PCC at floor (1:4:8:)	80.85	78	cft	6,306.30
				Total	**23,808.12**
3	**Brick masonry up to plinth (1:6)**				
	A)up to plinth	521.31	68.26	cft	35,584.62
	B)up to slab	574.08	68.26	cft	39,186.57
				Total	**74,771.20**
4	**R.C.C Work (1:2:(2+1))**				
	A) Coping	31.03	121.74	cft	3,777.74
	B) Plinth beam	17.81	121.74	cft	2,168.49
	C) G.F Sill	26.69	121.74	cft	3,248.94
	D) G.F Lintel	1.00	121.74	cft	121.74
	E) G.F Chhajja	101.25	121.74	cft	12,326.18
	F) G.F Beams	62.06	121.74	cft	7,555.49
	G) G.F Slab	235.13	121.74	cft	28,624.12
	Total	474.97		**Total**	**57,822.70**
5	**Plaster Work (12 mm, 1:4)**				
A	Inside Ceiling	245	24.78	sft	6,071.10
B	Inside Wall	1360	24.78	sft	33,700.80
D	Outside Wall	890.00	24.78	sft	22,054.20
E	Inside Parapet Plaster	130.00	24.78	sft	3,221.40
				Total	**65,047.50**

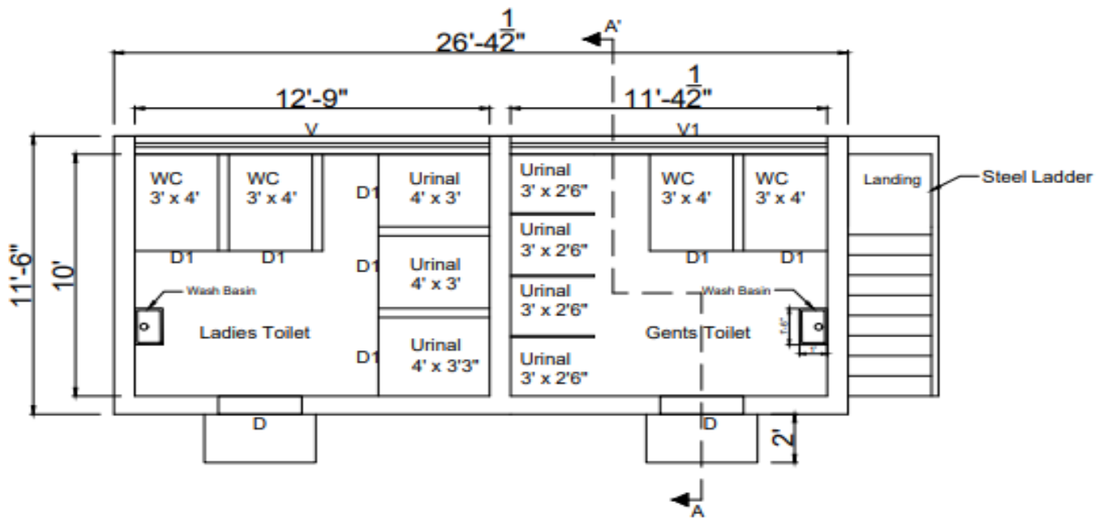
6	**Colour**				
A	Inside Wall	1360	25.00	sft	34,000.00
B	Outside Wall	890.00	25.00	sft	22,250.00
C	Inside parapet	130.00	25.00	sft	3,250.00
D	Inside ceiling	245.00	25.00	sft	6,125.00
				Total	**65,625.00**
7	**Flooring**				
A	tiles	245.00	100.00	sft	24,500.00
B	walls	300	100.00	sft	30,000.00
				Total	**54,500.00**
8	**Sanitation**			**Total**	**50,000.00**
9	**Electric**			**Total**	**25,000.00**
10	**Steel Ladder**				**80,000.00**
			TOTAL AMOUNT		**5,07,574.33**



ELEVATION



SECTION A-A'



PLAN

OPENING TABLE

D	3'.0" X 7'.0"
V	12'.9" X 2'.0"
V1	11'.4 1/2" 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) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 8"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.

DESIGN PROPOSAL FOR PUBLIC TOILET

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	PUBLIC TOILET
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

8.7 Design proposal of paver block with plan, elevation, section and costing

- Road construction requires the creation of an engineered continuous right-of-way or roadbed, overcoming geographic obstacles and having grades low enough to permit vehicle or foot travel and may be required to meet standards set by law or official guidelines. The process is often begun with the removal of earth and rock by digging or blasting, construction of embankments, bridges and tunnels, and removal of vegetation (this may involve deforestation) and followed by the laying of pavement material. A variety of road building equipment is employed in road building.
- After design, approval, planning, legal and environmental considerations have been addressed alignment of the road is set out by a surveyor. The radii and gradient are designed and staked out to best suit the natural ground levels and minimize the amount of cut and fill. Great care is taken to preserve reference Benchmarks.
- Roads are designed and built for primary use by vehicular and pedestrian traffic. Storm drainage and environmental considerations are a major concern. Erosion and sediment controls are constructed to prevent detrimental effects. Drainage lines are laid with sealed joints in the road easement with runoff coefficients and characteristics adequate for the land zoning and storm water system. Drainage systems must be capable of carrying the ultimate design flow from the upstream catchment with approval for the outfall from the appropriate authority to a watercourse, creek, river or the sea for drainage discharge.
- 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. Here we give the AutoCAD design of the road. The overall cost of this road is **5.21 lakh.**
- Calculation:

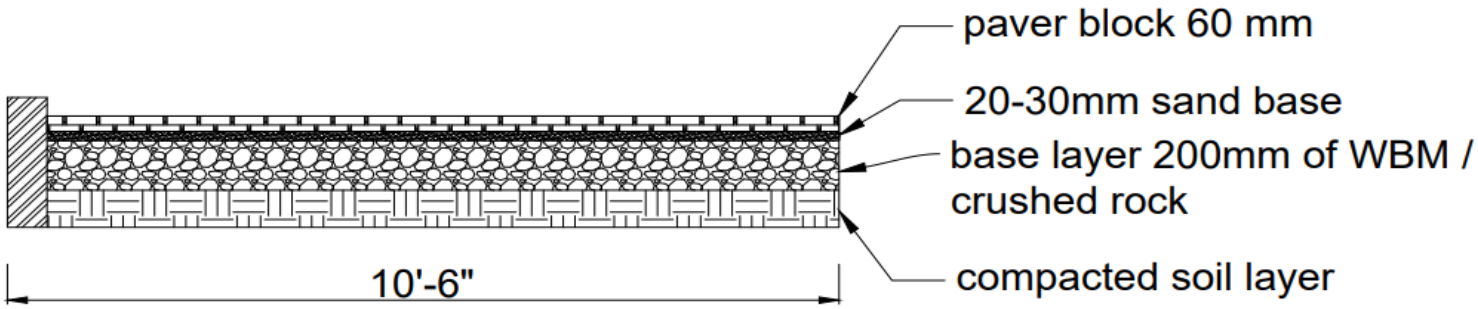
  The total length of the road is 316m and the width of the road 3m

  Thickness of the block = 60mm, The compressive strength of the block = 30N/mm^2

  Total area = L x B = 316 x 3 = 948 sqm.

  The Cost of fitting of 1 m2 paver block with material and labour charge is 550 Rs.

  Then, Total cost = area x cost of 1m2
  = 948 x 550
  = 5.21 lakhs.



C/S OF PAVER BLOCK ROAD

DESIGN PROPOSAL FOR PAVER BLOCK ROAD

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	PAVER BLOCK ROAD
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

8.8 Design proposal of primary school with plan, elevation, section and costing

- In most parts of the world, primary education is the first stage of compulsory education, and is normally available without charge, but may also be offered by fee-paying independent schools. The term grade school is sometimes used in the US, although this term may refer to both primary education and secondary education.
- The term primary school is derived from the French école primaries, which was first used in an English text in 1802. In the United Kingdom, "elementary education" was taught in "elementary schools" until 1944, when free elementary education was proposed for students over 11: there were to be primary elementary schools and secondary elementary schools. these became known as primary schools and secondary schools.
- Primary school is the preferred term in the United Kingdom, Ireland and many Commonwealth nations, and in most publications of the United Nations Educational, Scientific, and Cultural Organization (UNESCO).
- Elementary school is still preferred in some countries, especially in the United States and Canada.
- In some parts of the United States, "primary school" refers to a school covering kindergarten through to second grade or third grade (K through 2 or 3); the "elementary school" includes grade three through five or grades four to six. [citation needed] In Canada, "elementary school" almost everywhere refers to Grades 1 through 6; with Kindergarten being referred to as "preschool."

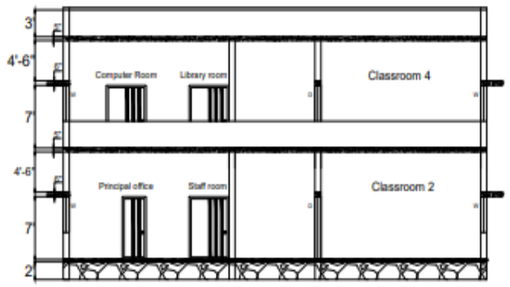
- In the village, there is a primary school which is in not good condition. At the existing building there are only three classes but only one class is usable other two classes are not in good condition.
- Due to its condition the students and teachers are facing many problems so, we decided to reconstruct 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.
- Here, we give Designs and Abstract sheet of the School building. The approximate cost of school is 23 lakhs.

Table 13 Abstract sheet of Primary School building

Project : Primary school Kasumbad						
ABSTRACT SHEET						
No	**Item**	**Quantity**	**Rate (rs)**	**Per cu,m**	**Amount (rs)**	
1	**Earthwork**					
	A) Excavation	290.47	100	cu.m	29,047.35	
	B) Soil filling in trench	206.52	40	cu.m	8,260.61	
	C) soil filling in plinth	91.35	40	cu.m	3,654.00	
				Total	**40,961.96**	
2	**Metal & PCC**					
	A) Rubble soiling	26.37	1100	cu.m	29,008.98	
	B) P.C.C. Foundation	27.14	3000	cu.m	81,409.50	
	C) PCC at floor	30.45	3000	cu.m	91,350.00	
				Total	**2,01,768.48**	
3	**Brick masonry up to plinth (1:6)**					
	A)up to plinth	12.94	1200	cu.m	15,525.00	
	B)up to slab	224.86	1500	cu.m	3,37,296.15	
				Total	**3,52,821.15**	
4	**R.C.C Work (1:2:(2+1))**					
	A) Footing	68.796	3500	cu.m	2,40,786.00	
	B) Column	39.447	3500	cu.m	1,38,064.50	
	C) Coping	4.31	3500	cu.m	15,093.75	
	D) Ground beam	17.25	3500	cu.m	60,375.00	
	E) Lintel	9.28	3500	cu.m	32,481.75	
	F) Beams	45.33	3500	cu.m	1,58,655.84	
	G) Slab	69.11	3500	cu.m	2,41,883.25	
	Total	253.53		**Total**	**8,87,340.09**	
5	**Plaster Work (12 mm, 1:4)**					
A	Inside Ceiling	460.73	120.00	sq.m	55,287.60	
B	Inside Wall	928.8	120.00	sq.m	1,11,456.00	
D	Outside Wall	419.85	120.00	sq.m	50,382.00	
E	Inside Parapet Plaster	78.30	120.00	sq.m	9,396.00	
				Total	**2,26,521.60**	

6	**Colour**					
A	Inside Wall	928.8	20.00	sq.m	18,576.00	
B	Outside Wall	419.85	20.00	sq.m	8,397.00	
C	Inside parapet	78.30	20.00	sq.m	1,566.00	
D	Inside ceiling	460.73	20.00	sq.m	9,214.60	
				Total	**37,753.60**	
7	**Flooring**					
A	tiles	460.73	450.00	sq.m	2,07,328.50	
B	Skirting	258	450.00	sq.m	1,16,100.00	
				Total	**3,23,428.50**	
8	**Sanitation**			**Total**	**1,00,000.00**	
9	**Electric**			**Total**	**1,00,000.00**	
				Total	**22,70,595.38**	
			SAY APPROX.		**23,00,000.00**	**Rs.**

Elevation



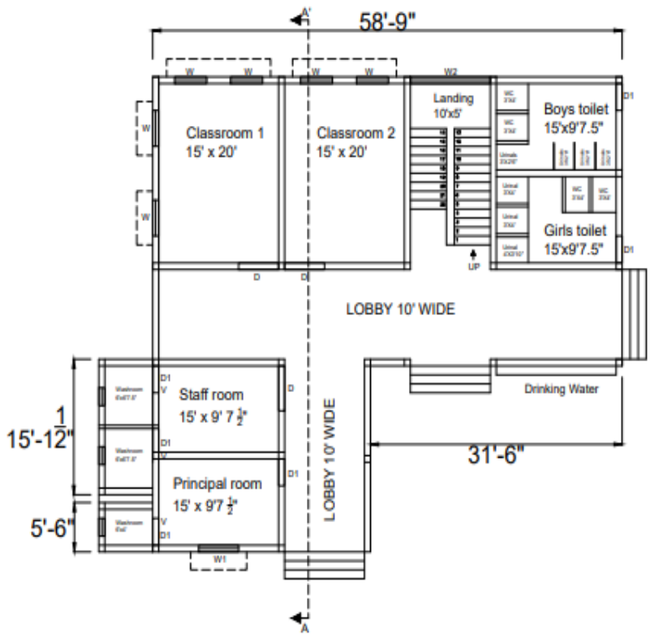
Section A-A'

OPENING TABLE

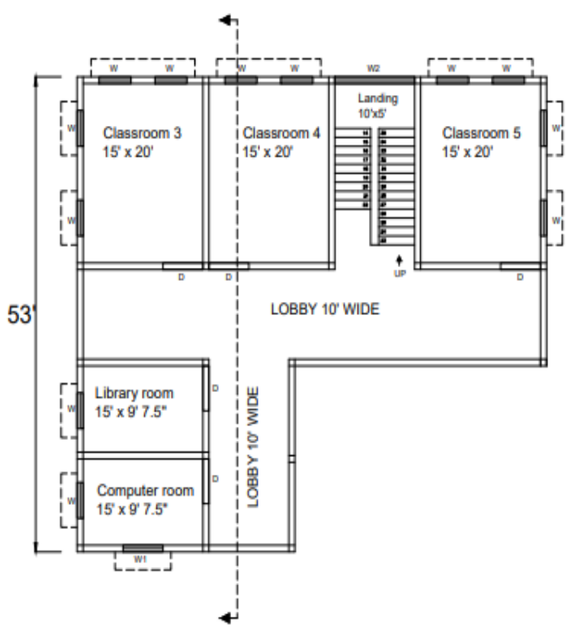
CLASSROOM	15'.0" X 20'.0"
LOBBY	10'.0" WIDE
D	5'.0" X 7'.0"
D1	3'.0" X 7'.0"
W	4'.0" X 4'.0"
W1	5'.0" X 4'.0"
W2	10'.0" X 12'.0"
V	2'.0" X 2'.0"

NOTES :-

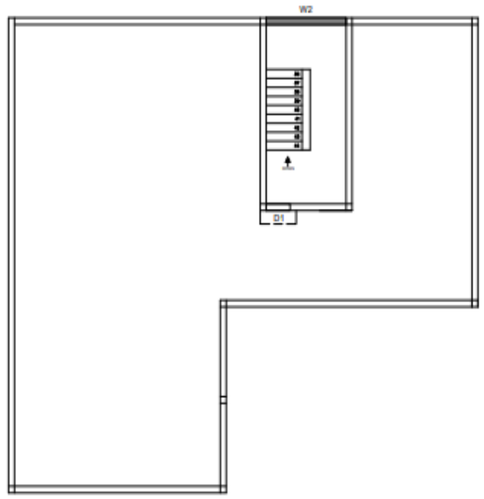
1) DO NOT SCALE THE DRG.ONLY WRITTEN DIMENSION SHALL BE FOLLOWED.
2) UNLESS OTHERWISE SPECIFIED ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE
3) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL
   :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN
   :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 8"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.



Ground floor plan



First floor plan



Terrace & Cabin

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	PRIMARY SCHOOL
GUIDED BY.	PROF. DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

DESIGN PROPOSAL FOR PRIMARY SCHOOL

8.9 Design proposal of the Public garden with plan, elevation, section and costing

- A garden is a planned space, usually outdoors, set aside for the display, cultivation, or enjoyment of plants and other forms of nature, as an ideal setting for social or solitary human life. The single feature identifying even the wildest wild garden is control. The garden can incorporate both natural and man-made materials.

- Garden design is the process of creating plans for the layout and planting of gardens and landscapes. Gardens may be designed by garden owners themselves, or by professionals. Professional garden designers tend to be trained in principles of design and horticulture, and have a knowledge and experience of using plants. Some professional garden designers are also landscape architects, a more formal level of training that usually requires an advanced degree and often a state license.

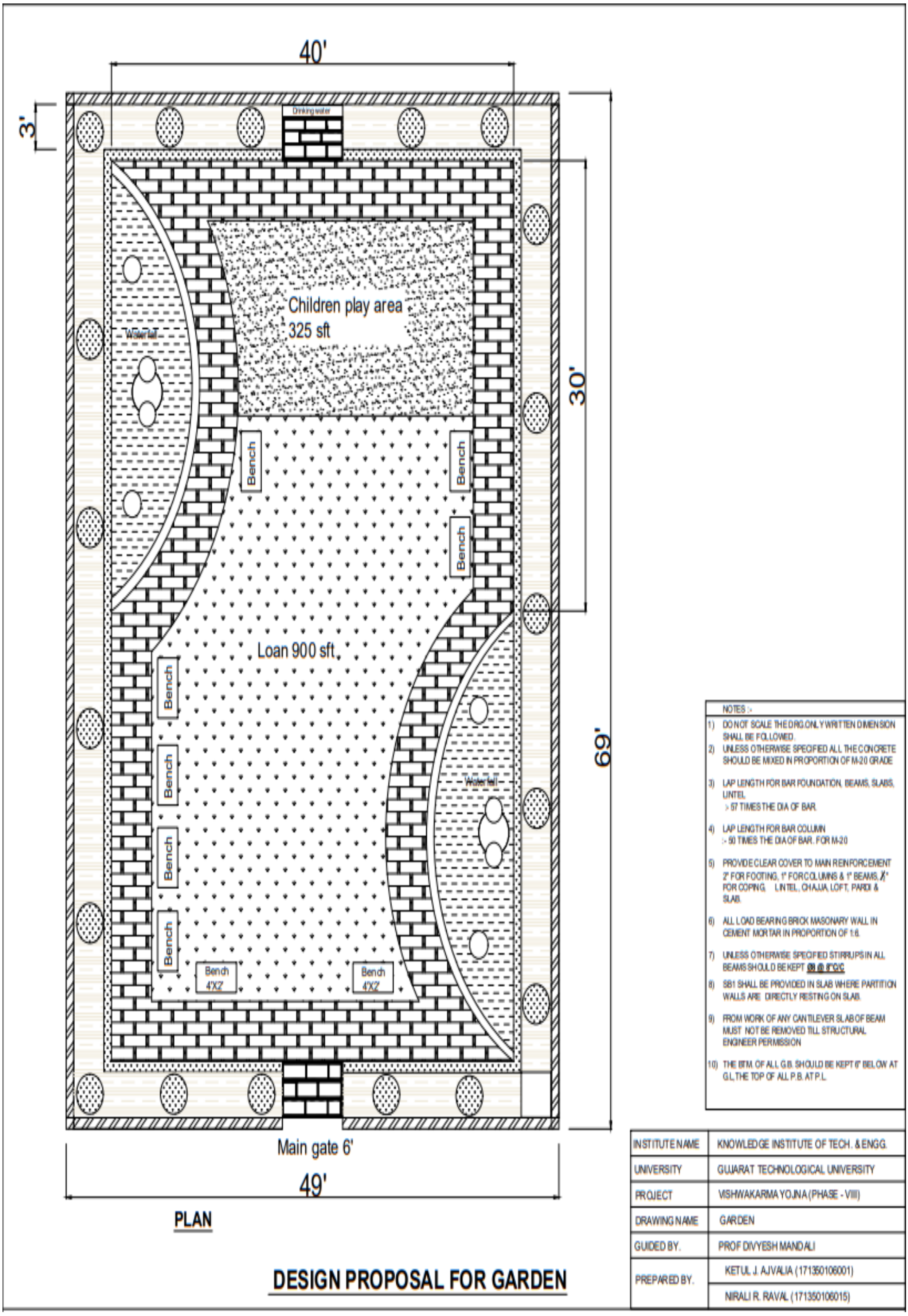
- Elements of garden design include the layout of hard landscape, such as paths, rockeries, walls, water features, sitting areas and decking, as well as the plants themselves, with consideration for their horticultural requirements, their season-to-season appearance, lifespan, growth habit, size, speed of growth, and combinations with other plants and landscape features. Most gardens consist of a mix of natural and constructed elements, although even very 'natural' gardens are always an inherently artificial creation. Natural elements present in a garden principally comprise flora (such as trees and weeds), fauna (such as arthropods and birds), soil, water, air and light. Constructed elements include paths, patios, decking, sculptures, drainage systems, lights and buildings (such as sheds, gazebos, pergolas and follies), but also living constructions such as flower beds, ponds and lawns.

- 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, setting arrangement, drinking water, waterfall and large area of loan.
- Here, we give Drawings and Abstract sheet of public garden.
- Approximate cost of public garden is 5.70 lakhs.

Table 14 Abstract sheet of Public Garden

Project : Garden					
ABSTRACT SHEET					
No	**Item**	**Quantity**	**Rate (rs)**	**Per cft**	**Amount (rs)**
1	**Earthwork**				
	A) Excavation	2,796.00	7	cft	19,572.00
	B) Soil filling in trench	1,268.96	4	cft	5,075.83
				Total	**24,647.83**
2	**PCC (1:4:8)**				
	A) P.C.C.	349.50	85.97	cft	30,046.52
				Total	**30,046.52**
3	**Brick masonry**				
	A) up to GL	1,094.33	68.26	cft	74,698.94
	B) above GL (1:6)	854.87	68.26	cft	58,353.08
				Total	**1,33,052.02**
4	**R.C.C Work (1:2:(2+1))**				
	A) Coping	79.21	121.74	cft	9,642.72
	B) Footing	48.72	121.74	cft	5,931.17
	C) Column	105.37	121.74	cft	12,827.44
	Total	233.30		**Total**	**28,401.33**
5	**Plaster Work (12 mm, 1:4)**				
A	Inside wall	1,344.00	24.78	sft	33,304.32
D	Outside Wall	1,380.00	24.78	sft	34,196.40
				Total	**67,500.72**
6	**Colour**				
A	Inside Wall	1,344.00	25.00	sft	33,600.00
B	Outside Wall	1,380.00	25.00	sft	34,500.00
				Total	**68,100.00**

7	**Fountain**	2	10000	Nos.	**20,000.00**
8	**Tree plantation**	30	50	Nos.	**1,500.00**
9	**Light pole with light**	21	5000	Nos.	**1,05,000.00**
10	**slides & Swings**	4	7000	Nos.	**28,000.00**
11	**Benches**	9	4500	Nos.	**40,500.00**
12	**paver block**				**21,660.00**
			Total amount		**5,68,408.42**



PLAN

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) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL
   :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN
   :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING. LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT @ @ 8"C/C
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L THE TOP OF ALL P.B. AT P.L

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	GARDEN
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

DESIGN PROPOSAL FOR GARDEN

8.10 Design of Rain water recharging with plan, elevation, section and costing

Rainwater harvesting (RWH) is the collection and storage of rain, rather than allowing it to run off. Rainwater is collected from a roof-like surface and redirected to a tank, cistern, deep pit (well, shaft, or borehole), aquifer, or a reservoir with percolation. Dew and fog can also be collected with nets or other tools.

Rainwater harvesting differs from stormwater harvesting as the runoff is collected from roofs, rather than creeks, drains, roads, or any other land surfaces. Its uses include watering gardens, livestock, irrigation, domestic use with proper treatment, and domestic heating. The harvested water can also be committed to longer-term storage or groundwater recharge.

Rainwater harvesting is one of the simplest and oldest methods of self-supply of water for households, and residential and household-scale projects, usually financed by the user. However, larger systems for schools, hospitals, and other facilities can run up costs only able to be financed by owners, organizations, and governmental units.

Rainwater harvesting is the storing of rainwater during the monsoon season for the purpose of using it during periods of water scarcity. Rainwater harvesting is best described 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.

So, we decided to give a design proposal for rain water recharge for the bore and the collection of rain water from the primary school building. Approximate cost of rainwater recharging is about **35,000** Rs.

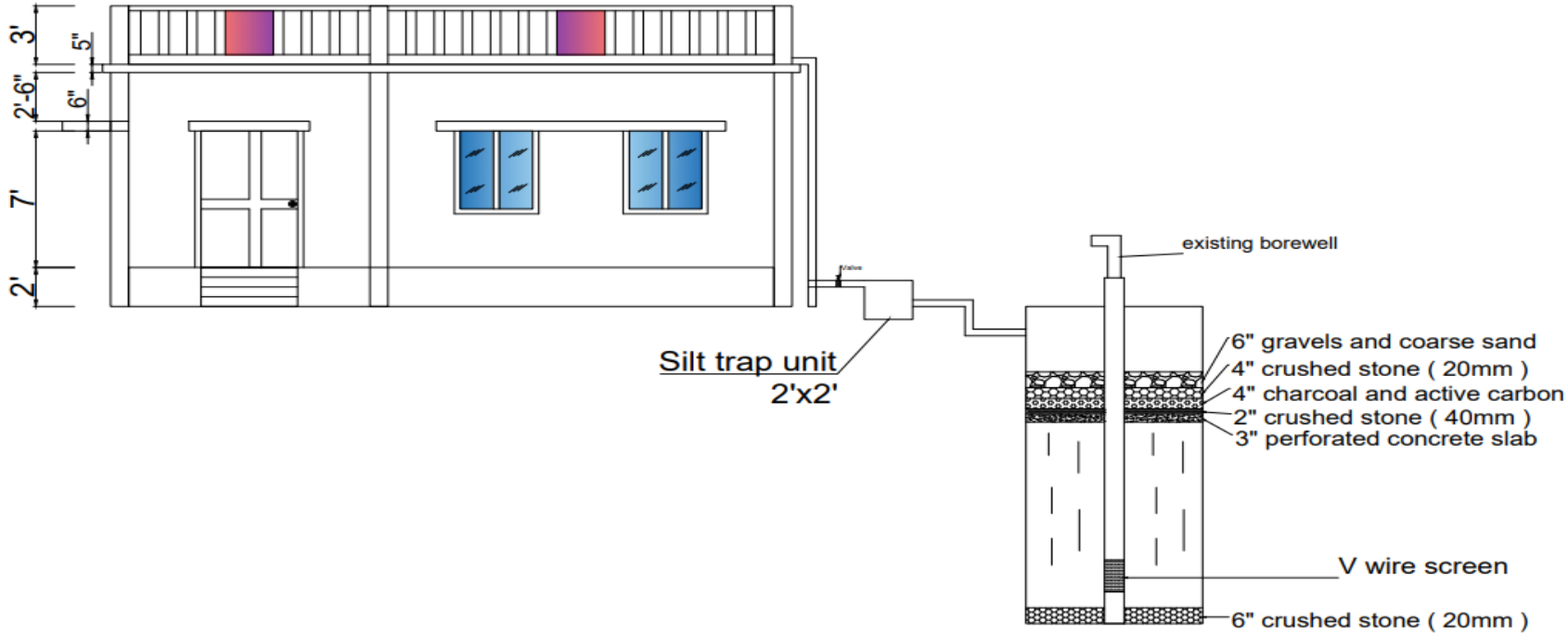
Tamil Nadu was the first state to make rainwater harvesting compulsory for every building to avoid groundwater depletion. The project was launched in 2001 and has been implemented in all rural areas of Tamil Nadu. Posters all over Tamil Nadu including rural areas create awareness about harvesting rainwater. TN Govt site. It gave excellent results within five years, and slowly every state took it as a role model. Since its implementation, Chennai had a 50% rise in water level in five years and the water quality significantly improved.

- Area of the catchment (A) = 2,295 sq.ft.
- Average annual rainfall of Anand district (1990 – 2019) (R) = 773 mm (2.54 ft)
- Runoff coefficient = 0.85
- Calculate the maximum amount of rainfall that can be harvested from the rooftop:

  Annual water harvesting potential = 2,295 x 2.54 x 0.85

  = 4,955 cu.ft. (1cu.ft = 28.32 liters)

  = **1,40,325 liters.**



DESIGN PROPOSAL FOR RAINWATER HARVESTING

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	RAIN WATER HARVESTING
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

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

There is wide scope of development in Kasumbad village. The present condition according to development is not good even it is not starting yet. The village has the population of 3056 and total numbers of households are 668 according to census 2011. The village is located in Borsad taluka, Anand district. The village is 10km far from the borsad city and 14km from Anand city. The villagers are visits to cities for the buying household things. The villagers are live in kuccha house. There are 70% houses are kuccha. The village has bitumen road which is connected to the nearby villages and the internal roads of the villages are of R.C.C. The village has a good and pure drinking water facilities. The village has the overhead water tank which stores **1 lakh** litre and also had a small overhead tank with the capacity of 50 thousand litre. The drinking water is provided to door to door by the pipelines. So, the village has the only drinking facilities, road facilities, education facilities and irrigation facilities. Some other facilities which is very important to the villagers like Health facilities, Waste management facilities, recreational facilities, higher education facilities, Training centres are not available in the village. So, for the development of the village we gave many proposals that are divided in to two parts.

In the part-I,

- First, we design the Primary school for the Educational purpose. The existing building of the school is in worst condition. Due to its condition the students are not study comfortably even some students are not arriving to the school So, we decide to design the school. The school has the big and well-ventilated classrooms with the capacity of 40 students. And there are 5 classrooms, principal's office, staff room, computer room, library etc. the school is design according to the Indian standard code IS:8827-1978 and the approximate cost of school is 23 lakhs.

- Second, we design the public toilet for the hygiene of the village. 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. The proposed toilet to be constructed in the main village near the community hall. we gave the AutoCAD design and the cost of the toilet is approximate 5.08 lakhs.

- Over third design was library. We design a library for the educational purpose. The library can used by every villager and the readers who are fond of reading & wants to improve their knowledge also for students. in that, we provide a large reading hall, number of book shelves and also a computer room for reading e-books. we give AutoCAD of Public library and the cost of the library is approx. 4.83 lakhs.

- Over fourth design was Garden. We design the garden for the recreational purpose. 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, setting arrangement, drinking water, waterfall and large area of loan. The Approximate cost of public garden is 5.70 lakhs.

- Over fifth design was the block pavement in the streets. 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. Here we give the AutoCAD design of the road. The overall cost of this road is 5.21 lakh.

- Over sixth design was the borewell recharging. Rainwater harvesting is the storing of rainwater during the monsoon season for the purpose of using it during periods of water scarcity. Rainwater harvesting is best described 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. we decided to give a design proposal for borewell recharging in the school building. The approximate cost of rainwater recharging is about 35,000 Rs.

In the future part-II,

we want to provide the various facilities like,

- Bus stop
- Development of pond,
- Primary health centre,
- Community hall,
- Public water tap,
- Aanganwadi,
- Post office,
- Cremation ground etc.

for the development of village, also we want to provide various facilities like Solid Waste Management, Secondary School, Garmin Bank, Internet Cafe, WI-FI, Bank, ATM, etc. for the upliftment of villagers and village. We give our efforts for literacy & better infra-structure for village to make a developed village.

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

In this project we surveyed out the smart and ideal village. After carried out physical survey, we compare 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 Kasumbad. We met the sarpanch and finalize the remaining amenities which are fulfil basic need of village based on the priority. We design some of facilities and find out the cost of each projects.

First, we design the Primary school for the Educational purpose. The existing building of the school is in worst condition. Due to its condition the students are not study comfortably even some students are not arriving to the school So, we decide to design the school. The school has the big and well-ventilated classrooms with the capacity of 40 students. And there are 5 classrooms, principal's office, staff room, computer room, library etc. the school is design according to the Indian standard code IS:8827-1978 and the approximate cost of school is 23 lakhs.

Second, we design the public toilet for the hygiene of the village. 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. The proposed toilet to be constructed in the main village near the community hall. we gave the AutoCAD design and the cost of the toilet is approximate 5.08 lakhs.

Over third design was library. We design a library for the educational purpose. The library can used by every villager and the readers who are fond of reading & wants to improve their knowledge also for students. in that, we provide a large reading hall, number of book shelves and also a computer room for reading e-books. we give AutoCAD of Public library and the cost of the library is approx. 4.83 lakhs.

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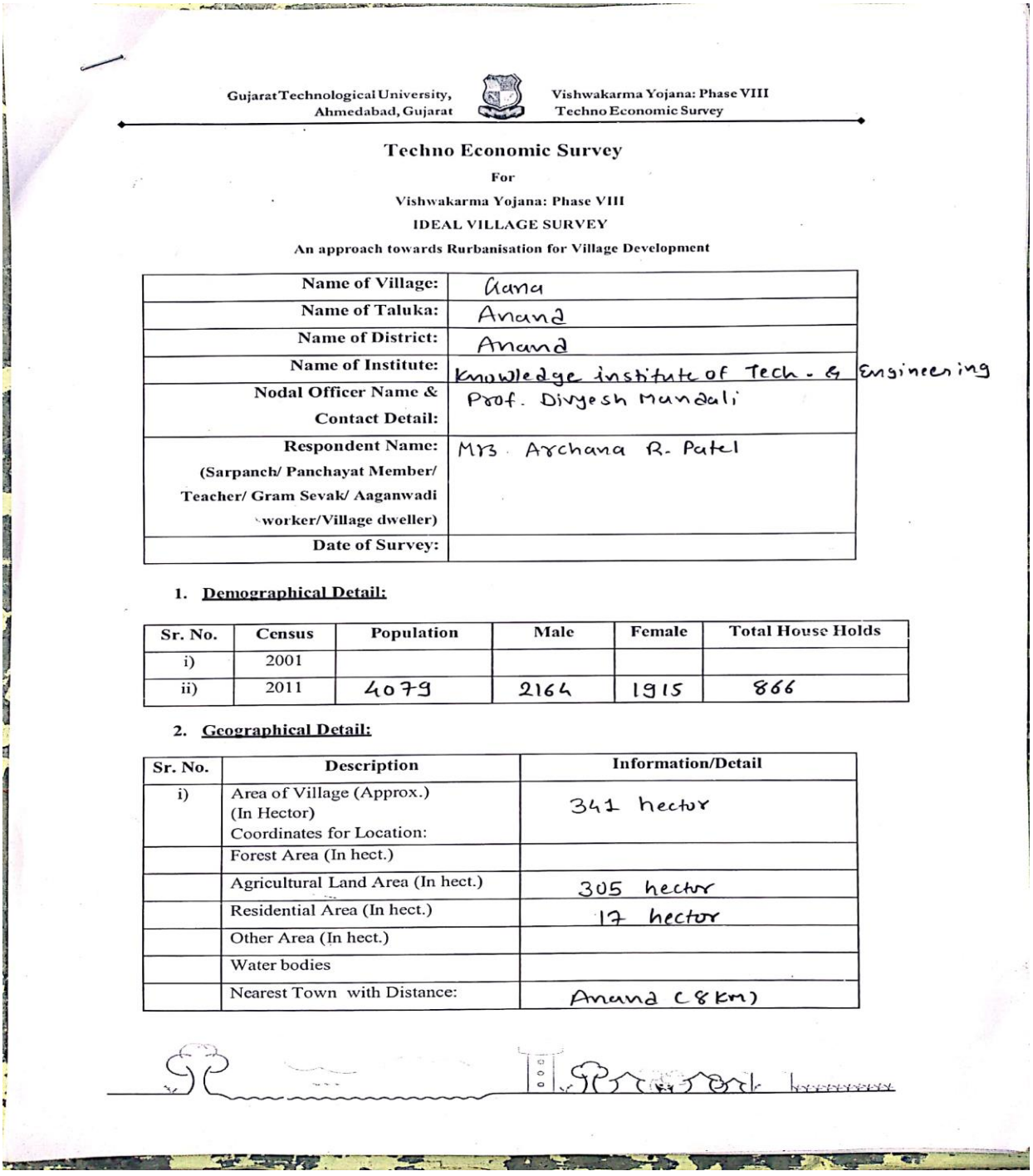
All designed are carried out the overall development of the village which over physical infrastructure facilities, social infrastructure and socio-cultural infrastructure facilities. A point is considered while designing all amenities.

Chapter: 11 References refereed for this project

1. Census department, Ministry of Home Affairs, Govt. of India, www.censusindia.gov.in
2. UDPFI Guidelines, Ministry of Urban Development
3. Rural development scheme of Govt. of Gujarat
4. Village information from www.onefivenine.com
5. IRC: SP-63-2004 for block pavement design
6. IS:8827-1978 for primary school design
7. IS:1553-1989 for public library design
8. IS:456-2000 for R.C.C structure design
9. Dr. H.J.Shah, Reinforced concrete, volume 1
10. Prof. B.N.Dutta, Estimating and costing in civil engineering, 28th edition
11. https://pmaymis.gov.in/
12. http://www.vyojana.gtu.ac.in/

Chapter: 12 Annexure attachment

12.1 Scanned copy of ideal village survey form



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Techno Economic Survey

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For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

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

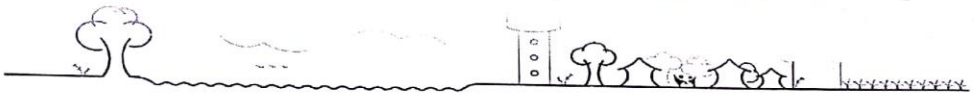
Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	341 hector
	Forest Area (In hect.)	
	Agricultural Land Area (In hect.)	305 hector
	Residential Area (In hect.)	17 hector
	Other Area (In hect.)	
	Water bodies	
	Nearest Town with Distance:	Anand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

3. Occupational Details:

Name of Three Major Occupation groups in Village	1. Aghiculture 2. Business 3. Job

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: 50k Liter	✓		3 nos.
	Underground Sump	Capacity:			
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	Yes	✓		
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ ~~Open~~	Yes	✓		Closed drainage
	If Open than Pucca / Kutchcha				
	Whether drain water is discharged directly in to Water bodies/ Sewer plants	Yes	✓		Sewer Plants
Suggestions if any:					



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

E.	**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.	NH (8 km)			
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No			Karamsad (2.5 km)
	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:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes	✓		more than 6hrs.
	Power supply for Domestic Use	Yes	✓		MGVCL
	Power supply for Agricultural Use	Yes	✓		
	Power supply for Commercial Use	Yes	✓		
	Road/ Street Lights	Yes	✓		

	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			
	Community Toilet (With bath/ without bath facilities)	Yes	✓		
	Solid & liquid waste Disposal system available	Yes	✓		
	Any facility for Waste collection from road	Yes	✓		Collection by 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% Kutchha			

5. Social Infrastructural Facilities:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks

K.	**Health Facilities:**				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	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: .....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 nos
	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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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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

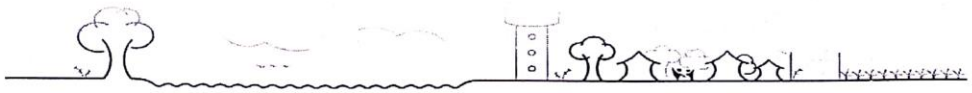
	General Market	No			
	Shops (Public Distribution System)	Yes	✓		
	Panchayat Building	Yes	✓		
	Pharmacy/Medical Shop	Yes	✓		
	Bank & ATM Facility	Yes	✓		
	Agriculture Co-operative Society	No			
	Milk Co-operative Soc.	Yes	✓		
	Small Scale Industries	Yes	✓		
	Internet Cafes/ Common Service Center/Wi Fi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

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**

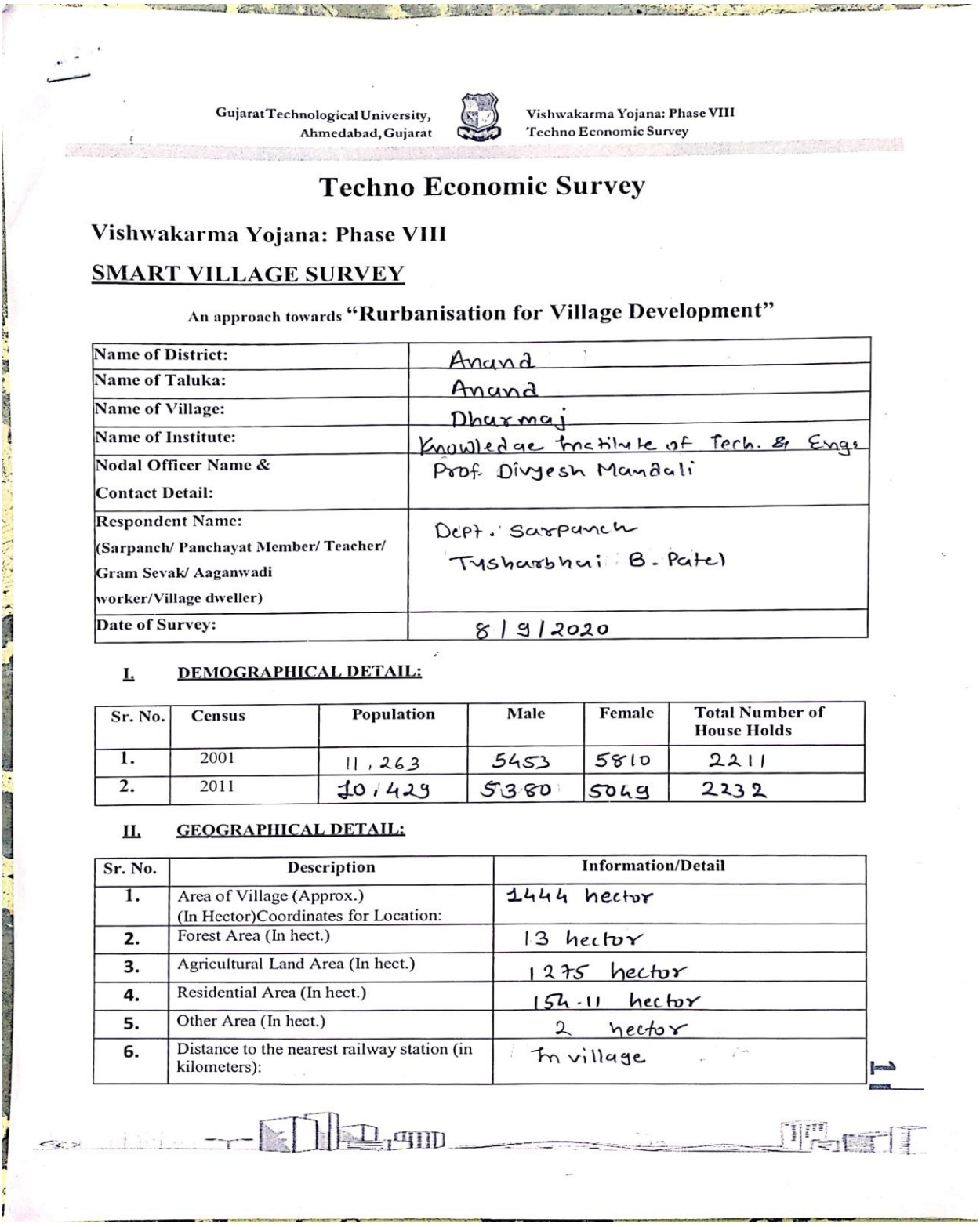
Sr. No.	Descriptions	Information/ Detail	Remarks
1.			

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 Scanned copy of Smart village survey form



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Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

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

Name of District:	Anand
Name of Taluka:	Anand
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)	Dept. 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	11,263	5453	5810	2211
2.	2011	10,429	5380	5049	2232

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	1444 hector
2.	Forest Area (In hect.)	13 hector
3.	Agricultural Land Area (In hect.)	1275 hector
4.	Residential Area (In hect.)	154.11 hector
5.	Other Area (In hect.)	2 hector
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.	Business
	2.	Job
	3.	Agricultural

Major crops grown in the village:	1.	Tobacco
	2.	Wheat, rice
	3.	Vegetable

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	✓		RO 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 channel	✓		
	Bottled Water Hand Pump				
	Other(Specify)**Lake/ Pond**	Pond	✓		

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Suggestions if any:						
B.	**Water Tank Facility**					
	Overhead Tank	Capacity:	✓		3nos. (1 lakh capacity)	
	Underground Sump	Capacity:				
Suggestions if any:						
C.	**The Type of Drainage Facility**					
	A. UNDERGROUND DRAINAGE 1 closed 2 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	RCC	✓			
	Internal streets	RCC	✓			
	Nearest NH/SH/MDR/ODR Dist. in kms.	MDR 1 km				
Suggestions if any:						
E.	**Transport Facility**					
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	Yes	✓		1.4 km	
	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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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Power supply for Domestic Use	Yes	✓		24 hrs.
	Power supply for Agricultural Use	Yes	✓		8 hrs.
	Power supply for Commercial Use	Yes	✓		24 hrs.
	Road/ Street Lights	Yes	✓		
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	✓		
	Renewable Energy Source Facilities (Y/ N)	Yes	✓		Solar street light
	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)	90% Pucca			

4

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	Yes	✓		7 nos.
	Sub-Centre	No			
	PHC	Yes	✓		1 nos.
	BLOCK PHC	No			
	CHC/RH	Yes	✓		1 nos.
	District/ Govt. Hospital	Yes	✓		1 nos.
	Govt. Dispensary	No			
	Private Clinic	Yes	✓		2 nos.
	Private Hospital/ Nursing Home	Yes	✓		1 nos.
	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	✓		
	Primary School	Yes	✓		
	Secondary school	Yes	✓		
	Higher sec. School	Yes	✓		
	ITI college/ vocational Training Center	Yes	✓		
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	Polytechnic Engineering Pharmacy			Ipcowala Institute
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				

5

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Suggestions if any:

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

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

9

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Credit Cooperative Society Agricultural Cooperative Society Milk Cooperative Society Fishermen's Cooperative Society Computer Kiosk/ e-chaupal / Mills / Small Scale Industries	1	Village	✓	
	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	Working		✓	
	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)	Working		✓	
	12. Rajiv Gandhi National Drinking Water Mission				
	13. Swarnjayanti Gram Swarozgar Yojana	Working		✓	
	14. Minimum Needs Programme (MNP)				
	15. National Rural Employment Programme				
	16. Employee Guarantee Scheme (EGS)				
	17. Prime Minister Rojgar Yojana (PMRY)				
	18. Jawahar Rozgar Yojana (JRY)				
	19. Indira Awas Yaojna (IAY)			✓	
	20. Samagra Awas Yojana (SAY)				
	21. Sanjay Gandhi Niradhar Yojana (SGNY)				
	22. Jawahar Gram Samridhi Yojana (JGSY)				
	23. Other (SPECIFY)				

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	Solar System	✓		
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 copy
2.	Recent Projects going on for Development of Village				
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

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 ?		

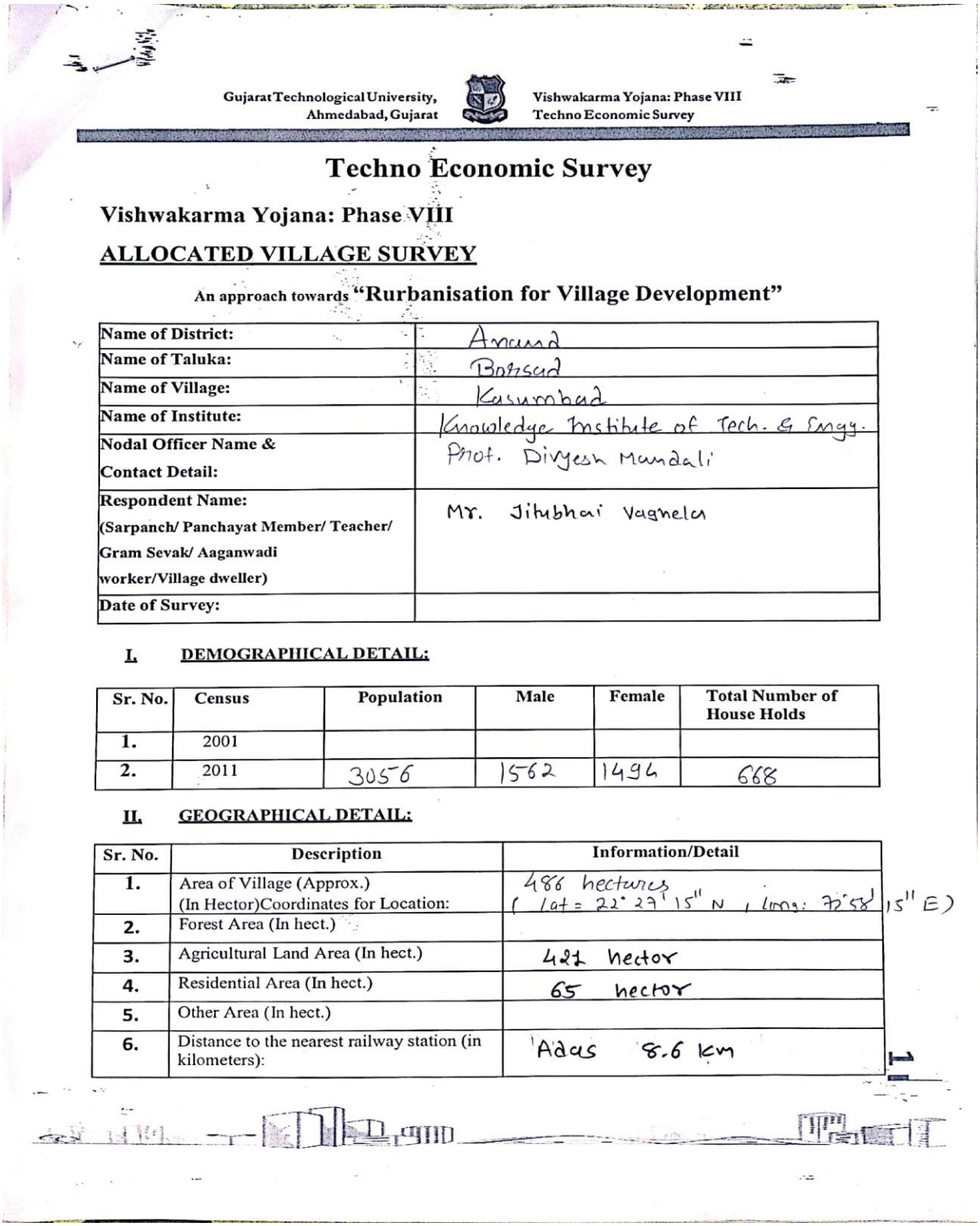
Note: Photographs/ Video/ Drawings of all existing Infrastructure facilities & conditions should be taken by students of respective villages for their record and information.

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

12.3 Scanned copy of Allocated village survey form



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

Name of District:	Anand
Name of Taluka:	Borsad
Name of Village:	Kasumbad
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)	Mr. Jitubhai Vaghela
Date of Survey:	

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001				
2.	2011	3056	1562	1494	668

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	486 hectures (Lat = 22° 27' 15" N, Long: 72°58' 15" E)
2.	Forest Area (In hect.)	
3.	Agricultural Land Area (In hect.)	421 hector
4.	Residential Area (In hect.)	65 hector
5.	Other Area (In hect.)	
6.	Distance to the nearest railway station (in kilometers):	Adas 8.6 km

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

7.	Name of Nearest Town with Distance:	Borsad 10km ✓
8.	Distance to the nearest bus station (in kilometers):	Khadol 3 km
9.	Whether village is connected to all road for the any facility or town or City?	Yes

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1.	Agricultural
	2.	Business
	3.	Job

Major crops grown in the village:	1.	Musa (Banana)
	2.	Tobacco
	3.	Bujara

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	Piped to Plot			Supplied from overhead tank
2.	**DUG WELL** Protected Well Un Protected Well		NO		Not in working condition
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 Bottled Water Hand Pump	Irrigation Channel	✓		

2

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Vishwakarma Yojana: Phase VIII
Techno-Economic Survey

	Other(Specify)Lake/ Pond	Total 12 nos.			4 watered
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	1 lakh	litters	Adequate
	Underground Sump	Capacity:	–		
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1	closed	✓		
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	bitumin	✓		
	Main road	RCC	✓		
	Internal streets	Blocks	✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.	Vasad (SH)	✓		
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No			Adas 8 km
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	No			Khadol 3km
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes			Auto / chhakda Private vehicles
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	MGVCL	✓		More than 6 hrs.

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Power supply for Domestic Use	MGVCL	✓		24 hrs.
	Power supply for Agricultural Use	MGVCL	✓		8 hrs. Daily
	Power supply for Commercial Use	MGVCL	✓		
	Road/ Street Lights	MGVCL	✓		
	Electrification in Government Buildings/ Schools/ Hospitals	MGVCL	✓		
	Renewable Energy Source Facilities (Y/ N)	No			
	LED Facilities	Yes			LED street light

Suggestions if any:

G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	2 nos			
	Location Condition				Needs Renovation
	Community Toilet (With bath/ without bath facilities)	No			
	Solid & liquid waste Disposal system available	No			
	Any facility for Waste collection from road	No			

Suggestions if any:

H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL. OTHER (SPECIFY)	Canal and Tubewell			

Suggestions if any:

I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	60% Pucca			

4

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	4nos	✓		
	Sub-Centre				
	PHC	1.			under construction
	BLOCK PHC				
	CHC/RH				
	District/ Govt. Hospital				
	Govt. Dispensary				
	Private Clinic				
	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	4nos	✓		
	Primary School	2			both needs renovation
	Secondary school	No			
	Higher sec. School	No			
	ITI college/ vocational Training Center	No			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	No			

5

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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

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

	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	working	village	✓	
	7. Intergrated Child Development Scheme (ICDS)				
	8. Mahila Mandal Protsahan Yojana (MMPY)	working	village	✓	
	9. National Food for work Programme (NFFWP)				
	10. National Social Assistance Programme				
	11. Sanitation Programme (SP)				
	12. Rajiv Gandhi National Drinking Water Mission				
	13. Swarnjayanti Gram Swarozgar Yojana				
	14. Minimum Needs Programme (MNP)				
	15. National Rural Employment Programme				
	16. Employee Guarantee Scheme (EGS)				
	17. Prime Minister Rojgar Yojana (PMRY)				
	18. Jawahar Rozgar Yojana (JRY)				
	19. Indira Awas Yaojna (IAY)				
	20. Samagra Awas Yojana (SAY)				
	21. Sanjay Gandhi Niradhar Yojana (SGNY)				
	22. Jawahar Gram Samridhi Yojana (JGSY)				
	23. Other (SPECIFY)				

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	No			Not available
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 copy recieved
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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Vishwakarma Yojana: Phase VIII
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	✓	
2.	Additional Information/ Requirement		
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?	happens on festival or any occation	

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

સરપંચ
ગ્રામ પંચાયત કસુંબાડ
તા.બોરસદ જી.આણંદ

12.4 Gap Analysis of the Allocated Village

Table 15 GAP Analysis

Facilities	Planning Commission/UDPFI Norms	Village Name:	Kasumbad (Anand)	
		Population:		3056
		Existing	Required as per Norms	Gap
Social Infrastructure Facilities				
Education				
Anganwadi	Each or Per 2500 population	4	2	**2**
Primary School	Each or Per 2500 population	2	1	**1**
Secondary School	Per 7,500 population	0	0	**0**
Higher Secondary School	Per 15,000 Population	0	0	**0**
College	Per 125,000 Population	0	0	**0**
Tech. Training Institute	Per 100000 Population	0	0	**0**
Agriculture Research Centre	Per 100000 Population	0	0	**0**
Health Facility				
Govt/Panchayat Dispensary or Sub PHC or Health Centre	Each Village	0	1	**1**
CHC	Per 20,000 population	0	0	**0**
Child Welfare and Maternity Home	Per 10,000 population	0	0	**0**
Hospital	Per 1,00,000 Population	0	0	**0**
Public Latrines	1 for 50 families (if toilet is not there in home, especially for slum pockets &kutcha house)	0	1	**1**

Socio- Cultural Infrastructure facilities				
Community Hall	Per 10000 Population	1	0	**1**
Community hall cum Public Library	Per 15000 Population	0	0	**0**
Cremation Ground	Per 20,000 population	0	0	**0**
Post Office	Per 10,000 population	0	0	**0**
Grampanchayat building	Each individual/group panchayat	1	0	**-1**
Agriculture Produce Market Committee	Per 100000 Population	0	0	**0**
Fire Station	Per 100000 Population	0	0	**0**
Public Garden	Per village	0	0	**0**

Physical Infrastructure Facilities				
Transportation		**Adequate**	**Inadequate**	
Pucca Village Approach Road	Each village	Y		Adequate
Bus/Auto Stand provision	All Villages connected by PT (ST Bus or Auto)		Y	Inadequate
Drinking Water (Minimum 70 lpcd)				
Over Head Tank	1/3 of Total Demand	Y		Adequate
U/G Sump	2/3 of Total Demand		Y	Inadequate
Drainage Network				
Open		Y		10% Open
Cover		Y		90% Close
Waste Management System			Y	Inadequate
Electricity Network		Y		Adequate

12.5 Summary Details of All the Villages Designs in Table form as Part-I

Table 16 Kasumbad village design summary

Kasumbad Village	
1. Public Library	❖ The 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. ❖ The cost of the library is approx. 4.83 lakhs.
2. Public Toilet	❖ 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. ❖ The cost of the toilet is approx. 5.08 lakhs.
3. Paver block	❖ 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. The total length of road is 316m. ❖ The overall cost of this road is 5.21 lakh.
4. 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.

5. 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.
6. 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.

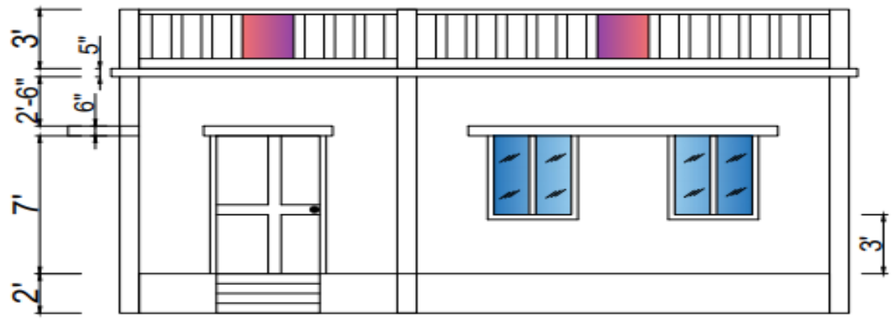
Pamol Village	
1. Aanganwadi	❖ In our allocated village there are two Anganwadi but it was far away. So, the little children had trouble in going. The space provided was less than the number of children present there. So, we decided to build an Anganwadi. ❖ Plan of Anganwadi is 9.75m x 3.81m (32'x12'6") and its approximate cost of public latrine block cost is about 2.36 lakh.
2. Public Health Centre	❖ 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 centre, for basic medical treatment. ❖ Public health centre having area 11.13m x 10.3m and its approximate cost of the P.H.C. centre is 5,14,800 INR.
3. 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. ❖ 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.
4. Public Garden	❖ In our village there is no recreational facilities are available so, we decided to give proposal of Garden. ❖ 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.
5. 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.
6. 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.

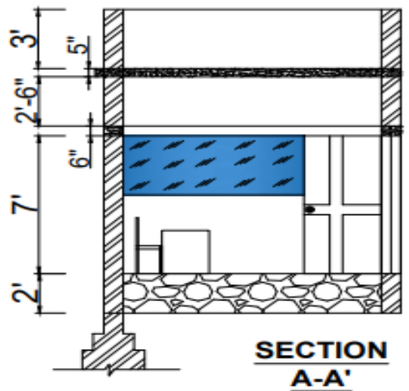
Dahemi Village	
1. Market Yard	❖ In our allocated village there is no market yard and villagers are using panchayat land for their kuccha shops. So, we designed a market yard on that land to replace kuccha shops with proper shops of 54'-6" x 21'-6" having 5 shops. Its estimated construction cost is Rs. 13,96,774/-.
2. 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/-
3. 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/-.
4. 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 /-.
5. 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/-.
6. 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/-

12.6 Drawings in A3 sheet

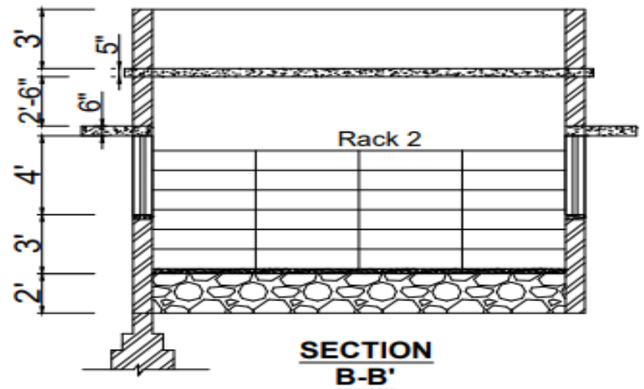
12.6.1 Public Library



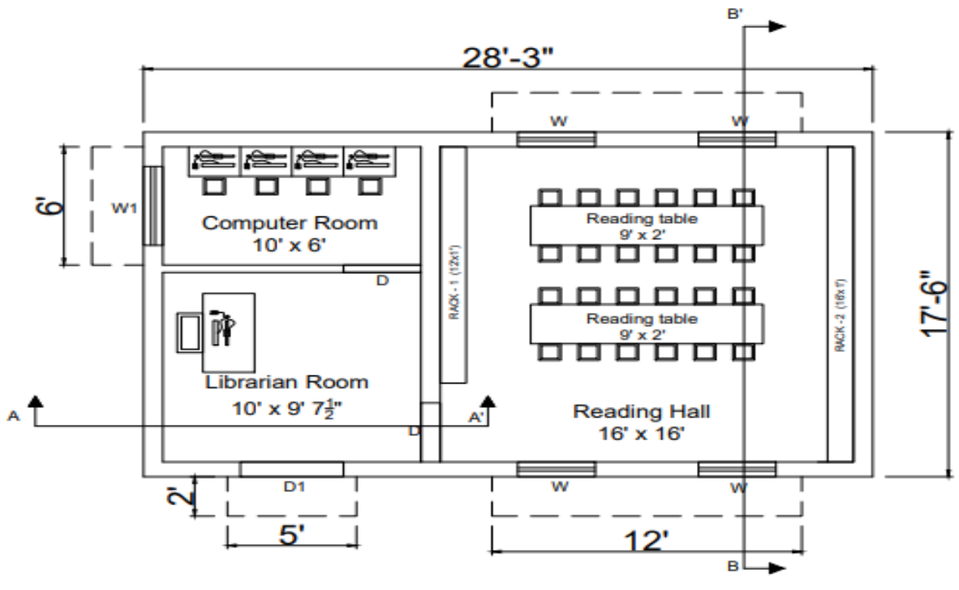
ELEVATION



SECTION A-A'



SECTION B-B'



PLAN

OPENING TABLE

D	3'.0" X 7'.0"
D1	5'.0" X 7'.0"
W	3'.0" X 4'.0"
W1	4'.0" X 4'.0"

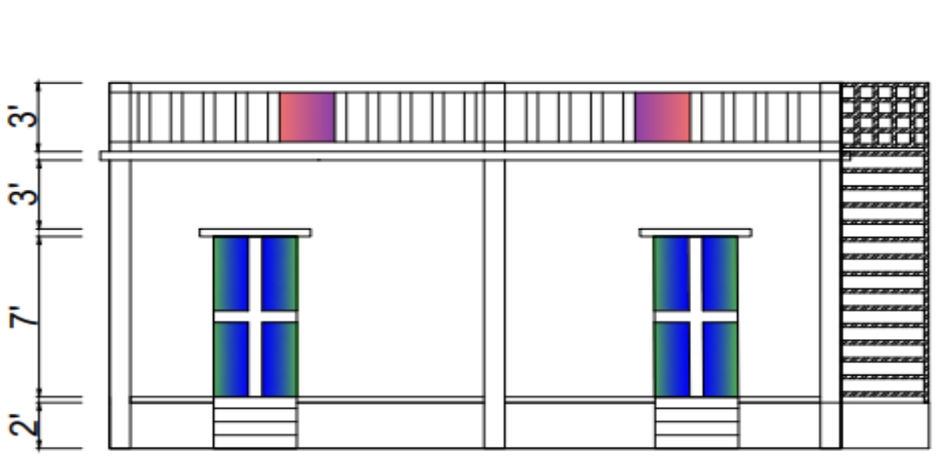
NOTES :-

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) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT Ø8 @ 8"C/C
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.

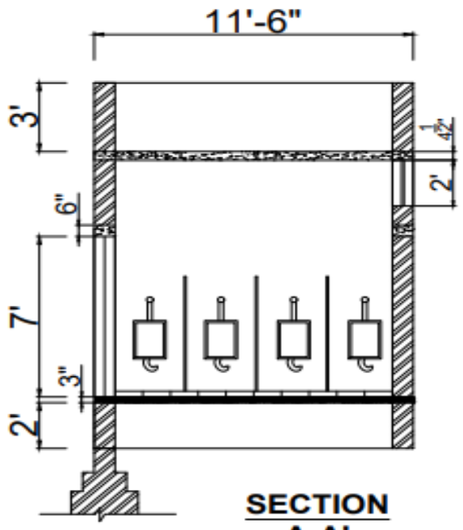
DESIGN PROPOSAL FOR LIBRARY

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	LIBRARY
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

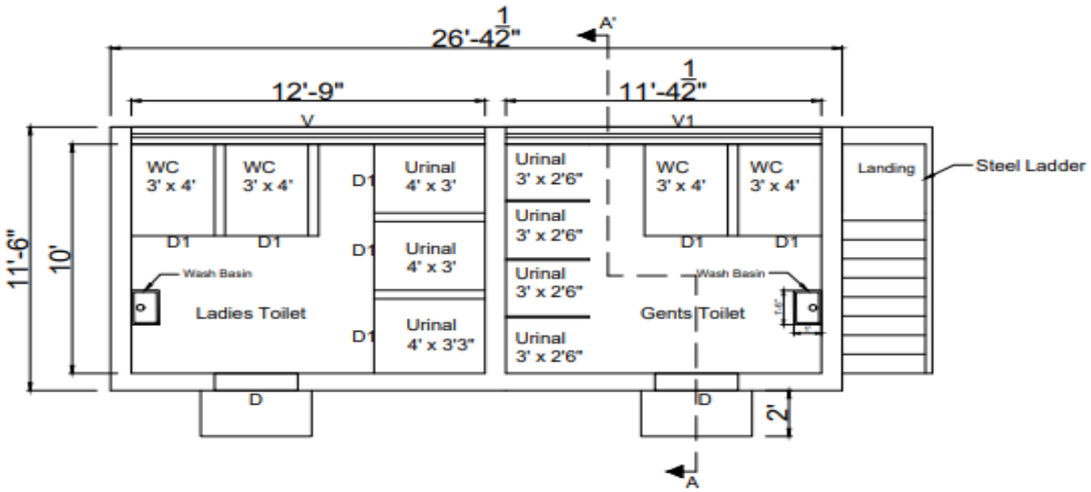
12.6.2 Public Toilet



ELEVATION



SECTION A-A'



PLAN

OPENING TABLE

D	3'.0" X 7'.0"
V	12'.9" X 2'.0"
V1	11'.4 1/2" X 2'.0"

NOTES :-

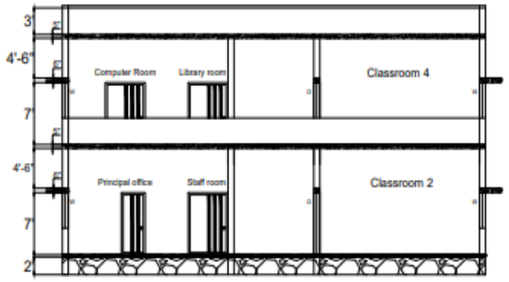
1) DO NOT SCALE THE DRG.ONLY WRITTEN DIMENSION SHALL BE FOLLOWED.
2) UNLESS OTHERWISE SPECIFIED ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE
3) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 8"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.

DESIGN PROPOSAL FOR PUBLIC TOILET

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	PUBLIC TOILET
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

12.6.3 Primary School Building

Elevation



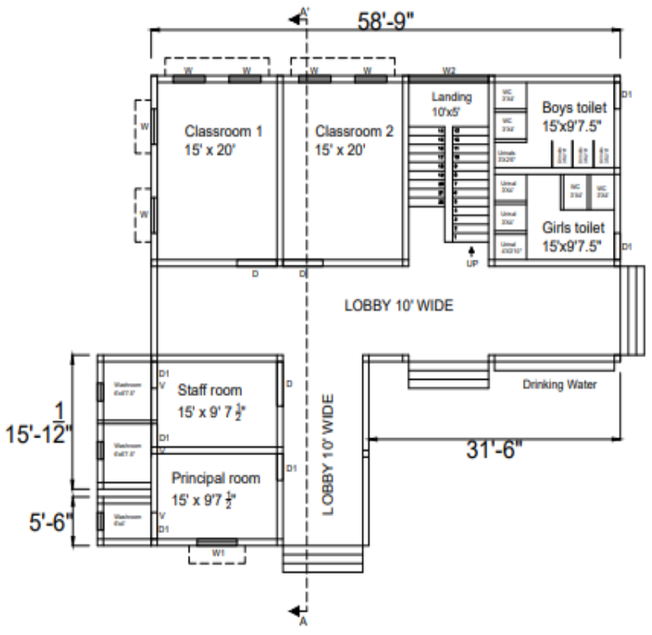
Section A-A'

OPENING TABLE

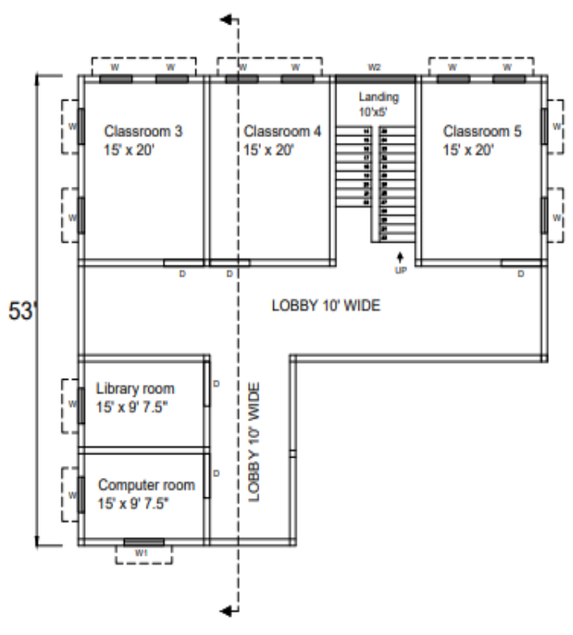
CLASSROOM	15'.0" X 20'.0"
LOBBY	10'.0" WIDE
D	5'.0" X 7'.0"
D1	3'.0" X 7'.0"
W	4'.0" X 4'.0"
W1	5'.0" X 4'.0"
W2	10'.0" X 12'.0"
V	2'.0" X 2'.0"

NOTES :-

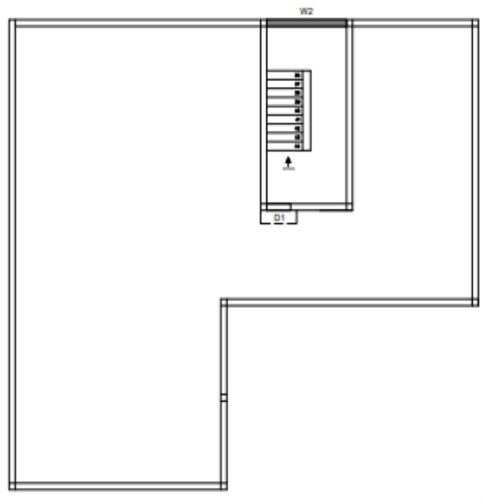
1) DO NOT SCALE THE DRG.ONLY WRITTEN DIMENSION SHALL BE FOLLOWED.
2) UNLESS OTHERWISE SPECIFIED ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE
3) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL
:- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN
:- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 8"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.



Ground floor plan



First floor plan

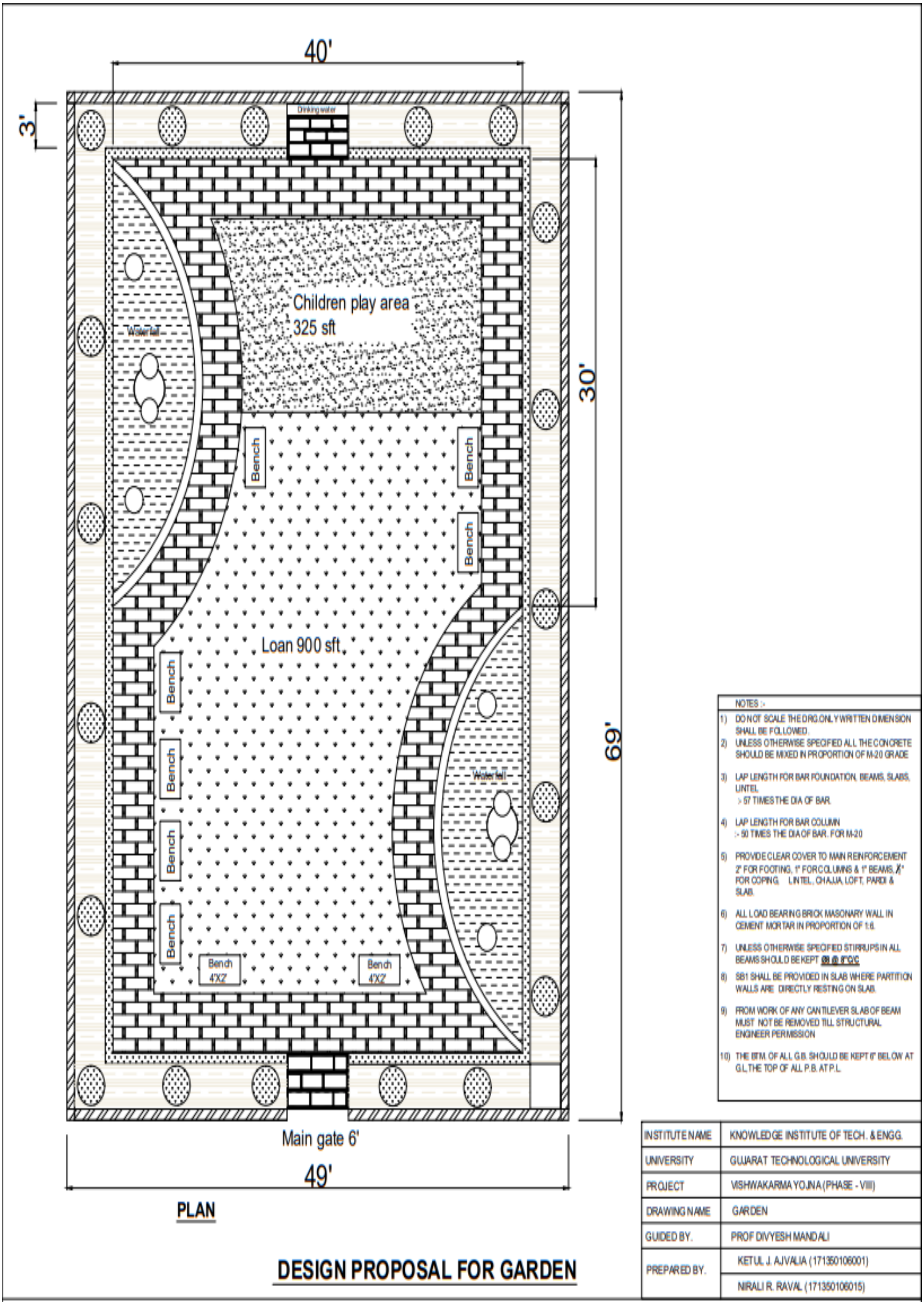


Terrace & Cabin

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	PRIMARY SCHOOL
GUIDED BY.	PROF. DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

DESIGN PROPOSAL FOR PRIMARY SCHOOL

12.6.4 Public Garden



12.7 Summary of Good Photographs

Table 17 Summary of good photographs

	
Kasumbad Gram Panchayat	Milk Co-operative society Kasumbad
	
Kasumbad Entrance Gate	Interaction with sarpanch and Talati (Kasumbad)

Photo with Sarpanch (Kasumbad)

Photo with Sarpanch (Dahemi)

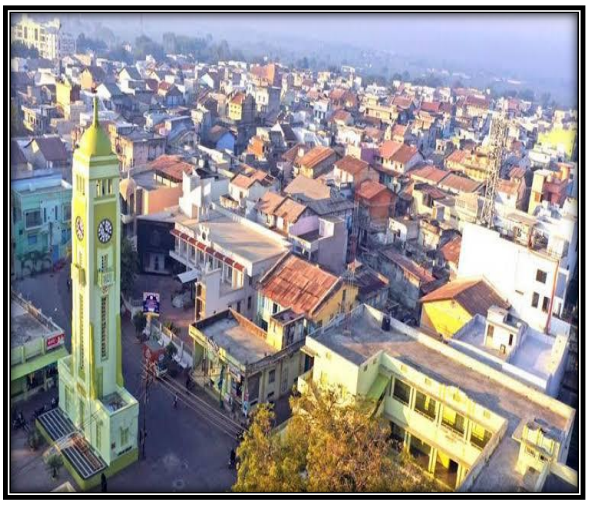
Swachhta Abhiyan

Mask Distribution

Swachhta Abhiyan with collage friends

Surajba Park, Dharmaj

Clock Tower Dharmaj



Areal view of Dharmaj

12.8 Village Interaction with sarpanch, Report with the photograph

As per the guideline of Vishwakarma Yojana phase VIII, we select the Kasumbad village for the development. The Sarpanch and all the Gram panchayat members are very supportive. They always help as to carried out the survey of village and the also help in interaction with the villagers. The Vishwakarma project says that, all the team members are present their work to the Sarpanch as well as all the members of gram panchayat for the better implementation of this project. We explain the core team of the Vishwakarma yojana and their work towards the development of village allover in Gujarat and also explain the various benefits of village development.

We explained all the designs that we design for the development of village. We design the Primary School and Public Library as Educational infrastructure, Public Toilet and Street road as Physical infrastructure, Public Garden as Re-creational infrastructure and the Borewell recharging system as Environment friendly Infrastructure. We explained all the parameters of the designs, how the designs can be sustainable by using local labour force and local materials. The presentation was very much interactive and helpful to understand various amenities to be designed at village level for the overall development of the Kasumbad village.

We heartily thankful to Sarpanch of Kasumbad village Mr. Jitendrabhai Rabari and all the members of Gram panchayat who support as and help us to carried out the surveys and collect the necessary information about the village. And also thankful to all the villagers, principal of primary school, members of Milk co-operative society, Talati mantri of village for the giving information of present condition of the village.

We gave the design information of part I to village. The designs are,

1. Primary School
2. Public Library
3. Paver block road
4. Public toilet
5. Garden
6. Borewell recharging system

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 cost with AutoCAD designs / planning with any software

The design proposal for the part II are given below,

1. Anganwadi
2. Public drinking water tap
3. Primary health center
4. Post office
5. Community hall
6. Retaining wall around pond

13.1 Design proposal for the Anganwadi center with the plan, elevation, section and costing

Anganwadi is a type of rural child care centre in India. They were started by the Indian government in 1975 as part of the Integrated Child Development Services program to combat child hunger and malnutrition. Anganwadi means "courtyard shelter" in Hindi.

Anganwadi works in villages. A typical Anganwadi centre provides basic health care in a village. It is a part of the Indian public health care system. Basic health care activities include counselling and supply nutrition, education and pre-school activities. There is total **13.3 lakh** Anganwadi successfully working in all over India.

The MWCD (**M**inistry of **W**omen and **C**hild **D**evelopment) has issued guidelines stating that Anganwadi centres should be child friendly with all relevant infrastructures, separate sitting room for child, separate kitchen, store room, child toilet, space for playing and the space should be at least 600 sft.

[Source: -
Guidelines for construction of Anganwadi Centres,
Instruction under schedule 1 part4(D)(V) of Mahatma Gandhi National employment guarantee Act
(File no. J-11016/11/2012-MGNREGA VI Dated:)]

The Total children in our village are 428 (As per Census 2011). Our village has 2 Aanganwadi, After the survey we found that the existing Anganwadi are not enough for the children. So, we decide to provide a Anganwadi in our village. the Anganwadi has one classroom and one kitchen. it is constructed in 300 sft.

Here, we give AutoCAD Designs, Measurement sheet and Abstract sheet of Anganwadi centre and the approximately cost of Anganwadi is 3.95 lakh INR.

Table 18 Measurement Sheet of Anganwadi centre, Kasumbad

Project : Anganwadi								
Measurement Sheet								
No.	**Item**	**No.**	**L ft**	**B ft**	**D/H ft**	**Qty.**	**Total**	**Unit**
1	**Earth Work**							
A)	**Excavation Work**							
	i) LW 1	3	24.75	3.25	4	965.25		
	ii)LW 2	1	12	3.25	4	156.00		
	iii) SW1	3	14.5	3.25	4	565.50		
						Total	**1,686.75**	**cft**
B)	**Rubble soiling**							
	i) LW 1	3	24.75	3.25	0.75	180.98		
	ii)LW 2	1	12	3.25	0.75	29.25		
	iii) SW1	3	14.5	3.25	0.75	106.03		
						Total	**316.27**	**cft**
C)	**P.C.C**							
	i) LW 1	3	24.75	3.25	0.5	120.66		
	ii)LW 2	1	12	3.25	0.5	19.50		
	iii) SW1	3	14.5	3.25	0.5	70.69		
						Total	**210.84**	**cft**
D)	**Brick masonry up to GL**							
	i) LW 1							
	27" (-1')	3	23.75	2.25	0.58	92.98		
	23" (-0.33')	3	23.42	1.92	0.58	78.24		
	18" (-0.42')	3	23	1.5	0.58	60.03		
	14" (-0.33')	3	22.67	1.16	2	157.78		
						Total	**389.04**	**cft**
	ii) LW2							
	27" (-1')	1	11	2.25	0.58	14.36		
	23" (-0.33')	1	10.67	1.92	0.58	11.88		
	18" (-0.42')	1	10.25	1.5	0.58	8.92		
	14" (-0.33')	1	9.92	1.16	2	23.01		
						Total	**58.17**	**cft**

	iii) SW1							
	27" (+1')	3	15.5	2.25	0.58	60.68		
	23" (+0.33')	3	15.83	1.92	0.58	52.88		
	18" (+0.42')	3	16.25	1.5	0.58	42.41		
	14" (+0.33')	3	16.58	1.16	2	115.40		
						Total	**271.38**	**cft**
						Total	**718.58**	**cft**
E)	**Refilling in to trench**							
	(Excavation - construction)					**Total**	**441.06**	**cft**
F)	**Refilling in to Plinth**							
	Area of all room	1	234		1.5		**351.00**	**cft**
	(144sft+ 40sft+ 50sft)							
2	**P.C.C Work**							
	i) LW1	3	24.75	3.25	0.5	120.66		
	ii) LW2	1	12	3.25	0.5	19.50		
	iii) SW1	3	14.5	3.25	0.5	70.69		
	iv) @ floor	1	351		0.25	87.75		
						Total	**298.59**	**cft**
3	**Rubble Soiling**							
	i) LW1	3	24.75	3.25	0.75	180.98		
	ii) LW2	1	12	3.25	0.75	29.25		
	iii) SW1	3	14.5	3.25	0.75	106.03		
						Total	**316.27**	**cft**
3	**Brick masonry**							
A)	**Up to plinth**							
	i) LW 1							
	27" (-1')	3	23.75	2.25	0.58	92.98		
	23" (-0.33')	3	23.42	1.92	0.58	78.24		
	18" (-0.42')	3	23	1.5	0.58	60.03		
	14" (-0.33')	3	22.67	1.16	2	157.78		
	9" (-0.42')	3	22.25	0.75	1	50.06		
						Total	**439.10**	**cft**

	ii) LW2							
	27" (-1')	1	11	2.25	0.58	14.36		
	23" (-0.33')	1	10.67	1.92	0.58	11.88		
	18" (-0.42')	1	10.25	1.5	0.58	8.92		
	14" (-0.33')	1	9.92	1.16	2	23.01		
	9" (-0.42')	1	9.5	0.75	1	7.13		
						Total	**65.29**	**cft**
	iii) SW1							
	27" (+1')	3	15.5	2.25	0.58	60.68		
	23" (+0.33')	3	15.83	1.92	0.58	52.88		
	18" (+0.42')	3	16.25	1.5	0.58	42.41		
	14" (+0.33')	3	16.58	1.16	2	115.40		
	9" (+0.42')	3	17	0.75	1	38.25		
						Total	**309.63**	**cft**
						Total	**814.02**	**cft**
B)	**Up to slab**							
	i) LW 1	2	22.25	0.75	9.25	308.72		
	ii)LW 2	1	9.5	0.75	9.25	65.91		
	iii) SW1	3	12	0.75	9.25	249.75		
	(10'-lintel-sill)=(10'-0.5'-0.25')							
	Deduction							
	D (3')	2	3	0.75	7	31.50		
	opening	1	3	0.75	7	15.75		
	W (4'X4')	1	4	0.75	4	12.00		
	W1(3'X4')	1	3	0.75	4	9.00		
	V (4'x2')	1	4	0.75	2	6.00		
						Total	**550.13**	**cft**
C)	**Parapet**							
	i) LW 1	2	22.25	0.75	3	100.13		
	ii) SW1	2	12	0.75	3	54.00		
						Total	**154.13**	**cft**
4	**R.C.C work**							
A)	**Coping**							
	i) LW 1	3	22.25	0.75	0.5	25.03		
	ii) LW2	1	9.5	0.75	0.5	3.56		
	iii) SW1	3	17	0.75	0.5	19.13		
						Total	**47.72**	**cft**

B)	**Lintel**							
	i) LW 1	2	22.25	0.75	0.5	16.69		
	ii) LW2	1	9.5	0.75	0.5	3.56		
	iii) SW1	3	12	0.75	0.5	13.50		
						Total	**33.75**	**cft**
C)	**Chhajja**							
	Total Length	1	10	1.5	0.25	**3.75**		**cft**
D)	**Beam**							
	i) LW 1	3	22.25	0.75	0.75	37.55		
	ii) SW1	3	17	0.75	0.75	28.69		
						Total	**66.23**	**cft**
E)	**Slab**							
	total area 300.375 sft	1	300.375		0.42	**126.16**		**cft**
5	**Plaster**							
A)	**Inside wall**							
	i) Class room	4	12		10	480.00		
	deduction							
	D (3')	1	3		7	10.50		
	W (4'X4')	1	4		4	16.00		
						Total	**453.50**	**sft**
	ii) Kitchen	2	8		10	160.00		
		2	6.25		10	125.00		
	deduction							
	D (3')	1	3		7	10.50		
	W1 (3'X4')	1	3		4	6.00		
						Total	**268.50**	**sft**
	iii) Store room	2	8		10	160.00		
		2	5		10	100.00		
	deduction							
	V (4')	1	4		2	4.00		
	D (3')	1	3		7	10.50		
						Total	**245.50**	**sft**

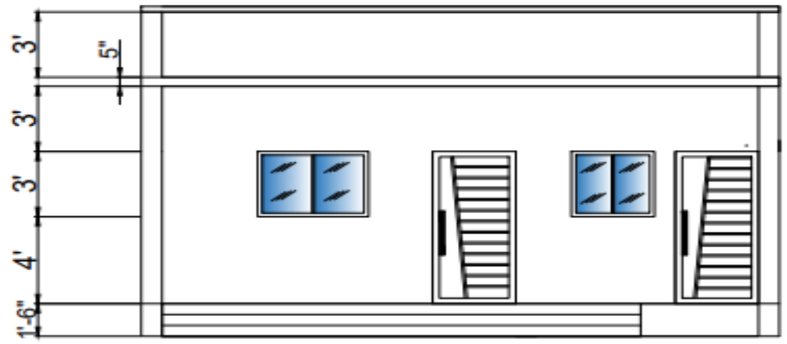
	iv) Inside Parapet	2	12		3.25	78.00		
		2	20.75		3.25	134.88		
						Total	**212.88**	**sft**
B)	**Ceiling**							
	i) Class room	1	12	12		144.00		
	ii) Kitchen	1	8	6.25		50.00		
	iii) Store room	1	8	5		40.00		
						Total	**234.00**	**sft**
C)	**Outside wall up to parapet**							
	i) LW 1	2	22.25		15.17	675.07		
	ii) SW1	2	13.5		15.17	409.59		
	(H= PL+LL+SL+SL(T)+ parapet + sill)							
	(H= 1.5'+7'+3'+0.42'+3'+.25')=15'2"							
	deduction							
	D (3')	1	3		7	21.00		
	W (4'X4')	1	4		4	16.00		
	W1 (3'X4')	1	3		4	6.00		
	V (4'X2')	1	4		2	4.00		
						Total	**1,037.66**	**sft**
D)	**Chhajja**							
	i) over 4' window + V	2	17			34.00		
	total A= (5'x1.5'x2) + (1.5'x0.25'x2) + (5'x0.25')							
	ii) Over 3' window	1	13.75			13.75		
						Total	**47.75**	**sft**
6	**Flooring**							
A)	Class room	1	12	12		**144.00**		**sft**
B)	Kitchen	1	8	6.25		**50.00**		**sft**
C)	Store room	1	8	5		**40.00**		**sft**
D)	Terrace	1	249			**249.00**		**sft**
9	**Colour**							
A)	Class room					**453.50**		**sft**
B)	Kitchen					**268.50**		**sft**
C)	Store room					**245.50**		**sft**
D)	All Ceiling					**234.00**		**sft**
E)	Outer side (all side)					**1,037.66**		**sft**

Table 19 Abstract Sheet of Anganwadi centre, Kasumbad

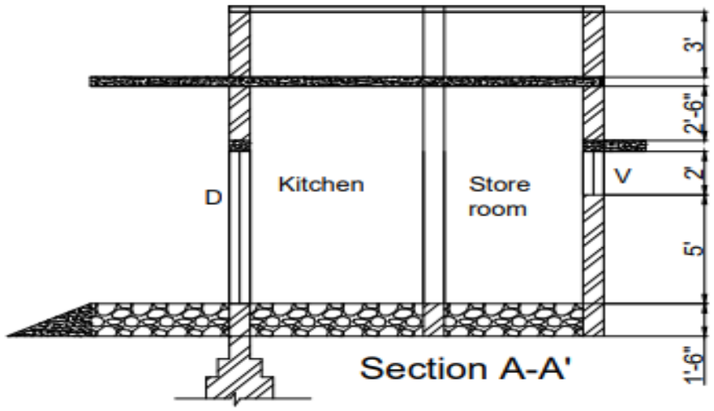
Project : Anganwadi					
ABSTRACT SHEET					
No	**Item**	**Quantity**	**Rate (rs)**	**Per cft**	**Amount (rs)**
1	**Earthwork**				
	A) Excavation	1,686.75	7	cft	11,807.25
	B) Soil filling in trench	441.06	4	cft	1,764.24
	C) soil filling in plinth	351.00	4	cft	1,404.00
				Total	**14,975.49**
2	**Metal & PCC**				
	A) Rubble soiling	316.27	32.16	cft	10,171.10
	B) P.C.C. Foundation	298.59	85.97	cft	25,670.10
	C) PCC at floor	87.75	78	cft	6,844.50
				Total	**42,685.71**
3	**Brick masonry up to plinth (1:6)**				
	A) up to plinth	814.02	68.26	cft	55,564.95
	B) up to slab	550.13	68.26	cft	37,551.53
	C) Parapet	154.13	68.26	cft	10,520.57
				Total	**1,03,637.05**
4	**R.C.C Work (1:2:(2+1))**				
	A) Coping	47.72	121.74	cft	5,809.28
	B) G.F Lintel	33.75	121.74	cft	4,108.73
	C) G.F Chhajja	3.75	121.74	cft	456.53
	D) G.F Slab	126.16	121.74	cft	15,358.41
	Total	211.38		**Total**	**25,732.94**
5	**Plaster Work (12 mm, 1:4)**				
A	Inside Ceiling	234.00	24.78	sft	5,798.52
B	Inside Wall	967.50	24.78	sft	23,974.65
C	Outside Chhajja	47.75	24.78	sft	1,183.25
D	Outside Wall	1,037.66	24.78	sft	25,713.09
E	Inside Parapet Plaster	212.88	24.78	sft	5,275.04
				Total	**61,944.55**

6	**Colour**				
A	Inside Wall	967.50	25.00	sft	24,187.50
B	Outside Wall	1,037.66	25.00	sft	25,941.38
C	Inside parapet	212.88	25.00	sft	5,321.88
D	Inside ceiling	234.00	25.00	sft	5,850.00
				Total	**61,300.75**
7	**Flooring**				
A	Tiles	351.00	100.00	sft	35,100.00
				Total	**35,100.00**
9	**Electric**			**Total**	**25,000.00**
10	**Plumbing**			**Total**	**25,000.00**
			Total Amount		**3,95,376.49**

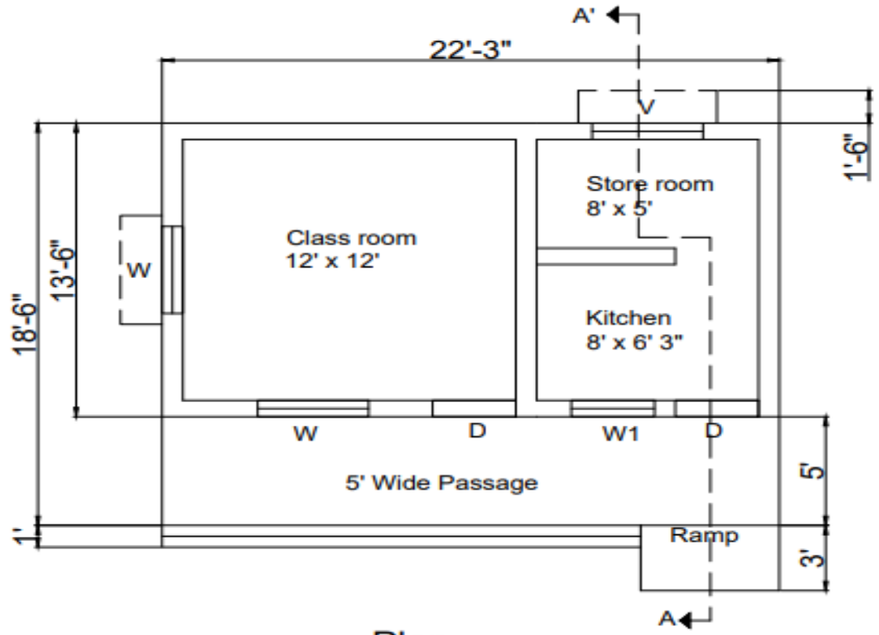
Figure 57 3D view of Anganwadi



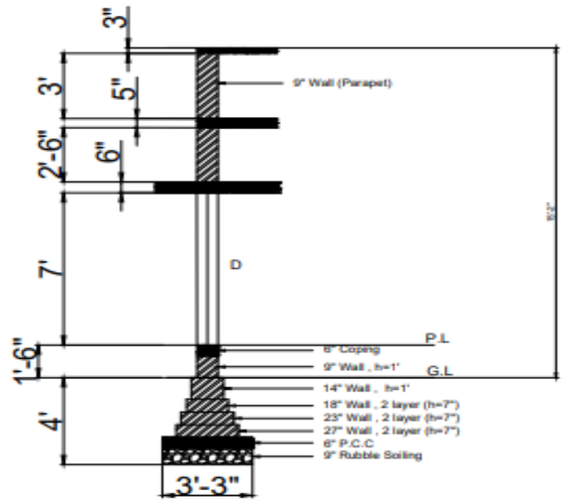
Elevation



Section A-A'



Plan



Foundation

OPENING TABLE

D	3' 0" X 7' 0"
W	4' 0" X 4' 0"
W1	3' 0" X 4' 0"
V	4' 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) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 8"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.

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.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

DESIGN PROPOSAL FOR ANGANWADI CENTRE

13.2 Design proposal for the Public Drinking Water Tap with the plan, elevation, section and costing

Contaminated water and poor sanitation are linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid, and polio. Absent, inadequate, or inappropriately managed water and sanitation services expose individuals to preventable health risks. This is particularly the case in health care facilities where both patients and staff are placed at additional risk of infection and disease when water, sanitation, and hygiene services are lacking.

Benefits of pure drinking water

- carrying nutrients and oxygen to your cells
- flushing bacteria from your bladder
- aiding digestion
- preventing constipation
- normalizing blood pressure
- stabilizing the heartbeat
- cushioning joints
- protecting organs and tissues
- regulating body temperature
- maintaining electrolyte (sodium) balance.

There is no public drinking water tap is available in the village. Every village should have public drinking water tap for the villagers and also for the visitors. So, we give a proposal for the public drinking water tap in our village.

This water tap is located at the Centre of the village near primary school, milk co-operative society and community hall. So, it is fully utilized by the people.

Here, we give AutoCAD Designs, Measurement sheet and Abstract sheet of Public drinking water tap and the approximately cost of Public drinking water tap is 75,000 INR.

Table 20 Measurement Sheet of public drinking water tap

Project: Drinking Water TAP								
Measurement Sheet								
No	**Item**	**No**	**Length**	**Breadth**	**Depth**	**Qut**	**Total**	**Unit**
1	**Earth Work**							
A)	**Excavation Work**							
	i) LW 1	2.00	10.25	2.5	3	153.75		
	ii) SW1	2.00	3.25	2.5	3	48.75		
						Total	**202.50**	**cft**
	Excavation of front otta							
	Area (8.5 x 3)	1.00	8.5	3	1	25.50		
						Total	**25.50**	**cft**
B)	**P.C.C**							
	i) LW 1	2.00	10.25	2.5	0.5	25.63		
	ii) SW1	2.00	3.25	2.5	0.5	8.13		
						Total	**33.75**	**cft**
	P.C.C @ front otta	1.00	8.5	3	0.5	**12.75**		**cft**
C)	**Brick masonry up to GL**							
	i) LW 1							
	18" (-1')	2.00	9.25	1.5	0.83	23.03		
	14" (-0.33')	2.00	8.92	1.16	0.83	17.18		
	9" (-0.42')	2.00	8.5	0.75	0.83	10.58		
						Total	**50.79**	**cft**
	ii) SW1							
	18" (+1')	2.00	4.25	1.5	0.83	10.58		
	14" (+0.33')	2.00	4.58	1.16	0.83	8.82		
	9" (+0.42')	2.00	5	0.75	0.83	6.23		
						Total	**25.63**	**cft**
						Total	**76.42**	**cft**
	BK for otta							
	LW	1.00	8.5	0.75	0.5	3.19		
	SW	2.00	2.25	0.75	0.5	1.69		
						Total	**4.88**	**cft**

D)	**Refilling in to trench**							
	(Excavation - construction)					**Total**	**100.21**	**cft**
E)	**Refilling in to Plinth**							
	Area of room	1.00	50.75		0.75		**38.06**	**cft**
	(35sft + (7x2.25)= 50.75sft)							
2	**P.C.C Work**							
	i) LW1	2.00	10.25	2.5	0.5	25.63		
	ii) SW1	2.00	3.25	2.5	0.5	8.13		
	iii) @ floor	1.00	60.5		0.25	15.13		
	(35sft + (8.5x3)= 60.5 sft)					**Total**	**48.88**	**cft**
3	**Brick masonry**							
A)	**Up to plinth**							
	i) LW 1							
	18" (-1')	2.00	9.25	1.5	0.83	23.03		
	14" (-0.33')	2.00	8.92	1.16	0.83	17.18		
	9" (-0.42') (h=10"+6")	2.00	8.5	0.75	1.33	16.96		
						Total	**57.17**	**cft**
	ii) SW1							
	18" (+1')	2.00	4.25	1.5	0.83	10.58		
	14" (+0.33')	2.00	4.58	1.16	0.83	8.82		
	9" (+0.42')	2.00	5	0.75	1.33	9.98		
						Total	**29.38**	**cft**
	BK for otta							
	LW	1.00	8.5	0.75	0.75	**4.78**		
	SW	2.00	2.25	0.75	0.75	**2.53**		
						Total	**7.31**	**cft**
						Total	**93.86**	**cft**
B)	**Up to slab**							
	i) LW 1	2.00	8.5	0.75	7	89.25		
	ii) SW1	2.00	5	0.75	7	52.50		
	Deduction							
	D (3')	1.00	3	0.75	7	15.75		
						Total	**126.00**	**cft**

C)	**Parapet**							
	i) LW 1	2.00	8.5	0.75	3	38.25		
	ii) SW1	2.00	5	0.75	3	22.50		
						Total	**60.75**	**cft**
4	**R.C.C work**							
A)	**Coping**							
	i) LW 1	2.00	8.5	0.75	0.5	6.38		
	ii) SW1	2.00	5	0.75	0.5	3.75		
						Total	**10.13**	**cft**
B)	**Slab**							
	Total Area (80.75 sft)	1.00	80.75		0.42	33.92		
						Total	**33.92**	**cft**
C)	**Chhajja**							
	Total Length	1.00	4.5	1.5	0.25	**1.69**		**cft**
5	**Plaster**							
A)	**Inside wall**							
	i) Room	2.00	7		7	98.00		
		2.00	5		7	70.00		
	desuction							
	D (3')	0.50	3		7	10.50		
						Total	**157.50**	**sft**
	ii) Inside Parapet	2.00	7		3	42.00		
		2.00	5		3	30.00		
						Total	**72.00**	**sft**
B)	**Ceiling**							
	i) Room	1.00	7	5		35.00		
						Total	**35.00**	**sft**
C)	**Outside wall up to parapet**							
	i) LW 1	2.00	8.5		11.42	194.14		
	ii) SW1	2.00	6.5		11.42	148.46		
	(H= PL+LL+SL+ parapet)							
	(H= 1'+7'+3'+0.42)=15'2"							

	deduction							
	D (3')	0.50	3		7	10.50		
						Total	**10.50**	**sft**
D)	**Chhajja**							
	i) over 3' door	1	15.375			15.38		
	total A= (4.5'x1.5'x2) + (1.5'x0.25'x2) + (4.5'x0.25')							
						Total	**15.38**	**sft**
6	**Flooring**							
A)	Room	1.00	7	5		**35.00**		**sft**
7	**Colour**							
A)	Class room					**157.50**		**sft**
D)	Ceiling					**35.00**		**sft**
E)	Outer side (all side)					**10.50**		**sft**

Table 21 Abstract sheet of drinking water tap

Project : Drinking Water TAP					
ABSTRACT SHEET					
No	**Item**	**Quantity**	**Rate (rs)**	**Per cft**	**Amount (rs)**
1	**Earthwork**				
	A) Excavation	228.00	7	cft	1,596.00
	B) Soil filling in trench	100.21	4	cft	400.83
	C) soil filling in plinth	38.06	4	cft	152.25
				Total	**2,149.08**
2	**PCC**				
	A) P.C.C. Foundation	46.50	85.97	cft	3,997.61
	B) PCC at floor	15.13	78	cft	1,179.75
				Total	**5,177.36**
3	**Brick masonry up to plinth (1:6)**				
	A)up to plinth	93.86	68.26	cft	6,406.58
	B)up to slab	126.00	68.26	cft	8,600.76
	C) Parapet	60.75	68.26	cft	4,146.80
				Total	**19,154.14**
4	**R.C.C Work (1:2:(2+1))**				
	A) Coping	10.13	121.74	cft	1,232.62
	C) G.F Chhajja	1.69	121.74	cft	205.44
	D) G.F Slab	33.92	121.74	cft	4,128.81
	Total	45.73		**Total**	**5,566.87**
5	**Plaster Work (12 mm, 1:4)**				
A	Inside Ceiling	35.00	24.78	sft	867.30
B	Inside Wall	157.50	24.78	sft	3,902.85
C	Outside Chhajja	15.38	24.78	sft	380.99
D	Outside Wall	10.50	24.78	sft	260.19
E	Inside Parapet Plaster	72.00	24.78	sft	1,784.16
				Total	**7,195.49**
6	**Colour**				
A	Inside Wall	157.50	25.00	sft	3,937.50
B	Outside Wall	10.50	25.00	sft	262.50
C	Inside parapet	72.00	25.00	sft	1,800.00
D	Inside ceiling	35.00	25.00	sft	875.00
				Total	**6,875.00**

7	**Flooring**				
A	Tiles	35.00	100.00	sft	3,500.00
				Total	**3,500.00**
8	**Plumbing cost**			**Total**	**25,000.00**
			Total Amount		**74,617.93**

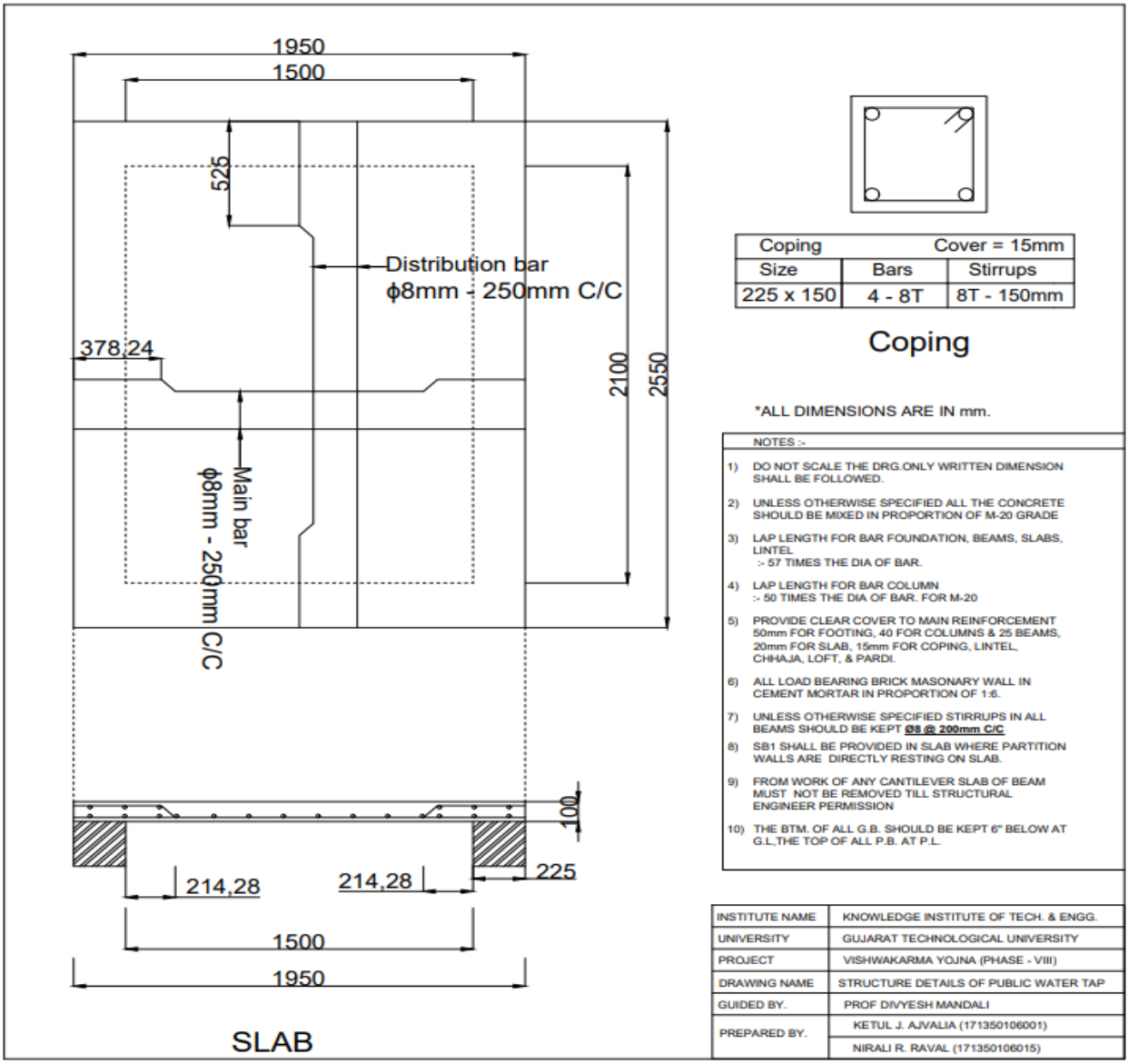
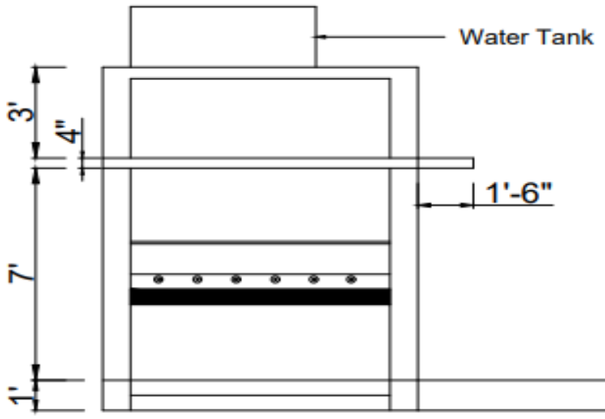
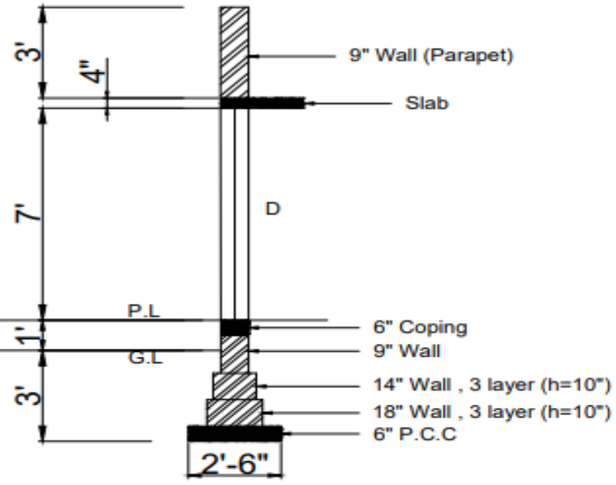


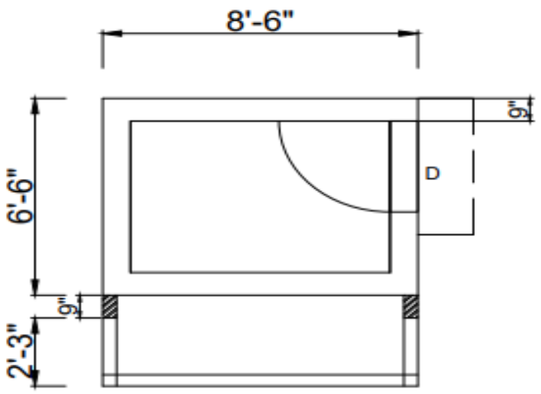
Figure 58 Structural design of Public Drinking water tap



Elevation



Section



Plan

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) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 8"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	PUBLIC DRINKING WATER TAP
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

DESIGN PROPOSAL FOR DRINKING WATER TAP

13.3 Design proposal for the Primary health center with the plan, elevation, section and costing

Primary Health Centre (PHCs), sometimes referred to as public health centres, are state-owned rural health care facilities in India. They are essentially single-physician clinics usually with facilities for minor surgeries. They are part of the government-funded public health system in India and are the most basic units of this system. As on 31 March 2019 there are 30,045 PHCs in India in which 24,855 are located on rural areas and 5,190 are on urban areas.

Primary Health Centres programmes are listed below:

- Provision of medical care
- Maternal-child health including family planning
- Safe water supply and basic sanitation
- Prevention and control of locally endemic diseases
- Collection and reporting of vital statistics
- Education about health
- National health programs, as relevant
- Referral services
- Training of health guides, health workers, local dais and health assistants
- Basic laboratory workers

Our village has no Primary health centre so the villagers are going to the Davol (7km) Village for to get Health facilities. So, for the better and quick health services we give proposal of primary health centre in our village. Every village has at least one type of health care facility So, as per this we give a proposal of the Primary Health Centre in our village.

The primary health centre has two patient room, one doctor's room, one OPD. Here, we give AutoCAD Designs, Measurement sheet and Abstract sheet of Primary health centre and the approximately cost of Primary health centre is 15.70 lakh INR.

Table 22 Measurement Sheet of Primary health centre

Project : Primary Health Centre								
Measurement Sheet								
No	**Item**	**No**	**Length**	**Breadth**	**Depth**	**Qut**	**Total**	**Unit**
1	**Earth Work**							
A)	**Excavation Work**							
	i) LW 1	4	60.75	3.25	4	3,159		
	ii) SW1	6	29	3.25	4	2,262		
						Total	**5,421**	**cft**
B)	**P.C.C**							
	i) LW 1	4	60.75	3.25	0.5	395		
	ii) SW1	6	29	3.25	0.5	283		
						Total	**678**	**cft**
C)	**Rubble Soiling**							
	i) LW 1	4	60.75	3.25	0.75	592		
	ii) SW1	6	29	3.25	0.75	424		
						Total	**1,016**	**cft**
D)	**Brick masonry up to GL**							
	i) LW 1							
	27"	4	59.75	2.25	0.58	312		
	23"	4	59.42	1.92	0.58	265		
	18"	4	59	1.5	0.58	205		
	14"	4	58.67	1.16	1	272		
						Total	**1,054**	**cft**
	ii) SW1							
	27"	7	30	2.25	0.58	274		
	23"	7	30.33	1.92	0.58	236		
	18"	7	30.75	1.5	0.58	187		
	14"	7	31.08	1.16	1	252		
						Total	**950**	**cft**
	Deduction							
	i) Column footing	20	2.25	2.25	0.58	59		
	ii) column	20	0.75	0.75	2.16	24		
						Total	**1,921**	**cft**

E)	**R.C.C work**							
	Footing	20	2.25	2.25	0.58	59		
	Column	20	0.75	0.75	2.16	24		
						Total	**83**	**cft**
E)	**Refilling in to trench**							
	(Excavation - construction)					**Total**	**1,723**	**cft**
F)	**Refilling in to Plinth**							
	Total area	1	1762		1.75		**3,084**	**cft**
	(1567 sft + (31.5 x 6.25)= 1762 sft)							
2	**P.C.C Work**							
	i) LW1	4	60.75	3.25	0.5	395		
	ii) SW1	7	29	3.25	0.5	330		
	iii) @ floor	1	1762		0.25	441		
						Total	**1,165**	**cft**
3	**Brick masonry**							
A)	**Up to plinth**							
	i) LW 1							
	27"	4	59.75	2.25	0.58	312		
	23"	4	59.42	1.92	0.58	265		
	18"	4	59	1.5	0.58	205		
	14"	4	58.67	1.16	1	272		
	9"	4	58.25	0.75	1.5	262		
						Total	**1,316**	**cft**
	ii) SW1							
	27"	7	30	2.25	0.58	274		
	23"	7	30.33	1.92	0.58	236		
	18"	7	30.75	1.5	0.58	187		
	14"	7	31.08	1.16	1	252		
	9"	7	31.5	0.75	1.5	248		
						Total	**1,198**	**cft**
						Total	**2,514**	**cft**
	Deduction							
	i) Column	20	0.75	0.75	1.5	17		
						Total	**2,498**	**cft**

B)	**Up to slab**							
	i) LW 1	2	51.25	0.75	9.5	730		
	ii) LW2	2	40.5	0.75	9.5	577		
	iii) SW1	2	31.5	0.75	9.5	449		
	iv) SW2	7	10	0.75	9.5	499		
	(H= 12' - 2'(B) - 0.5'(LL) = 9.5ft)							
	v) Partition wall							
	SW	1	10	0.375	12	45		
	SW1	5	0.92	0.375	12	21		
						Total	**2,321**	**cft**
	Deduction							
	D (6')	1	6	0.75	7	32		
	D1(3')	8	3	0.75	7	126		
	D2(2.5')	7	2.5	0.75	7	92		
	W(5)	3	5	0.75	4	45		
	W1(4')	5	4	0.75	4	60		
	W2(3')	1	3	0.75	4	9		
	V(2')	7	2	0.75	2	21		
	V1(5')	1	5	0.75	2	8		
	Column							
						Total	**392**	**cft**
			BK up to SLAB			**Total**	**1,929**	**cft**
C)	**Parapet**							
	i) LW 1	2	51.25	0.75	3	231		
	ii) SW1	2	31.5	0.75	3	142		
						Total	**372**	**cft**
4	**R.C.C work**							
A)	**Coping**							
	i) LW 1	4	51.25	0.75	0.5	77		
	ii) SW1	7	31.5	0.75	0.5	83		
						Total	**160**	**cft**
B)	**Plinth Beam**							
	B1	1	11.5	0.375	1	4		
						Total	**4**	**cft**

C)	**Lintel**							
	i) LW 1	2	51.25	0.75	0.5	38		
	ii) LW2	2	40.5	0.75	0.5	30		
	iii) SW1	2	31.5	0.75	0.5	24		
	iv) SW2	7	10	0.75	0.5	26		
	v) Partition wall							
	SW	1	10	0.375	0.5	2		
	SW1	5	0.92	0.375	10	17		
						Total	**138**	**cft**
D)	**Chhajja**							
	Total Length	1	77.5	1.5	0.25	**29**		**cft**
E)	**Beam**							
	Horizontal B1	6	33	0.75	2	297		
	Vertical B2	4	51.25	0.75	2	308		
						Total	**605**	**cft**
F)	**Column**							
	i) Footing	20	2.25	2.25	0.58	59		
	ii) Column	20	0.75	0.75	15.66	176		
						Total	**235**	**cft**
G)	**Slab**							
	Total Area (1695.25 sft)	1	1691.25		0.42	710		
						Total	**710**	**cft**
5	**Plaster**							
A)	**Inside wall**							
	i) Patient room 1	2	10		12	240		
		2	12		12	288		
	ii) Patient room 2	2	10		12	240		
		2	12		12	288		
	iii) Doctor's room	2	10		12	240		
		2	12		12	288		
	iv) O.P.D	2	10		12	240		
		2	12		12	288		
	v) Gents WC	2	10		12	240		
		2	6.375		12	153		
	vi) Ladies WC	2	10		12	240		
		2	6.375		12	153		
	vii) Store room	2	10		12	240		

		2	8.5		12	204		
	viii) Small pantry	2	10		12	240		
		2	4.625		12	111		
	ix) reception & waiting area	1	31.5		12	378		
		2	10		12	240		
		2	10.75		12	258		
	x) exterior of rooms	2	40.5		12	972		
		1	10		12	120		
						Total	**5,661**	**sft**
	Deduction							
	D (6')	1	6		7	21		
	D1(3')	8	3		7	168		
	D2(2.5')	4	2.5		7	61		
	W (5)	2	5		4	30		
	W1(4')	3	4		4	40		
	W2(3')	1	3		4	6		
	V(2')	4	2		2	14		
	V1(5')	1	5		2	5		
						Total	**345**	**sft**
						Total	**5,316**	**sft**
	ii) Inside Parapet	2	49.8		3.25	324		
		2	31.5		3.25	205		
						Total	**528**	**sft**
B)	**Ceiling**							
	i) Patient room 1	1	10	12		120		
	ii) Patient room 2	1	10	12		120		
	iii) Doctor's room	1	10	12		120		
	iv) O.P.D	1	10	12		120		
	v) Gents WC	1	10	6.375		64		
	vi) Ladies WC	1	10	6.375		64		
	vii) Store room	1	10	8.5		85		
	viii) Small pantry	1	10	4.625		46		
	ix) reception & waiting area	1	31.5	10		315		
	x) Passage	1	10	40.5		405		
						Total	**1,459**	**sft**

C)	**Outside wall up to parapet**							
	i) LW 1	2	51.25		17.67	1,811		
	ii) SW1	2	33		17.67	1,166		
	(H= PL+LL+ SL+ parapet)							
	(H= 2'+12'+0.42'+3'+.25')=17.67'							
	Deduction							
	D (6')	1	6		7	21		
	W(5)	2	5		4	30		
	W1(4')	3	4		4	40		
	W2(3')	1	3		4	6		
	V(2')	4	2		2	14		
	V1(5')	1	5		2	5		
						Total	**2,861**	**sft**
D)	**Chhajja**							
	i) over 6' window	3	23.5			71		
	total A= (7'x1.5'x2) + (1.5'x0.25'x2) + (7'x0.25')							
	ii) over 5' window	5	20.25			101		
	Total A= (6'x1.5'x2) + (1.5'x0.25'x2) + (6'x0.25')							
	iii) over 3' window	1	13.75			14		
	Total A= (4'x1.5'x2) + (1.5'x0.25'x2) + (4'x0.25')							
	iv) over 6' ventilation	1	23.5			24		
	Total A= (7'x1.5'x2) + (1.5'x0.25'x2) + (7'x0.25')							
	v) remaining							
	8.25'	1	27.56			28		
	Total A= (8.25'x1.5'x2) + (1.5'x0.25'x2) + (8.25'x0.25')							
	17.25	1	56.81			57		
	Total A= (17.25'x1.5'x2) + (1.5'x0.25'x2) + (17.25'x0.25')							
						Total	**293**	**sft**

6	**Flooring**							
	i) Patient room 1	1	10	12		120		
	ii) Patient room 2	1	10	12		120		
	iii) Doctor's room	1	10	12		120		
	iv) O.P.D	1	10	12		120		
	v) Gents WC	1	10	6.375		64		
	vi) Ladies WC	1	10	6.375		64		
	vii) Store room	1	10	8.5		85		
	viii) Small pantry	1	10	4.625		46		
	ix) reception & waiting area	1	31.5	10		315		
	x) Passage	1	10	40.5		405		
						Total	**1,459**	**sft**
7	**Colour**							
A)	All Room					**5,316**		**sft**
B)	Ceiling					**1,459**		**sft**
C)	Outer side (all side)					**2,861**		**sft**

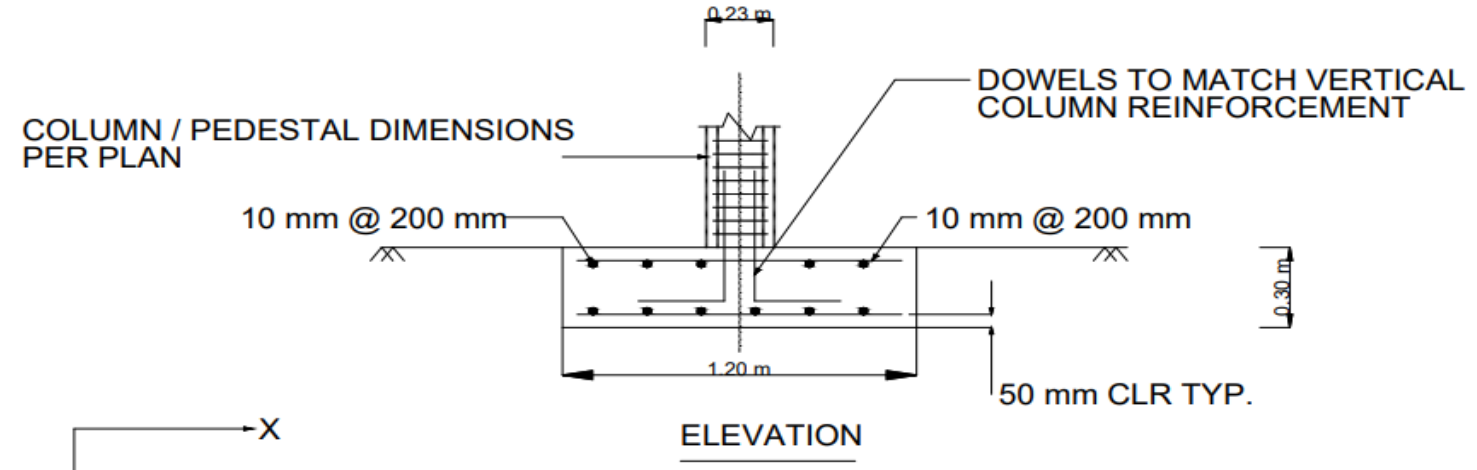
Table 23 Abstract sheet of primary health centre

Project : Primary Health Centre					
ABSTRACT SHEET					
No	**Item**	**Quantity**	**Rate (rs)**	**Per cft**	**Amount (rs)**
1	**Earthwork**				
	A) Excavation	5,421.00	7	cft	37,947.00
	B) Soil filling in trench	1,722.70	4	cft	6,890.79
	C) soil filling in plinth	3,083.50	4	cft	12,334.00
				Total	**57,171.79**
2	**PCC**				
	A) P.C.C. Foundation	724.75	85.97	cft	62,306.76
	B) PCC at floor	440.50	78	cft	34,359.00
				Total	**96,665.76**
3	**Brick masonry up to plinth (1:6)**				
	A)up to plinth	2,497.55	68.26	cft	1,70,482.92
	B)up to slab	1,928.89	68.26	cft	1,31,665.86
	C) Parapet	372.38	68.26	cft	25,418.32
				Total	**3,27,567.10**
4	**R.C.C Work (1:2:(2+1))**				
	A) Coping	159.56	121.74	cft	19,425.14
	B) Plinth Beam	4.31	121.74	cft	525.00
	C) Column	234.90	121.74	cft	28,596.73
	D) Lintel	137.81	121.74	cft	16,777.29
	E) G.F Chhajja	29.06	121.74	cft	3,538.07
	F) G.F Slab	710.33	121.74	cft	86,474.97
	G) G.F Beam	604.50	121.74	cft	73,591.83
	Total	1,880.48		**Total**	**2,28,929.03**
5	**Plaster Work (12 mm, 1:4)**				
A	Inside Ceiling	1,458.75	24.78	sft	36,147.83
B	Inside Wall	5,315.75	24.78	sft	1,31,724.29
C	Outside Chhajja	293.37	24.78	sft	7,269.71
D	Outside Wall	2,861.40	24.78	sft	70,905.37
E	Inside Parapet Plaster	528.45	24.78	sft	13,094.99
				Total	**2,59,142.18**

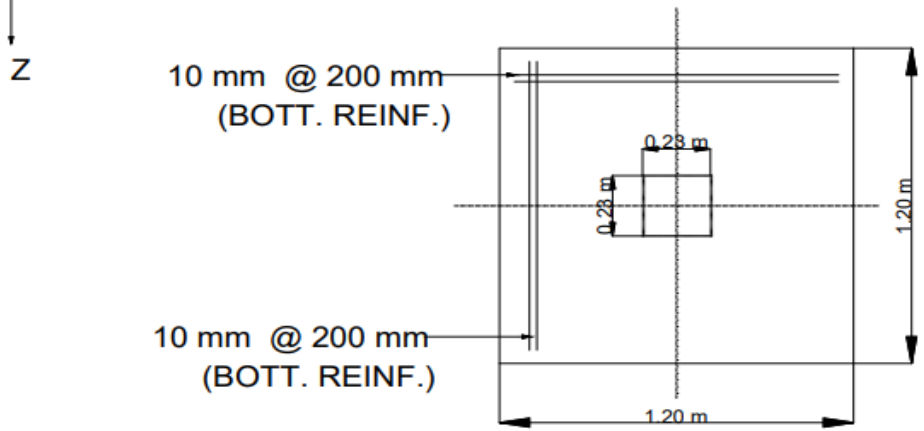
6	**Colour**				
A	Inside Wall	5,315.75	25.00	sft	1,32,893.75
B	Outside Wall	2,861.40	25.00	sft	71,534.88
C	Inside parapet	528.45	25.00	sft	13,211.25
D	Inside ceiling	1,458.75	25.00	sft	36,468.75
				Total	**2,54,108.63**
7	**Flooring**				
A	Tiles	1,458.75	100.00	sft	1,45,875.00
				Total	**1,45,875.00**
8	**Electric**				**1,00,000.00**
9	**Sanitation**				**1,00,000.00**
			Total Amount		**15,69,459.47**

Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
1	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	N/A	N/A
2	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	N/A	N/A
3	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	N/A	N/A
4	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	N/A	N/A
5	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	N/A	N/A
6	Ø10 @ 220 mm c/c	Ø10 @ 220 mm c/c	Ø10 @ 220 mm c/c	Ø10 @ 220 mm c/c	N/A	N/A
7	Ø10 @ 220 mm c/c	Ø10 @ 220 mm c/c	Ø10 @ 220 mm c/c	Ø10 @ 220 mm c/c	N/A	N/A
8	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	Ø10 @ 215 mm c/c	N/A	N/A
9	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	N/A	N/A
10	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	N/A	N/A
11	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	N/A	N/A
12	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	N/A	N/A
13	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	N/A	N/A
14	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	N/A	N/A
15	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	N/A	N/A
16	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	Ø10 @ 195 mm c/c	N/A	N/A
17	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	N/A	N/A
18	Ø10 @ 225 mm c/c	Ø10 @ 225 mm c/c	Ø10 @ 225 mm c/c	Ø10 @ 225 mm c/c	N/A	N/A
19	Ø10 @ 225 mm c/c	Ø10 @ 225 mm c/c	Ø10 @ 225 mm c/c	Ø10 @ 225 mm c/c	N/A	N/A
20	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	Ø10 @ 205 mm c/c	N/A	N/A

Figure 59 Footing reinforcement schedule of PHC



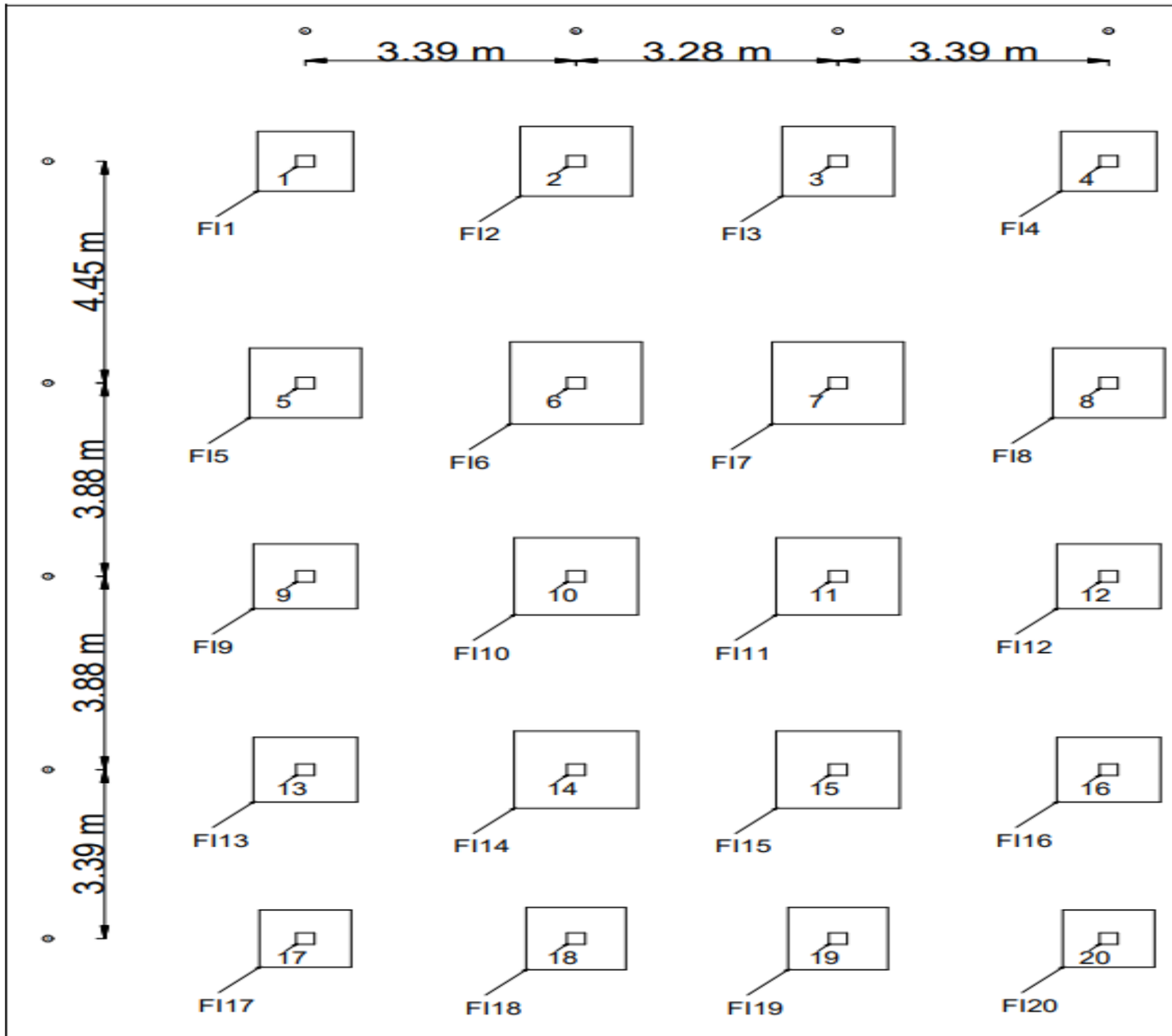
ELEVATION



PLAN

Typical Foundation detail of PHC

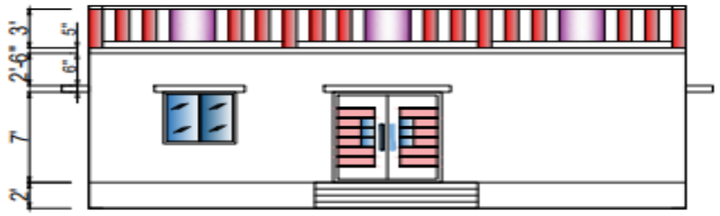
INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	FOUNDATION DETAILS OF PHC
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)



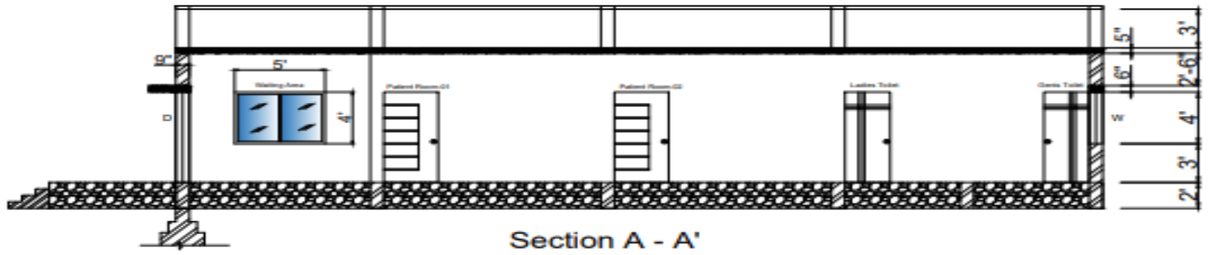
FOUNDATION LAYOUT OF PHC

MARK	SIZE	Column Nos.
FI1	1.200 X 1.200 X 0.305	1
FI2	1.400 X 1.400 X 0.305	2
FI3	1.400 X 1.400 X 0.305	3
FI4	1.200 X 1.200 X 0.305	4
FI5	1.400 X 1.400 X 0.305	5
FI6	1.650 X 1.650 X 0.305	6
FI7	1.650 X 1.650 X 0.305	7
FI8	1.400 X 1.400 X 0.305	8
FI9	1.300 X 1.300 X 0.305	9
FI10	1.550 X 1.550 X 0.305	10
FI11	1.550 X 1.550 X 0.305	11
FI12	1.300 X 1.300 X 0.305	12
FI13	1.300 X 1.300 X 0.305	13
FI14	1.550 X 1.550 X 0.305	14
FI15	1.550 X 1.550 X 0.305	15
FI16	1.300 X 1.300 X 0.305	16
FI17	1.150 X 1.150 X 0.305	17
FI18	1.250 X 1.250 X 0.305	18
FI19	1.250 X 1.250 X 0.305	19
FI20	1.150 X 1.150 X 0.305	20

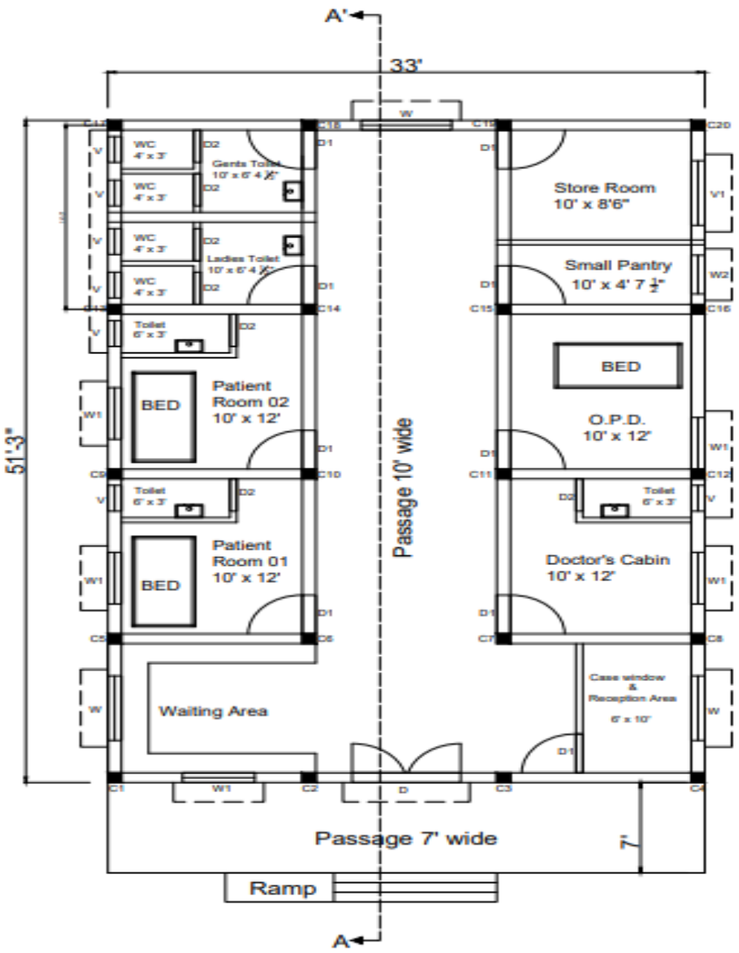
INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	FOUNDATION LAYOUT OF PHC
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)



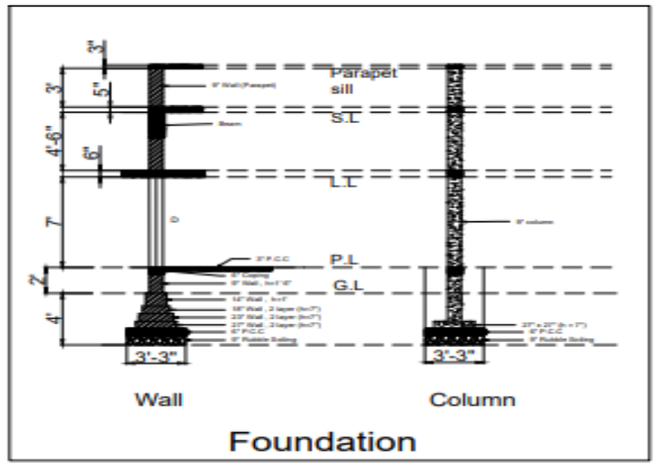
Elevation



Section A - A'



Ground Floor Plan



Foundation

Schedule of Column	
No.	Size
C1 to C20	9" x 9"

OPENING TABLE

D	6' 0" X 7' 0"
D1	3' 0" X 7' 0"
D2	2' 6" X 7' 0"
W	5' 0" X 4' 0"
W1	4' 0" X 4' 0"
W2	3' 0" X 4' 0"
V	2' 0" X 2' 0"
V1	5' 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) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 8"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.

DESIGN PROPOSAL FOR PRIMARY HEALTH CENTRE

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	PRIMARY HEALTH CENTRE
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

13.4 Design proposal for Post office with plan, elevation, section and costing

A post office is a public facility that provides mail services, including accepting of letters and parcels, providing post office boxes, and selling postage stamps, packaging, and stationery.

Post offices may also offer additional services, which vary by country. These include providing and accepting government forms (such as passport applications), processing government services and fees (such as road tax, and postal savings or bank post office).

In our allocated village there is no separate post office and also not in nearby villages (Pamol, Dahemi, Naaman). so, we decided to provide a post office which is helpful to the villagers in communications with other cities. and the post office is providing a banking facility also. So, the villagers are put their savings (money) in to the post office.

The post office constructed in 760 sft. Here, we give AutoCAD Designs, Measurement sheet and Abstract sheet of Post office and the approximately cost of post office is 5.92 lakh INR.

Table 24 Measurement Sheet of Post office

Project : Post Office								
Measurement Sheet								
No	**Item**	**No**	**Length**	**Breadth**	**Depth**	**Qut**	**Total**	**Unit**
1	**Earth Work**							
A)	**Excavation Work**							
	i) LW 1	2.00	36.83	3.25	4	957.58		
	ii) SW1	2.00	18.125	3.25	4	471.25		
						Total	**1,428.83**	**cft**
	Excavation of front otta							
	Area (7.75 x 3)	1.00	7.75	3	1	23.25		
						Total	**23.25**	**cft**
B)	**P.C.C**							
	i) LW 1	2.00	36.83	3.25	0.5	119.70		
	ii) SW1	2.00	18.125	3.25	0.5	58.91		
						Total	**178.60**	**cft**
	P.C.C @ front otta	1.00	7.75	3	0.5	**11.63**		**cft**
C)	**Brick masonry up to GL**							
	i) LW 1							
	27"	2.00	35.83	2.25	0.58	93.52		
	23"	2.00	35.5	1.92	0.58	79.07		
	18"	2.00	35.08	1.5	0.58	61.04		
	14"	2.00	34.75	1.16	1	80.62		
						Total	**314.24**	**cft**
	ii) SW1							
	27"	2.00	19.125	2.25	0.58	49.92		
	23"	2.00	19.455	1.92	0.58	43.33		
	18"	2.00	19.875	1.5	0.58	34.58		
	14"	2.00	20.205	1.16	1	46.88		
						Total	**174.70**	**cft**
	Deduction							
	i) Column footing	8.00	2.25	2.25	0.58	**23.49**		
	ii) column	8.00	0.75	0.75	2.16	**9.72**		
						Total	**455.74**	**cft**

	BK for otta							
	LW	2	3.00	0.75	0.5	2.25		
	SW	7	7.75	0.75	0.5	20.34		
						Total	**22.59**	**cft**
D)	**Refilling in to trench**							
	(Excavation - construction)					**Total**	**783.52**	**cft**
E)	**Refilling in to Plinth**							
	Total area	1.00	691		1.75		**1,209.25**	**cft**
	(677 sft + (6.25x2.25)= 691 sft)							
2	**P.C.C Work**							
	i) LW1	2.00	36.83	3.25	0.5	119.70		
	ii) SW1	2.00	18.125	3.25	0.5	58.91		
	iii) @ floor	1.00	700.25		0.25	175.06		
	677 sft + (7.75x3)= 700.25 sft)					**Total**	**353.67**	**cft**
3	**Brick masonry**							
A)	**Up to plinth**							
	i) LW 1							
	27"	2.00	35.83	2.25	0.58	93.52		
	23"	2.00	35.5	1.92	0.58	79.07		
	18"	2.00	35.08	1.5	0.58	61.04		
	14"	2.00	34.75	1.16	1	80.62		
	9"	2.00	34.33	0.75	1.5	77.24		
						Total	**391.48**	**cft**
	ii) SW1							
	27"	2.00	19.125	2.25	0.58	49.92		
	23"	2.00	19.455	1.92	0.58	43.33		
	18"	2.00	19.875	1.5	0.58	34.58		
	14"	2.00	20.205	1.16	1	46.88		
	9"	2.00	20.625	0.75	1.5	46.41		
						Total	**221.11**	**cft**
	BK for otta							
	LW	1.00	7.75	0.75	0.75	**4.36**		
	SW	2.00	2.25	0.75	0.75	**2.53**		
						Total	**6.89**	**cft**
						Total	**619.49**	**cft**
	Deduction							

	i) Column	8.00	0.75	0.75	1.5	**6.75**		
						Total	**612.74**	**cft**
B)	**Up to slab**							
	i) LW 1	2.00	34.33	0.75	9.5	489.20		
	ii) SW1	2.00	20.625	0.75	9.5	293.91		
	(H= 12' - 2'(B) - 0.5'(LL) = 9.5)							
	iii) Partition wall							
	LW (V)	1.00	6.75	0.375	9.5	24.05		
	SW	2.00	4	0.375	9.5	28.50		
						Total	**835.66**	**cft**
	Deduction							
	D (5')	1.00	5	0.75	7	26.25		
	D1(2.5')	2.00	2.5	0.375	7	13.13		
	W(4')	3.00	4	0.75	4	36.00		
	W1(3')	1.00	3	0.75	4	9.00		
	W2(2')	1.00	2	0.75	7	10.50		
	V(2')	2.00	2	0.75	2	6.00		
	Column	8.00	0.75	0.75	9.5	42.75		
						Total	**143.63**	**cft**
			BK up to SLAB			**Total**	**692.03**	**cft**
C)	**Parapet**							
	i) LW 1	2.00	34.33	0.75	3	154.49		
	ii) SW1	2.00	20.625	0.75	3	92.81		
						Total	**247.30**	**cft**
4	**R.C.C work**							
A)	**Coping**							
	i) LW 1	2.00	34.33	0.75	0.5	25.75		
	ii) SW1	2.00	20.625	0.75	0.5	15.47		
						Total	**41.22**	**cft**
B)	**Plinth Beam**							
	B1	1.00	7.5	0.375	1	2.81		
	B2	2.00	4.75	0.375	1	3.56		
						Total	**6.38**	**cft**

C)	**Lintel**							
	i) LW 1	2.00	34.33	0.75	0.5	25.75		
	ii) SW1	2.00	20.625	0.75	0.5	15.47		
	iii) Partition wall							
	LW (V)	1.00	6.75	0.375	0.5	1.27		
	SW	2.00	4	0.375	0.5	1.50		
						Total	**43.98**	**cft**
D)	**Chhajja**							
	Total Length	1.00	35.5	1.5	0.25	**13.31**		**cft**
E)	**Beam**							
	Horizontal B1	4.00	20.625	0.75	2	123.75		
	Vertical B2	2.00	32.75	0.75	2	98.25		
						Total	**222.00**	**cft**
F)	**Column**							
	i) Footing	8.00	2.25	2.25	0.58	23.49		
	ii) Column	8.00	0.75	0.75	19.83	89.24		
						Total	**112.73**	**cft**
G)	**Slab**							
	Total Area (760 sft)	1.00	760		0.42	319.20		
						Total	**319.20**	**cft**
5	**Plaster**							
A)	**Inside wall**							
	i) Room	2.00	32.83		12	787.92		
		2.00	20.625		12	495.00		
	ii) WC							
	LW all side	2.00	6.75		12	162.00		
	SW all side	4.00	4		12	192.00		
	Deduction							
	D (5')	0.50	5		7	17.50		
	D1(2.5')	1.00	2.5		7	17.50		
	W(4')	1.50	4		4	24.00		
	W1(3')	0.50	3		4	6.00		
	W2(2')	0.50	2		7	7.00		
	V(2')	1.00	2		2	4.00		
						Total	**1,560.92**	**sft**

	ii) Inside Parapet	2.00	32.83		3.25	213.40		
		2.00	20.625		3.25	134.06		
						Total	**347.46**	**sft**
B)	**Ceiling**							
	i) Room	1.00	32.83	20.625		677.12		
						Total	**677.12**	**sft**
C)	**Outside wall up to parapet**							
	i) LW 1	2.00	34.33		17.67	1,213.22		
	ii) SW1	2.00	22.125		17.67	781.90		
	(H= PL +LL +SL + parapet)							
	(H= 2'+12'+0.42'+3'+.25')=17.67'							
	Deduction							
	D (5')	0.50	5		7	17.50		
	W(4')	1.50	4		4	24.00		
	W1(3')	0.50	3		4	6.00		
	W2(2')	0.50	2		7	7.00		
	V(2')	1.00	2		2	4.00		
						Total	**1,936.62**	**sft**
D)	**Chhajja**							
	i) over 5' door	1	28.375			28.38		
	total A= (8.5'x1.5'x2) + (1.5'x0.25'x2) + (8.5'x0.25')							
	ii) over 4' window	3	17			51.00		
	Total A= (5'x1.5'x2) + (1.5'x.25'x2) + (5'x.25')							
	ii) over 3' window	1	15.375			15.38		
	Total A= (4.5'x1.5'x2) + (1.5'x.25'x2) + (4.5'x.25')							
						Total	**94.75**	**sft**
6	**Flooring**							
A)	Room	1.00	32.83	20.625		**677.12**		**sft**
7	**Colour**							
A)	Room					**1,560.92**		**sft**
D)	Ceiling					**677.12**		**sft**
E)	Outer side (all side)					**1,936.62**		**sft**

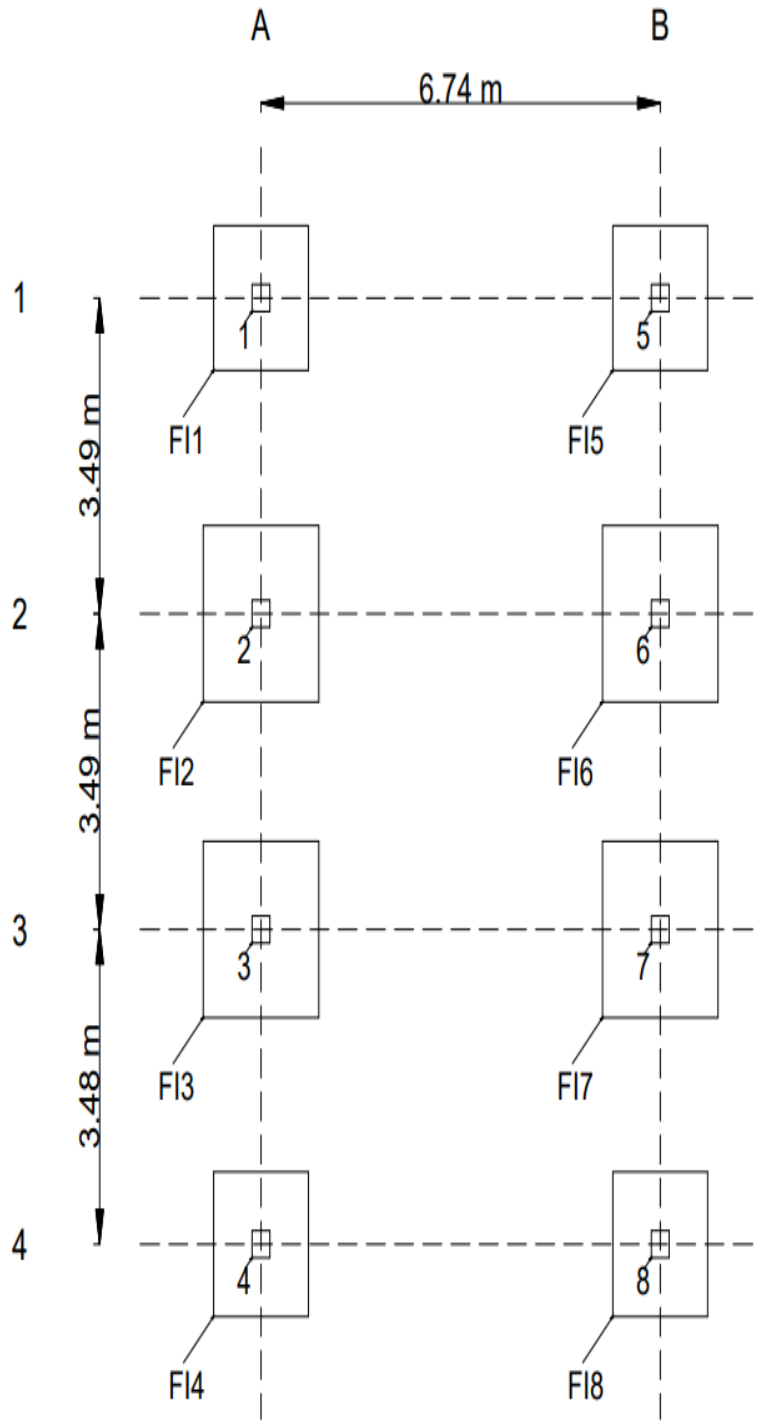
Table 25 Abstract Sheet of Post office

Project : Post Office					
ABSTRACT SHEET					
No	**Item**	**Quantity**	**Rate (rs)**	**Per cft**	**Amount (rs)**
1	**Earthwork**				
	A) Excavation	1,452.08	7	cft	10,164.56
	B) Soil filling in trench	783.52	4	cft	3,134.09
	C) soil filling in plinth	1,209.25	4	cft	4,837.00
				Total	**18,135.65**
2	**PCC**				
	A) P.C.C. Foundation	190.23	85.97	cft	16,353.97
	B) PCC at floor	175.06	78	cft	13,654.88
				Total	**30,008.84**
3	**Brick masonry up to plinth (1:6)**				
	A)up to plinth	612.74	68.26	cft	41,825.29
	B)up to slab	692.03	68.26	cft	47,238.01
	C) Parapet	247.30	68.26	cft	16,880.53
				Total	**1,05,943.83**
4	**R.C.C Work (1:2:(2+1))**				
	A) Coping	41.22	121.74	cft	5,017.67
	B) Plinth Beam	6.38	121.74	cft	776.09
	C) Column	112.73	121.74	cft	13,723.14
	D) Lintel	43.98	121.74	cft	5,354.35
	E) G.F Chhajja	13.31	121.74	cft	1,620.66
	F) G.F Slab	319.20	121.74	cft	38,859.41
	G) G.F Beam	222.00	121.74	cft	27,026.28
	Total	536.81		**Total**	**92,377.61**
5	**Plaster Work (12 mm, 1:4)**				
A	Inside Ceiling	677.12	24.78	sft	16,779.00
B	Inside Wall	1,560.92	24.78	sft	38,679.60
C	Outside Chhajja	94.75	24.78	sft	2,347.91
D	Outside Wall	1,936.62	24.78	sft	47,989.44
E	Inside Parapet Plaster	347.46	24.78	sft	8,610.00
				Total	**1,14,405.94**
6	**Colour**				
A	Inside Wall	1,560.92	25.00	sft	39,023.00
B	Outside Wall	1,936.62	25.00	sft	48,415.49
C	Inside parapet	347.46	25.00	sft	8,686.44

D	Inside ceiling	677.12	25.00	sft	16,927.97
				Total	**1,13,052.90**
7	**Flooring**				
A	Tiles	677.12	100.00	sft	67,711.88
				Total	**67,711.88**
8	**Electric**				**50,000.00**
			Total Amount		**5,91,636.63**

Footing No.	Group ID	Foundation Geometry		
-	-	Length	Width	Thickness
17	1	1.600 m	1.600 m	0.305 m
18	2	1.950 m	1.950 m	0.305 m
19	3	1.950 m	1.950 m	0.305 m
20	4	1.600 m	1.600 m	0.305 m
21	5	1.600 m	1.600 m	0.305 m
22	6	1.950 m	1.950 m	0.305 m
23	7	1.950 m	1.950 m	0.305 m
24	8	1.600 m	1.600 m	0.305 m

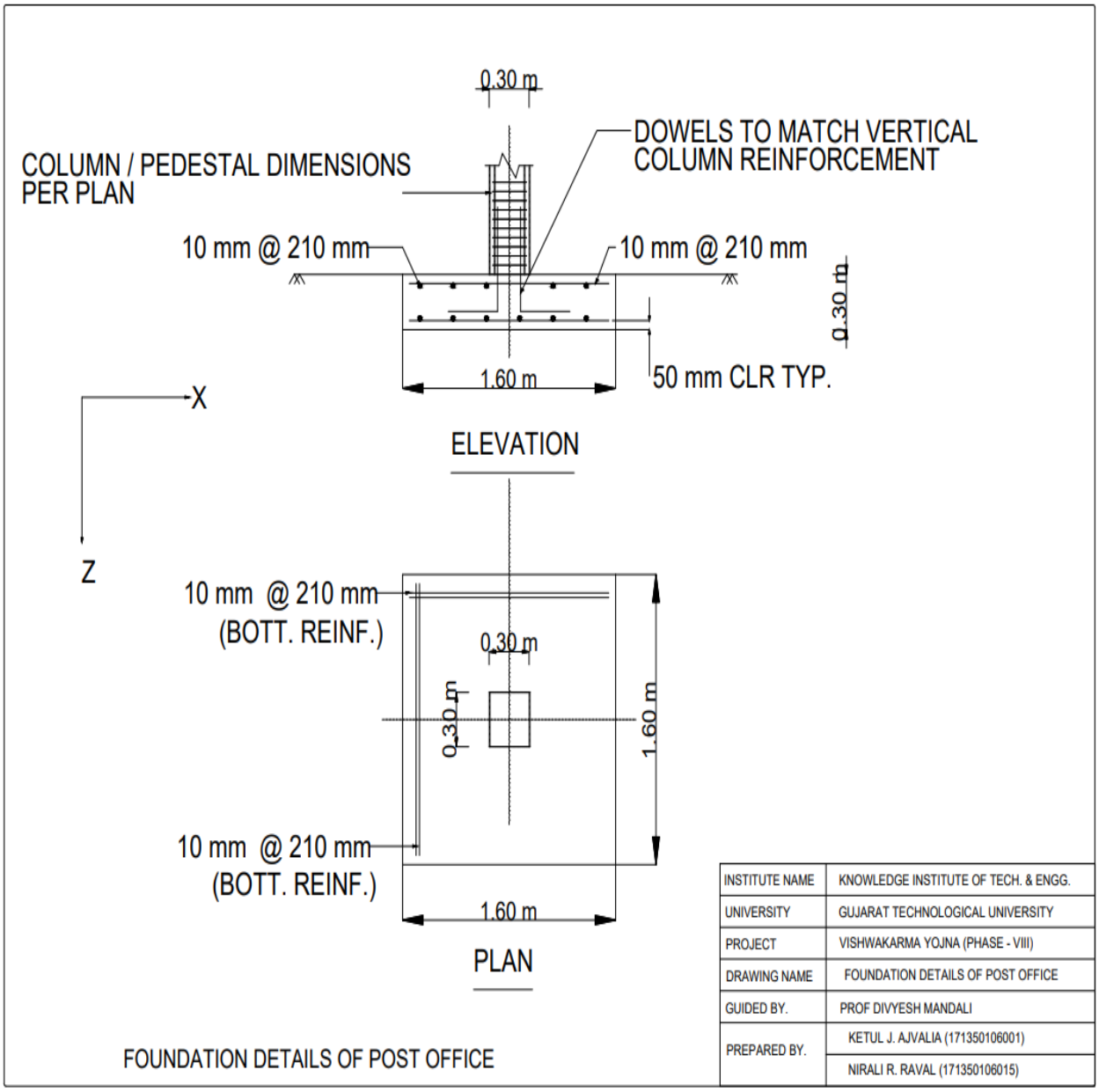
Footing No.	Footing Reinforcement				Pedestal Reinforcement	
-	Bottom Reinforcement(M_z)	Bottom Reinforcement(M_x)	Top Reinforcement(M_z)	Top Reinforcement(M_x)	Main Steel	Trans Steel
17	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	N/A	N/A
18	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	N/A	N/A
19	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	N/A	N/A
20	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	N/A	N/A
21	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	N/A	N/A
22	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	N/A	N/A
23	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	Ø10 @ 200 mm c/c	N/A	N/A
24	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	Ø10 @ 210 mm c/c	N/A	N/A



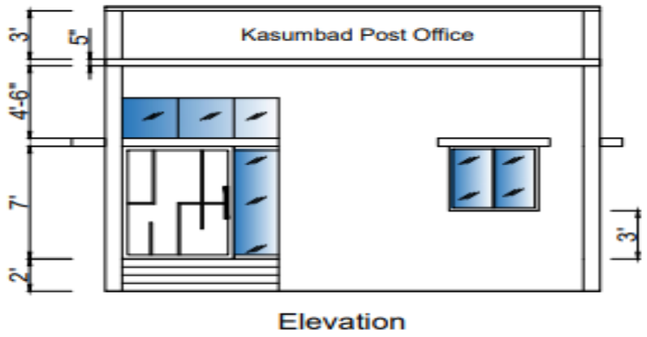
FOUNDATION LAYOUT OF POST OFFICE

MARK	SIZE	Column Nos.
FI1	1.600 X 1.600 X 0.305	1
FI2	1.950 X 1.950 X 0.305	2
FI3	1.950 X 1.950 X 0.305	3
FI4	1.600 X 1.600 X 0.305	4
FI5	1.600 X 1.600 X 0.305	5
FI6	1.950 X 1.950 X 0.305	6
FI7	1.950 X 1.950 X 0.305	7
FI8	1.600 X 1.600 X 0.305	8

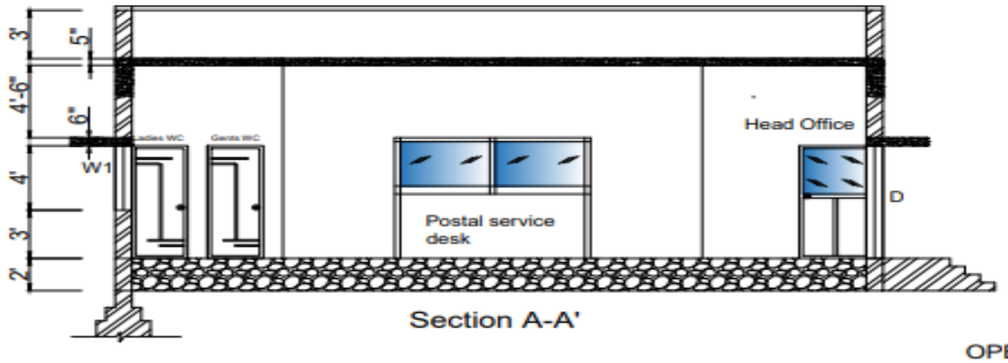
INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	FOUNDATION LAYOUT OF POST OFFICE
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)



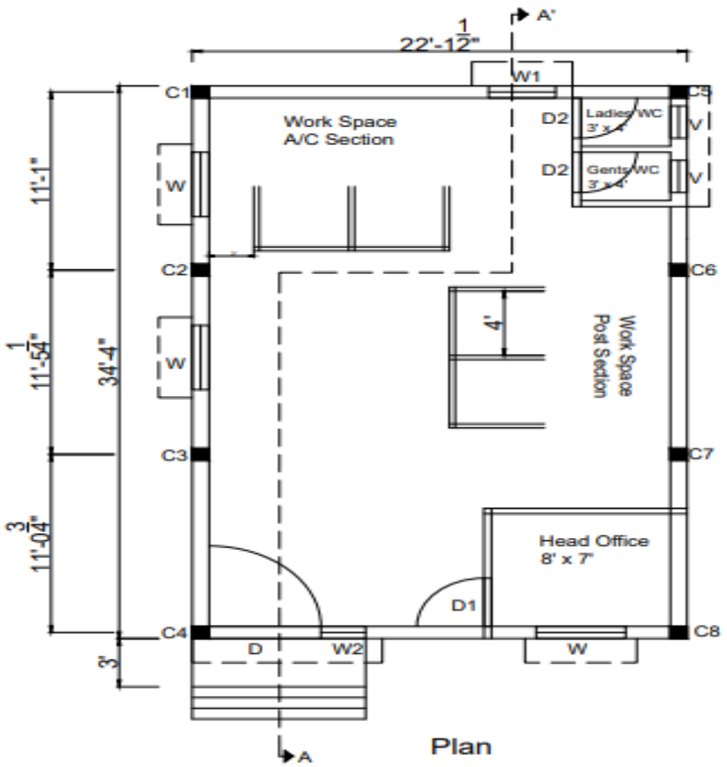
INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	FOUNDATION DETAILS OF POST OFFICE
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)



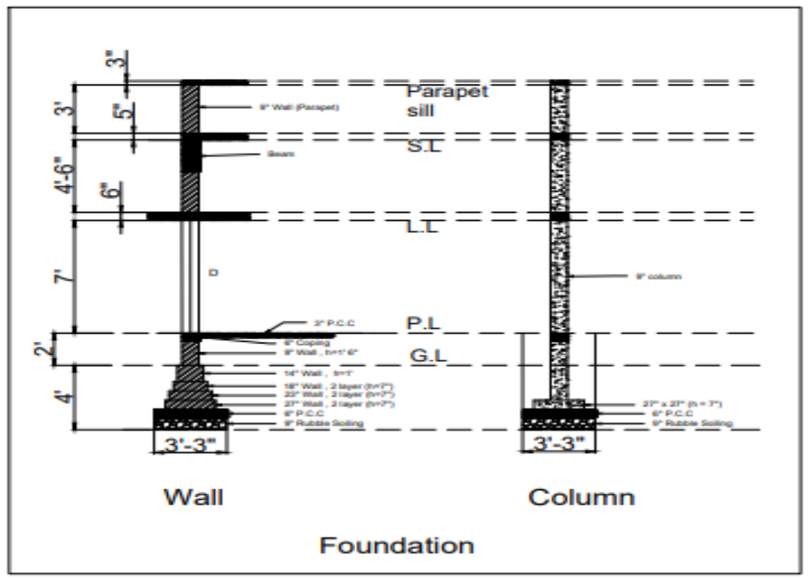
Elevation



Section A-A'



Plan



Wall Column

Foundation

OPENING TABLE

D	5' 0" X 7' 0"
D1	3' 0" X 7' 0"
D2	2' 6" X 7' 0"
W	4' 0" X 4' 0"
W1	3' 0" X 4' 0"
W2	2' 0" X 7' 0"
V	2' 0" X 2' 0"

Schedule of Column	
No.	Size
C1 to C8	9" x 9"

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) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 8"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.

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PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

DESIGN PROPOSAL FOR POST OFFICE

13.5 Design proposal for the Community hall with plan, elevation, section and costing

In our village, Community hall is very old and it is in critical condition as well as it is small to use So, villagers don't use that community hall. Also, the community hall is used by the one of resident of village who doesn't has his own house. So, we decided to plan new design proposal of community hall.

Here, we give AutoCAD Designs, Measurement sheet and Abstract sheet of Community hall and the approximately cost of community hall is 38.63 lakh INR.

Present condition of the community hall,

Table 26 Measurement Sheet of the community hall

Project: Community Hall								
Measurement Sheet								
No	**Item**	**No**	**Length**	**Breadth**	**Depth**	**Qty.**	**Total**	**Unit**
1	**Earth Work**							
A)	**Excavation Work**							
	i) LW 1	2.00	87.375	3.25	4	2,271.75		
	ii) LW2	2.00	13.75	3.25	4	357.50		
	iii) LW3	2.00	19	3.25	4	494.00		
	iv) SW1	4.00	43	3.25	4	2,236.00		
	FOOTINGS							
	F(T=26)	26.00	5	5	2	1,300.00		
	F(t=10)	10.00	5	5	6	1,500.00		
						Total	**8,159.25**	**cft**
B)	**P.C.C**							
	i) LW 1	2.00	87.375	3.25	0.5	283.97		
	ii) LW2	2.00	13.75	3.25	0.5	44.69		
	iii) LW3	2.00	19	3.25	0.5	61.75		
	ii) SW1	4.00	43	3.25	0.5	279.50		
	FOOTINGS							
	F(T=26)	26.00	5	5	0.5	325.00		
	F(t=10)	10.00	5	5	0.5	125.00		
						Total	**1,119.91**	**cft**
C)	**Rubble Soiling**							
	i) LW 1	2.00	87.375	3.25	0.75	425.95		
	ii) LW2	2.00	13.75	3.25	0.75	67.03		
	iii) LW3	2.00	19	3.25	0.75	92.63		
	ii) SW1	4.00	43	3.25	0.75	419.25		
	FOOTINGS							
	F(T=26)	26.00	5	5	0.75	487.50		
	F(t=10)	10.00	5	5	0.75	187.50		
						Total	**1,679.86**	**cft**

D)	**Brick masonry up to GL**							
	i) LW 1							
	27"	2.00	86.375	2.25	0.58	225.44		
	23"	2.00	86.045	1.92	0.58	191.64		
	18"	2.00	85.625	1.5	0.58	148.99		
	14"	2.00	85.295	1.16	1	197.88		
						Total	**763.95**	**cft**

	ii) LW2							
	27"	2.00	12.75	2.25	0.58	33.28		
	23"	2.00	12.42	1.92	0.58	27.66		
	18"	2.00	12	1.5	0.58	20.88		
	14"	2.00	11.67	1.16	1	27.07		
						Total	**108.89**	**cft**
	iii) LW3							
	27"	2.00	18	2.25	0.58	46.98		
	23"	2.00	17.67	1.92	0.58	39.35		
	18"	2.00	17.25	1.5	0.58	30.02		
	14"	2.00	16.92	1.16	1	39.25		
						Total	**155.60**	**cft**
	iv) SW1							
	27"	4.00	44	2.25	0.58	229.68		
	23"	4.00	44.33	1.92	0.58	197.46		
	18"	4.00	44.75	1.5	0.58	155.73		
	14"	4.00	45.08	1.16	1	209.17		
						Total	**792.04**	**cft**
	Deduction							
	ii) column	26.00	1.16	1.16	4	139.94		
						Total	**1,680.55**	**cft**
E)	**R.C.C work**							
	Footing	36.00	4	4	1.25	720.00		
	Column	36.00	1.16	1.16	3.5	169.55		
						Total	**889.55**	**cft**

E)	**Refilling in to trench**							
	(Excavation - construction)					**Total**	**2,789.39**	**cft**
	Soil remaining after filling in trenches						**5,369.86**	
F)	**Refilling in to Plinth**							
	Total area	1.00	3600		2		**7,200.00**	**cft**
	(2644+300+144+144+131+101+198= 3600 sft)							
2	**P.C.C Work**							
	i) LW1	2.00	87.375	3.25	0.5	283.97		
	ii) LW2	2.00	13.75	3.25	0.5	44.69		
	iii) LW3	2.00	19	3.25	0.5	61.75		
	iv) SW1	4.00	43	3.25	0.5	279.50		

	FOOTINGS							
	F(T=26)	26.00	5	5	0.5	325.00		
	F(t=10)	10.00	5	5	0.5	125.00		
	v) @ floor	1.00	3600		0.25	900.00		
						Total	**2,019.91**	**cft**
3	**Brick masonry**							
A)	**Up to plinth**							
	i) LW 1							
	27"	2.00	86.375	2.25	0.58	225.44		
	23"	2.00	86.045	1.92	0.58	191.64		
	18"	2.00	85.625	1.5	0.58	148.99		
	14"	2.00	85.295	1.16	1	197.88		
	9"	2.00	84.875	0.75	1.58	201.15		
						Total	**965.10**	**cft**
	ii) LW2							
	27"	2.00	12.75	2.25	0.58	33.28		
	23"	2.00	12.42	1.92	0.58	27.66		
	18"	2.00	12	1.5	0.58	20.88		
	14"	2.00	11.67	1.16	1	27.07		
	9"	2.00	11.25	0.75	1.58	26.66		
						Total	**135.56**	**cft**
	iii) LW3							
	27"	2.00	18	2.25	0.58	46.98		
	23"	2.00	17.67	1.92	0.58	39.35		
	18"	2.00	17.25	1.5	0.58	30.02		
	14"	2.00	16.92	1.16	1	39.25		
	9"	2.00	16.5	0.75	1.58	39.11		
						Total	**194.71**	**cft**
	iv) SW1							
	27"	4.00	44	2.25	0.58	229.68		
	23"	4.00	44.33	1.92	0.58	197.46		
	18"	4.00	44.75	1.5	0.58	155.73		
	14"	4.00	45.08	1.16	1	209.17		
	9"	4.00	45.5	0.75	1.58	215.67		
						Total	**1,007.71**	**cft**
						Total	**2,303.08**	**cft**
	Deduction							
	i) Column	36.00	1.16	1.16	1.58	76.54		
						Total	**2,226.55**	**cft**

B)	**Up to G.F slab**							
	i) LW 1	2.00	84.875	0.75	9.5	1,209.47		
	ii) LW2	2.00	11.25	0.75	9.5	160.31		
	iii) LW3	2.00	16.5	0.75	9.5	235.13		
	iv) SW1	4.00	45.5	0.75	9.5	1,296.75		
	(H= 12' - 2'(B) - 0.5'(LL) = 9.5ft)							
						Total	**2,901.66**	**cft**
	Deduction							
	D (6')	3.00	6	0.75	7.5	101.25		
	D1(4')	1.00	4	0.75	7.5	22.50		
	D3(2.5')	2.00	2.5	0.75	7.5	28.13		
	W(3)	2.00	3	0.75	4.5	20.25		
	W1(3.5')	3.00	3.5	0.75	8.5	66.94		
	W2(3')	6.00	3	0.75	8.5	114.75		
	V(2')	6.00	2	0.75	2	18.00		
	V1(3')	2.00	3	0.75	2	9.00		
	Column	26.00	1.16	1.16	9.5	332.36		
						Total	**713.18**	**cft**
			BK up to G.F SLAB			**Total**	**2,188.48**	**cft**
C)	**Up to F.F slab**							
	i) LW 1	2.00	84.875	0.75	9.5	1,209.47		
	ii) LW2	2.00	11.25	0.75	9.5	160.31		
	iii) LW3	2.00	16.5	0.75	9.5	235.13		
	iv) SW1	4.00	45.5	0.75	9.5	1,296.75		
	(H= 12' - 2'(B) - 0.5'(LL) = 9.5ft)					**Total**	**2,901.66**	**cft**
	Deduction							
	D (6')	1.00	6	0.75	7.5	33.75		
	D2 (3')	2.00	3	0.75	7.5	33.75		
	D3(2.5')	2.00	2.5	0.75	7.5	28.13		
	W(3)	2.00	3	0.75	4.5	20.25		
	W1(3.5')	4.00	3.5	0.75	8.5	89.25		
	W2(3')	8.00	3	0.75	8.5	153.00		
	V(2')	8.00	2	0.75	2	24.00		
	Column	26.00	1.16	1.16	9.5	332.36		
						Total	**714.49**	**cft**
			BK up to F.F SLAB			**Total**	**2,187.17**	**cft**

C)	**Parapet**							
	i) LW 1	2.00	84.875	0.75	4	509.25		
	ii) SW1	2.00	45.5	0.75	4	273.00		
						Total	**782.25**	**cft**
4	**R.C.C work**							
A)	**Coping**							
	i) LW 1	2.00	84.875	0.75	0.75	95.48		
	ii) LW2	2.00	11.25	0.75	0.75	12.66		
	iii) LW3	2.00	16.5	0.75	0.75	18.56		
	iv) SW1	4.00	45.5	0.75	0.75	102.38		
						Total	**229.08**	**cft**
B)	**Plinth Beam**							
	B1	5.00	47	0.75	1	176.25		
	B2	2.00	57.875	0.75	1	86.81		
						Total	**263.06**	**cft**
C)	**Lintel (BOTH FLOOR)**							
	i) LW 1	2.00	3.5	0.75	0.5	2.63		
	ii) LW2	2.00	3	0.75	0.5	2.25		
	iii) LW3	2.00	2	0.75	0.5	1.50		
	iv) SW1	4.00	1.16	0.75	0.5	1.74		
						Total	**16.23**	**cft**
D)	**Chhajja**							
	Total Length G.F	1.00	37	1.5	0.33	**18.32**		**cft**
	Total Length F.F	1.00	33.5	1.5	0.33	**16.58**		**cft**
E)	**Beam**							
	Horizontal B1	4.00	84.875	0.75	2	509.25		
	Vertical B2	9.00	47	0.75	2	634.50		
						Total	**1,143.75**	**cft**
F)	**Column**							
	i) Footing	36.00	4	4	1.25	720.00		
	ii) Column	36.00	1.16	1.16	31.5	1,525.91		
	(BOTH FLOOR+PARAPET)					**Total**	**2,245.91**	**cft**
G)	**Slab**							
	Total Area (BOTH FLOOR)	2.00	3990		0.5	3,990.00		
						Total	**3,990.00**	**cft**

5	**Plaster**							
A)	**Inside wall**							
	i) Dining hall	2.00	60		12	1,440.00		
		2.00	45.5		12	1,092.00		
	ii) Marriage hall	2.00	60		12	1,440.00		
		2.00	45.5		12	1,092.00		
	iii) store room	2.00	12		12	288.00		
		2.00	12		12	288.00		
	iv) wash area	2.00	12		12	288.00		
		2.00	12		12	288.00		
	v) Gents WC x2	4.00	9.75		12	468.00		
		4.00	13.5		12	648.00		
	vi) Ladies WC x2	4.00	9.75		12	468.00		
		4.00	10.5		12	504.00		
	vii) changing room x 2	4.00	12		12	576.00		
		4.00	12		12	576.00		
	viii) Kitchen	2.00	15		12	360.00		
		2.00	20		12	480.00		
						Total	**10,296.00**	**sft**
	Deduction (G.F)							
	D (6')	1.50	6	0.75	7.5	50.63		
	D1(4')	1.00	4	0.75	7.5	22.50		
	D3(2.5')	2.00	2.5	0.75	7.5	28.13		
	W(3)	1.00	3	0.75	4.5	10.13		
	W1(3.5')	1.50	3.5	0.75	8.5	33.47		
	W2(3')	3.00	3	0.75	8.5	57.38		
	V(2')	3.00	2	0.75	2	9.00		
	V1(3')	1.00	3	0.75	2	4.50		
	Deduction (F.F)							
	D (6')	1.00	6	0.75	7.5	33.75		
	D2 (3')	2.00	3	0.75	7.5	33.75		
	D3(2.5')	2.00	2.5	0.75	7.5	28.13		
	W(3)	1.00	3	0.75	4.5	10.13		
	W1(3.5')	2.00	3.5	0.75	8.5	44.63		
	W2(3')	4.00	3	0.75	8.5	76.50		
	V(2')	4.00	2	0.75	2	12.00		
						Total	**454.59**	**sft**
						Total	**9,841.41**	**sft**
	ix) Inside Parapet	2.00	83.375		4	667.00		
		2.00	45.5		4	364.00		
						Total	**1,031.00**	**sft**

B)	**Ceiling**							
	i) Dining hall	1.00	2644			2,644.00		
	ii) Marriage hall	1.00	2644			2,644.00		
	iii) store room	1.00	12	12		144.00		
	iv) wash area	1.00	12	12		144.00		
	v) Gents WC x2	2.00	9.75	13.5		263.25		
	vi) Ladies WC x2	2.00	9.75	10.5		204.75		
	vii) changing room x 2	2.00	12	12		288.00		
	viii) Kitchen	1.00	15	20		300.00		
						Total	**6,632.00**	**sft**
C)	**Outside wall up to parapet**							
	i) LW 1	2.00	84.875		31	5,262.25		
	ii) SW1	2.00	47		31	2,914.00		
	(H= PL +LL +SL + parapet)					Total	8,176.25	sft
	Deduction (G.F)							
	D (6')	0.50	6	0.75	7.5	16.88		
	W(3)	1.00	3	0.75	4.5	10.13		
	W1(3.5')	1.50	3.5	0.75	8.5	33.47		
	W2(3')	3.00	3	0.75	8.5	57.38		
	V(2')	3.00	2	0.75	2	9.00		
	V1(3')	1.00	3	0.75	2	4.50		
	Deduction (F.F)							
	W(3)	1.00	3	0.75	4.5	10.13		
	W1(3.5')	2.00	3.5	0.75	8.5	44.63		
	W2(3')	4.00	3	0.75	8.5	76.50		
	V(2')	4.00	2	0.75	2	12.00		
						Total	274.59	sft
						Total	**7,901.66**	**sft**
D)	**Chhajja**							
	i) over 3' window	3	14.31			42.93		
	total A= (4'x1.5'x2) + (1.5'x0.33'x2) + (4'x0.33')							
	ii) over 3' ventilation	2	14.31			28.62		
	total A= (4'x1.5'x2) + (1.5'x0.33'x2) + (4'x0.33')							
	ii) over 2' ventilation	2	33.46			66.92		

	total A= (9.75'x1.5'x2) + (1.5'x033'x2) + (9.75'x0.33')							
						Total	**138.47**	**sft**
6	**Flooring**							
	i) Dining hall	1.00	2644			2,644.00		
	ii) Marriage hall	1.00	2644			2,644.00		
	iii) store room	1.00	12	12		144.00		
	iv) wash area	1.00	12	12		144.00		
	v) Gents WC x2	2.00	9.75	13.5		263.25		
	vi) Ladies WC x2	2.00	9.75	10.5		204.75		
	vii) changing room x 2	2.00	12	12		288.00		
	viii) Kitchen	1.00	15	20		300.00		
						Total	**6,632.00**	**sft**
7	**Colour**							
A)	All Room					**9,841.41**		**sft**
B)	Ceiling					**6,632.00**		**sft**
C)	Outer side (all side)					**7,901.66**		**sft**

Table 27 Abstract Sheet of Community hall

Project : Community Hall					
ABSTRACT SHEET					
No	**Item**	**Quantity**	**Rate (rs)**	**Per cft**	**Amount (rs)**
1	**Earthwork**				
	A) Excavation	8,159.25	7	cft	57,114.75
	B) Soil filling in trench	2,789.39	4	cft	11,157.55
	C) soil filling in plinth	7,200.00	4	cft	28,800.00
				Total	**97,072.30**
2	**PCC**				
	A) P.C.C. Fouundation	1,119.91	85.97	cft	96,278.34
	B) PCC at floor	900.00	78	cft	70,200.00
				Total	**1,66,478.34**
3	**Brick masonry up to plinth (1:6)**				
	A)up to plinth	2,226.55	68.26	cft	1,51,984.04
	B)up to G.F slab	2,188.48	68.26	cft	1,49,385.68
	C) up to F.F. slab	2,187.17	68.26	cft	1,49,296.09
	D) Parapet	782.25	68.26	cft	53,396.39
				Total	**5,04,062.19**
4	**R.C.C Work (1:2:(2+1))**				
	A) Coping	229.08	121.74	cft	27,887.97
	B) Plinth Beam	263.06	121.74	cft	32,025.23
	C) Column	2,245.91	121.74	cft	2,73,417.13
	D) Lintel	16.23	121.74	cft	1,975.84
	E) Chhajja	34.90	121.74	cft	4,248.42
	F) G.F Slab	3,990.00	121.74	cft	4,85,742.60
	G) G.F Beam	1,143.75	121.74	cft	1,39,240.13
	Total	7,922.93		**Total**	**9,64,537.32**
5	**Plaster Work (12 mm, 1:4)**				
A	Inside Ceiling	6,632.00	24.78	sft	1,64,340.96
B	Inside Wall	9,841.41	24.78	sft	2,43,870.05
C	Outside Chhajja	138.47	24.78	sft	3,431.29
D	Outside Wall	7,901.66	24.78	sft	1,95,803.04
E	Inside Parapet Plaster	1,031.00	24.78	sft	25,548.18
				Total	**6,32,993.52**

6	**Colour**				
A	Inside Wall	9,841.41	25.00	sft	2,46,035.16
B	Outside Wall	7,901.66	25.00	sft	1,97,541.41
C	Inside parapet	1,031.00	25.00	sft	25,775.00
D	Inside ceiling	6,632.00	25.00	sft	1,65,800.00
				Total	**6,35,151.56**
7	**Flooring**				
A	Tiles	6,632.00	100.00	sft	6,63,200.00
				Total	**6,63,200.00**
8	**Electric**				**1,00,000.00**
9	**Sanitation**				**1,00,000.00**
			Total Amount		**38,63,495.24**

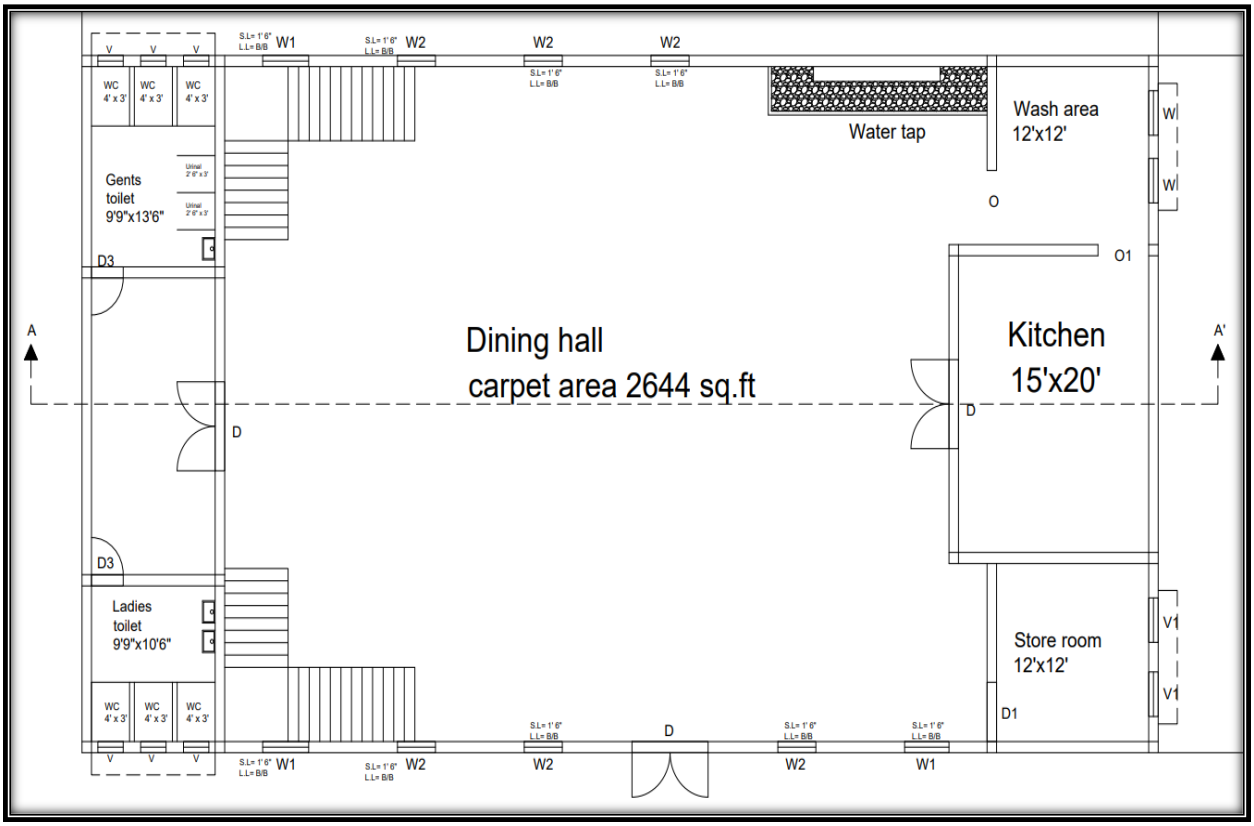


Figure 60 G.F Plan of Community hall

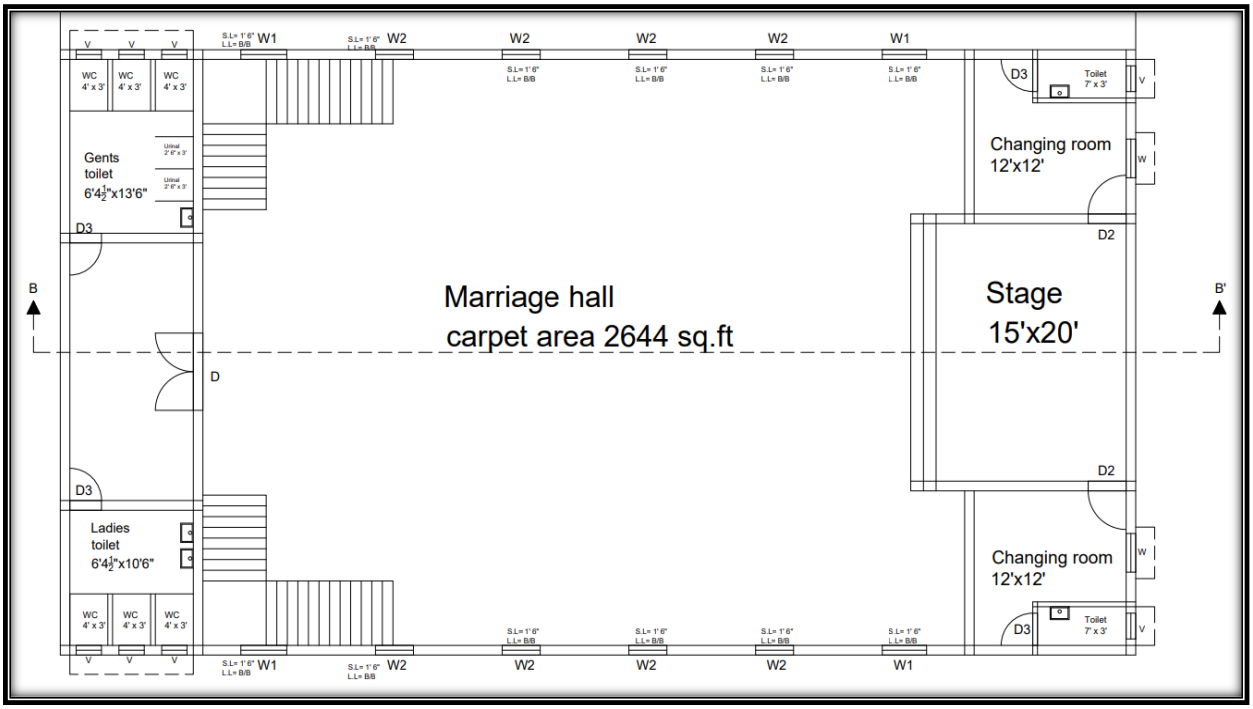


Figure 61 F.F plan of Community hall

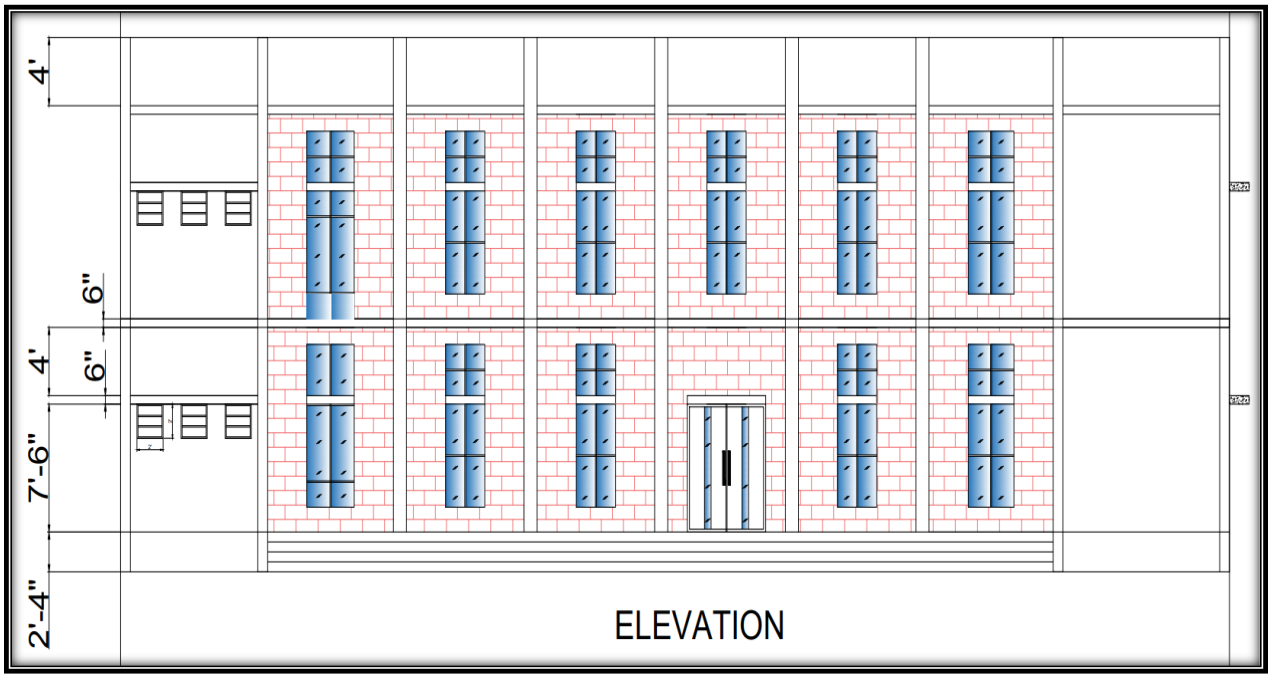


Figure 62 Elevation of Community hall

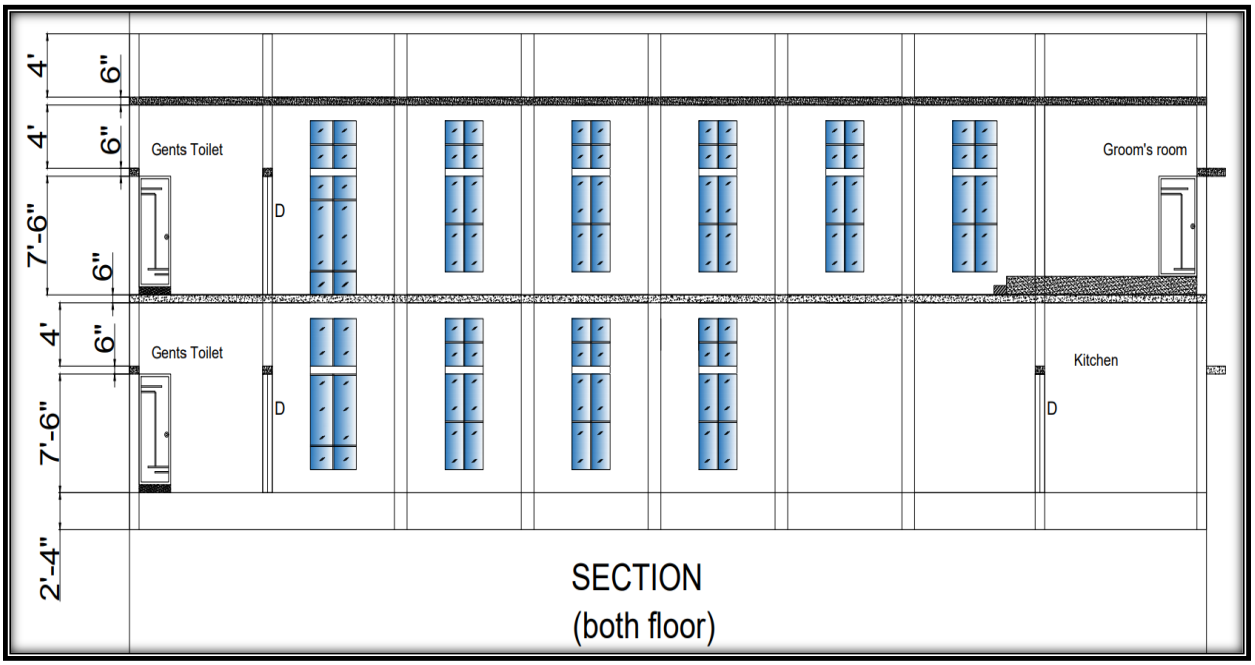


Figure 63 Section of Community hall

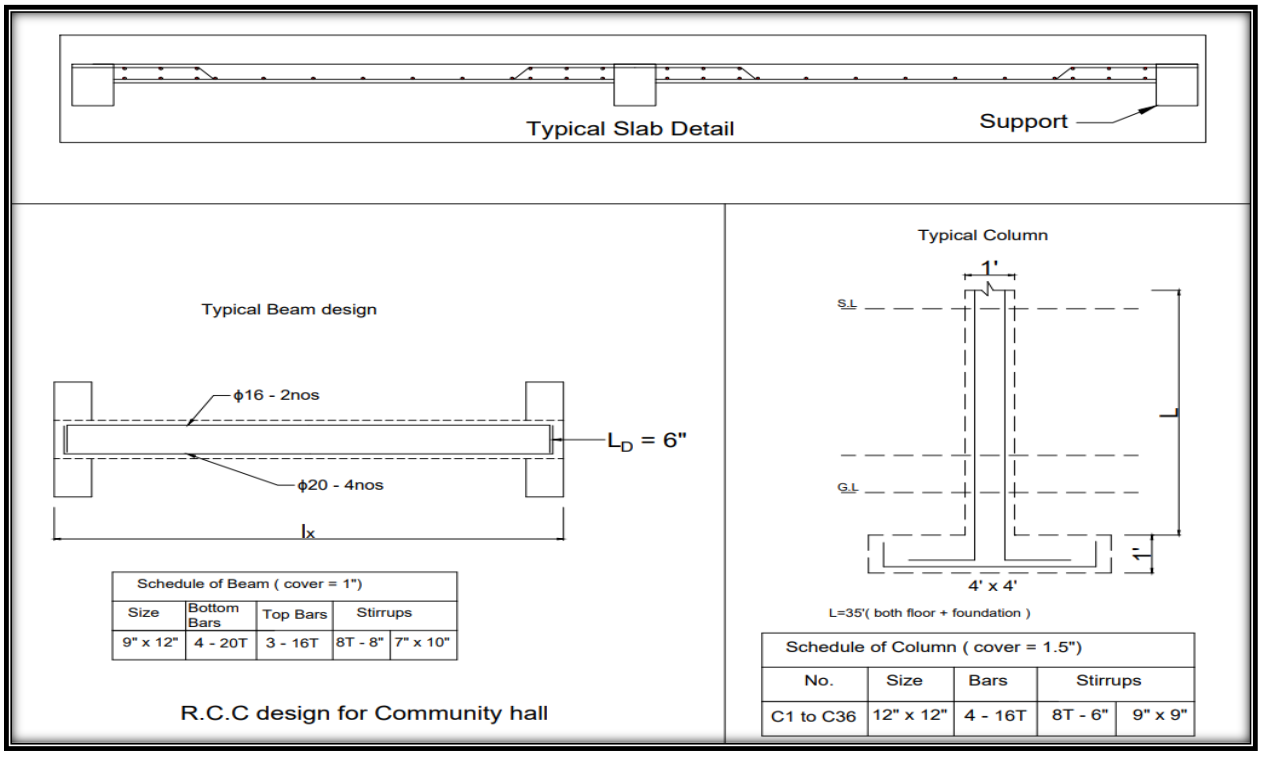


Figure 64 Structure design of community hall

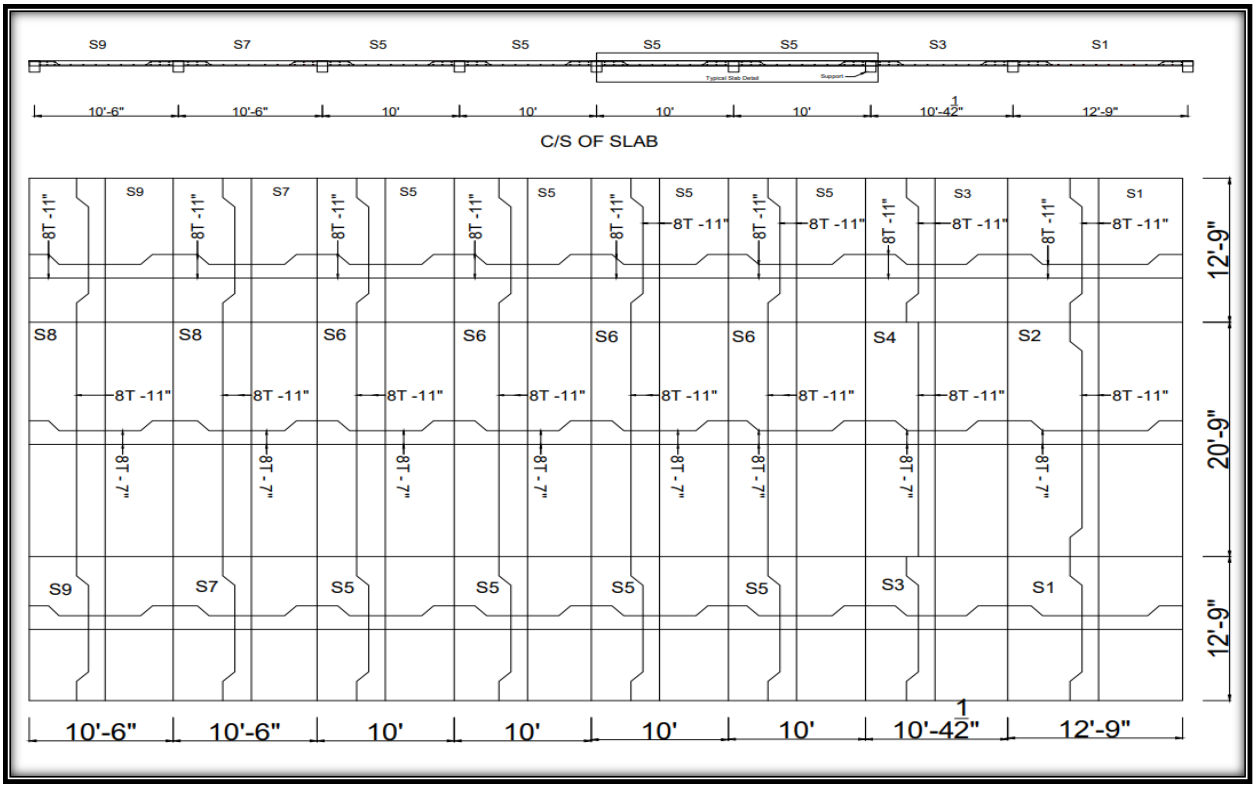


Figure 65 Slab design of community hall

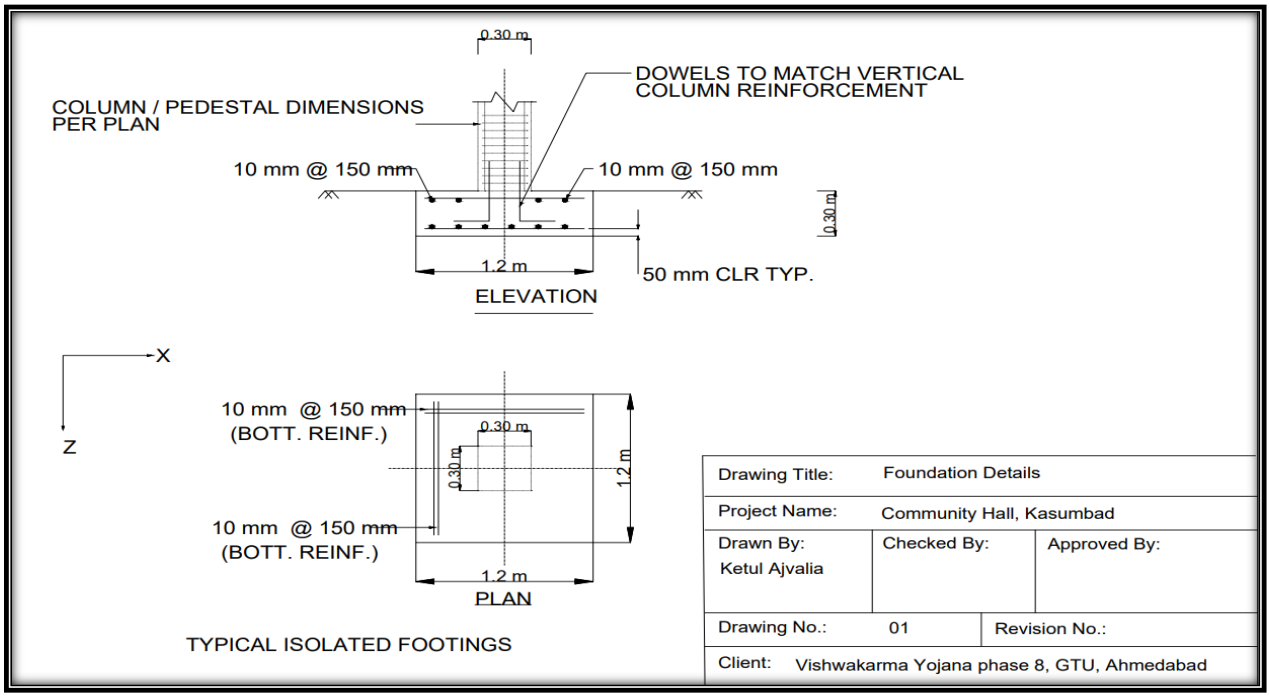
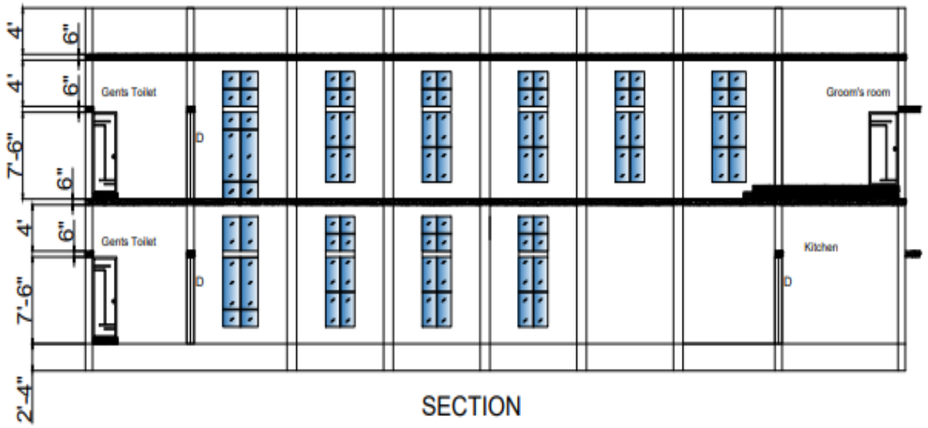
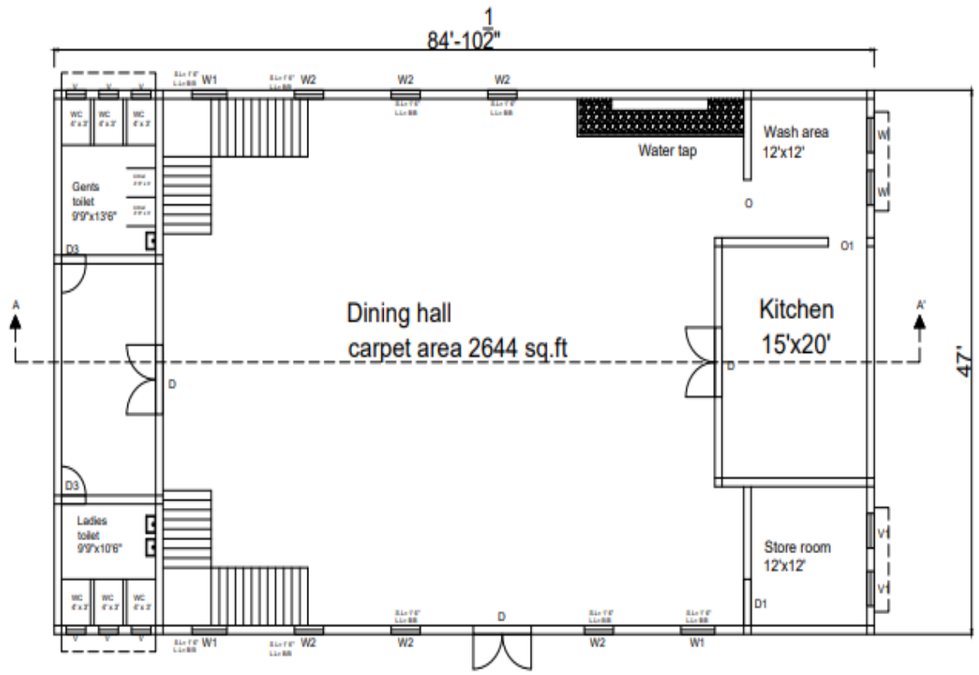


Figure 66 Foundation details

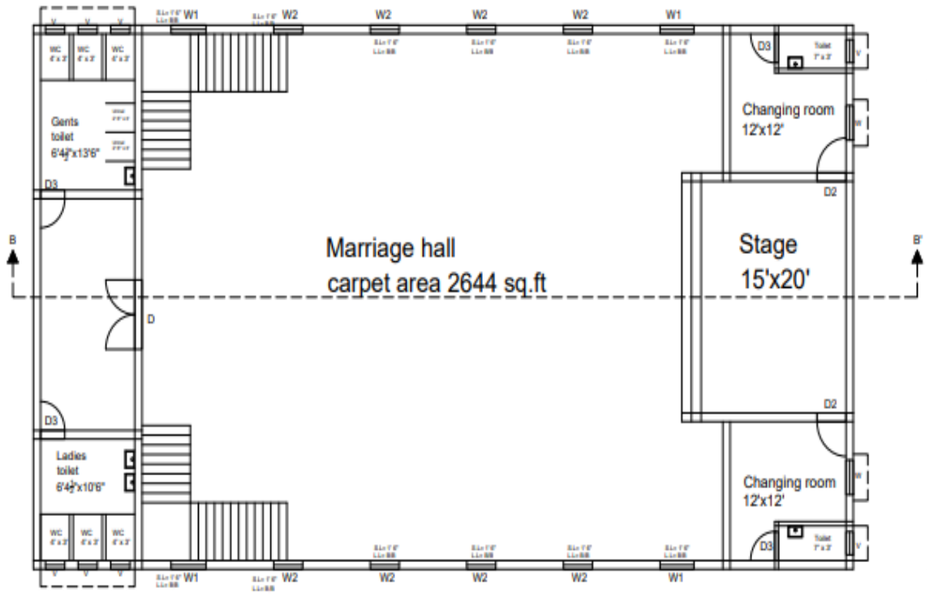
ELEVATION



SECTION
(both floor)



GROUND FLOOR PLAN



FIRST FLOOR PLAN

OPENING TABLE

D	6' 0" X 7' 6"
D1	4' 0" X 7' 6"
D2	3' 0" X 7' 6"
D3	2' 6" X 7' 6"
W	3'0" X 4' 6"
W1	3' 6" X B/B
W2	3' 0" X B/B
V	2' 0" X 2' 0"
V1	3' 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) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL
:- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN
:- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 6"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L.THE TOP OF ALL P.B. AT P.L.

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.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

DESIGN PROPOSAL FOR COMMUNITY HALL

13.6 Design proposal of Bus stop with plan, elevation, section and costing

There is no bus stop in the Kasumbad village. So the villagers are pick up the bus from the Khadol bus station which is far from the village about 4km. So, we give the proposal of BUS STOP in Kasumbad village.

Here, we give AutoCAD design, Measurement sheet and Abstract sheet of Bus stop and the approximate construction cost is 1.46 lakh INR.

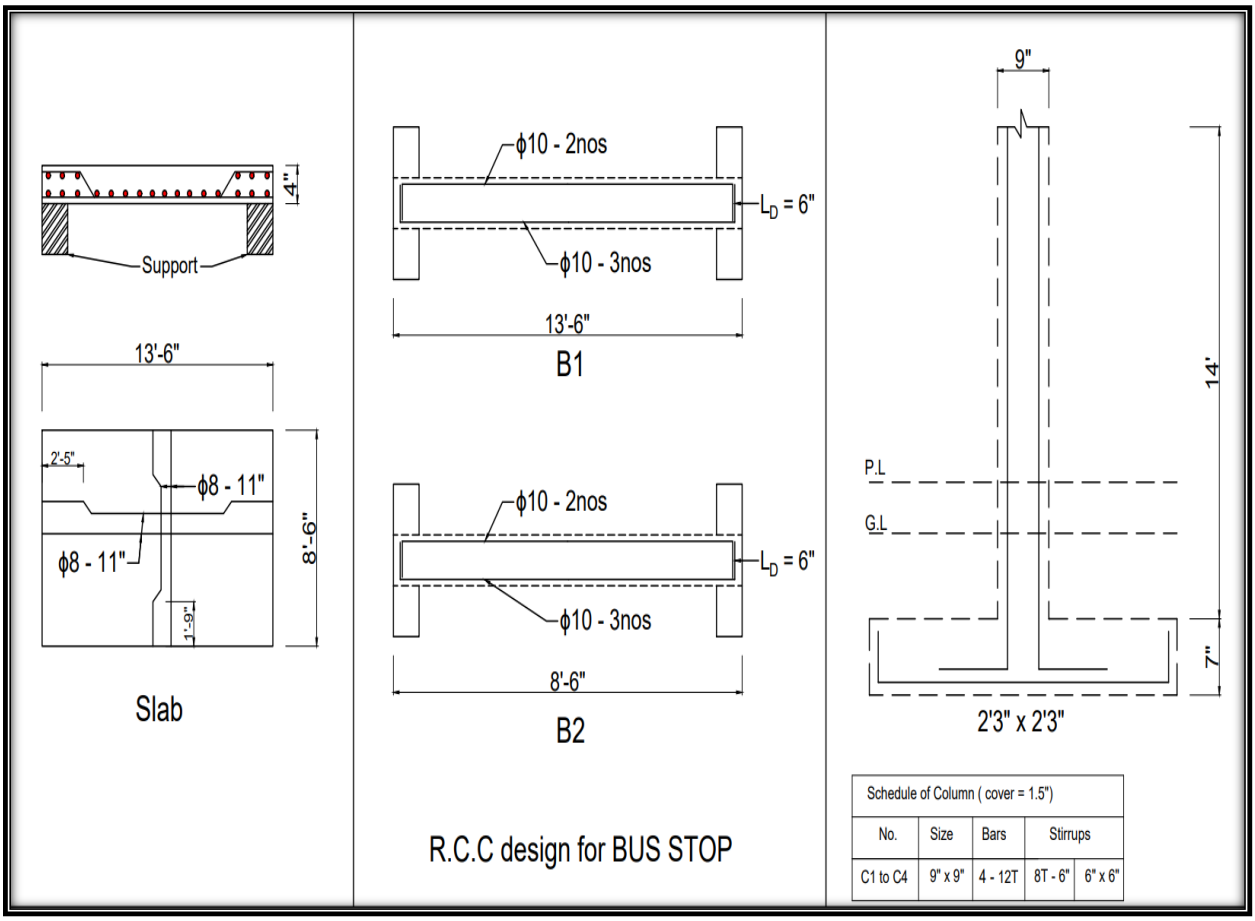


Figure 67 Structure Design of Bus stop

Table 28 Measurement Sheet of BUS STOP

Project : BUS STOP, Kasumbad								
Measurement Sheet								
No	**Item**	**No**	**Length**	**Breadth**	**Depth**	**Qut**	**Total**	**Unit**
1	**Earth Work**							
A)	**Excavation Work**							
	i) LW 1	2.00	16	3.25	4	416.00		
	ii) SW1	2.00	4.5	3.25	4	117.00		
						Total	**533.00**	**cft**
B)	**P.C.C**							
	i) LW 1	2.00	16	3.25	0.5	52.00		
	ii) SW1	2.00	4.5	3.25	0.5	14.63		
						Total	**66.63**	**cft**
C)	**Rubble Soiling**							
	i) LW 1	2.00	16	3.25	0.75	78.00		
	ii) SW1	2.00	4.5	3.25	0.75	21.94		
						Total	**99.94**	**cft**
D)	**Brick masonry up to GL**							
	i) LW 1							
	27"	2.00	15	2.25	0.58	39.15		
	23"	2.00	14.67	1.92	0.58	32.67		
	18"	2.00	14.25	1.5	0.58	24.80		
	14"	2.00	13.92	1.16	1	32.29		
						Total	**128.91**	**cft**
	ii) SW1							
	27"	2.00	5.5	2.25	0.58	14.36		
	23"	2.00	5.83	1.92	0.58	12.98		
	18"	2.00	6.25	1.5	0.58	10.88		
	14"	2.00	6.58	1.16	1	15.27		
						Total	**53.48**	**cft**
	Deduction							
	i) Column footing	4.00	2.25	2.25	0.58	11.75		
	ii) column	4.00	0.75	0.75	2.16	4.86		
						Total	**165.79**	**cft**
E)	**R.C.C work**							
	Footing	20.00	2.25	2.25	0.58	58.73		
	Column	20.00	0.75	0.75	2.16	24.30		
						Total	**83.03**	**cft**

F)	**Refilling in to trench**							
	(Excavation - construction)					**Total**	**117.62**	**cft**
G)	**Refilling in to Plinth**							
	Total area	1.00	84		1.75		**147.00**	**cft**
	(12 x 7 = 84 sft)							
2	**P.C.C Work**							
	i) LW1	2.00	16	3.25	0.5	52.00		
	ii) SW1	2.00	4.5	3.25	0.5	14.63		
	iii) @ floor	1.00	84		0.25	21.00		
						Total	**87.63**	**cft**
3	**Brick masonry**							
A)	**Up to plinth**							
	i) LW 1							
	27"	2.00	15	2.25	0.58	39.15		
	23"	2.00	14.67	1.92	0.58	32.67		
	18"	2.00	14.25	1.5	0.58	24.80		
	14"	2.00	13.92	1.16	1	32.29		
	9"	2.00	13.5	0.75	1.5	30.38		
						Total	**159.29**	**cft**
	ii) SW1							
	27"	2.00	5.5	2.25	0.58	14.36		
	23"	2.00	5.83	1.92	0.58	12.98		
	18"	2.00	6.25	1.5	0.58	10.88		
	14"	2.00	6.58	1.16	1	15.27		
	9"	2.00	7	0.75	1.5	15.75		
						Total	**69.23**	**cft**
						Total	**228.52**	**cft**
	Deduction							
	i) Column	4.00	0.75	0.75	1.5	3.38		
						Total	**225.14**	**cft**
B)	**Up to slab**							
	i) LW 1	2.00	13.5	0.75	8.75	177.19		
	ii) SW1	2.00	7	0.75	8.75	91.88		
	(H= 10' - 0.75'(B) - 0.5'(LL) = 8.75ft)					**Total**	**269.06**	**cft**
	Deduction							
	W (4')	1.00	4	0.75	4	12.00		
	Column	4.00	0.75	0.75	8.75	19.69		
						Total	**31.69**	**cft**

			BK up to SLAB			**Total**	**237.38**	**cft**
4	**R.C.C work**							
A)	**Coping**							
	i) LW 1	2.00	13.5	0.75	0.5	10.13		
	ii) SW1	2.00	7	0.75	0.5	5.25		
						Total	**15.38**	**cft**
B)	**Lintel**							
	i) LW 1	2.00	13.5	0.75	0.5	10.13		
	iii) SW1	2.00	7	0.75	0.5	5.25		
						Total	**15.38**	**cft**
C)	**Chhajja**							
	Over Window	1.00	5	1.5	0.33	**2.48**		**cft**
	at entrance	1.00	13.5	2	0.33	**8.91**		**cft**
D)	**Beam**							
	Horizontal B1	2.00	13.5	0.75	0.75	15.19		
	Vertical B2	2.00	8.5	0.75	0.75	9.56		
						Total	**24.75**	**cft**
E)	**Column**							
	i) Footing	4.00	2.25	2.25	0.58	11.75		
	ii) Column	4.00	0.75	0.75	15.66	35.24		
						Total	**46.98**	**cft**
F)	**Slab**							
	Total Area (13.5 x 8.5 = 114.75 sft)	1.00	114.75		0.33	37.87		
						Total	**37.87**	**cft**
5	**Plaster**							
A)	**Inside wall**							
	i) Room	2.00	12		10	240.00		
		2.00	7		10	140.00		
						Total	**380.00**	**sft**
	Deduction							
	W(4')	0.50	4		4	8.00		
						Total	**8.00**	**sft**
						Total	**372.00**	**sft**
B)	**Ceiling**							
	i) Room	1.00	12	7		84.00		
						Total	**84.00**	**sft**

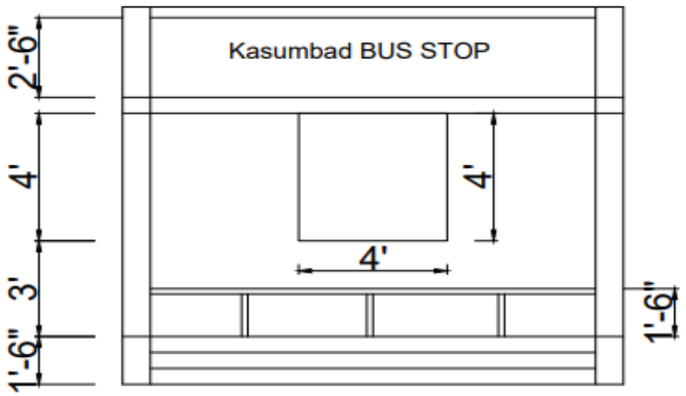
C)	**Outside wall up to slab**							
	i) LW 1	2.00	13.5		11.83	319.41		
	ii) SW1	2.00	8.5		11.83	201.11		
	(H= PL+LL+SL)					**Total**	**520.52**	**sft**
	(H= 1.5'+10'+0.33')=11.83'							
	Deduction							
	W(4')	0.50	4		4	**8.00**		
						Total	**512.52**	**sft**
D)	**Chhajja**							
	i) over 4' window	1	17.65			17.65		
	total A= (5'x1.5'x2) + (1.5'x0.33'x2) + (5'x0.33')							
	i) over entrance 13.5'	1	64			64.00		
	total A= (14.5'x2'x2) + (2'x0.33'x2) + (14.5'x0.33')							
						Total	**81.65**	**sft**
6	**Flooring**							
	i) Room	1.00	12	7		84.00		
						Total	**84.00**	**sft**
7	**Colour**							
A)	All Room					**372.00**		**sft**
B)	Ceiling					**84.00**		**sft**
C)	Outer side (all side)					**512.52**		**sft**

Table 29 Steel Quantity Sheet of Bus stop

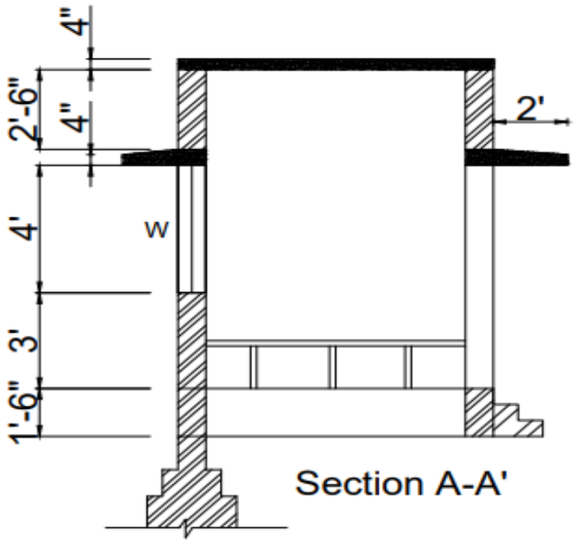
Project : BUS STOP													
STEEL QUANTITY													
No	Item	8 T				10 T				12 T			
		No	NO (bars)	Length (ft)	Total (kg)	No	NO (bars)	Length (ft)	Total (kg)	No	NO (bars)	Length (ft)	Total (kg)
1	Footing												
	HL :- 2.25'					4	4	2.42	38.72				
	VL :- 2.25'					4	4	2.42	38.72				
2	Colunms												
	Colunm									4	4	15.25	244.00
	Stirrups	4	25	2.5	250.00								
3	Coping												
	CP1 (13.5')					2	4	13.7	109.60				
	Stirrups	2	28	2.32	129.92								
	CP1 (8.5')					2	4	8.7	69.60				
	Stirrups	2	18	2.32	83.52								
4	Sill Leval												
	Sill 1	1	2	44	88.00								
	Distribution	1	76	0.58	44.08								
5	Lintel Leval												
	L 1					1	4	44	176.00				
	Stirrups	1	88	2.32	204.16								
6	Chhajja												
	CH1 (4')	1	10	3.25	32.50								
	Distribution	1	3	5.5	16.50								
	CH2 (13.5')	1	27	3.75	101.25								
	Distribution	1	3	14	42.00								
7	Beam												
	B1 (13.5')					2	5	14.34	143.40				
	Stirrups	2	29	2.9	168.20								
	B2 (8.5')					2	5	9.34	93.40				
	Stirrups	2	19	2.9	110.20								
8	Slab G.F												
	Horizontal L 1	1	10	13.5	135.00								
	EXT. TOP	1	9	2	18.00								
	Vortical L 1	1	15	8.5	127.50								
	EXT.TOP	1	6	3	18.00								
TOTAL STEEL (ft)					1,568.83				669.44				244.00
TOTAL STEEL (m)					478.30				204.10				74.39
1KG/m					0.40				0.62				0.89
TOTAL (KG)					188.93				125.93				66.06
10 % EXTRA					18.89				12.59				6.61
TOTAL (KG)					**207.82**				**138.52**				**72.66**

Table 30 Abstract sheet of Bus stop

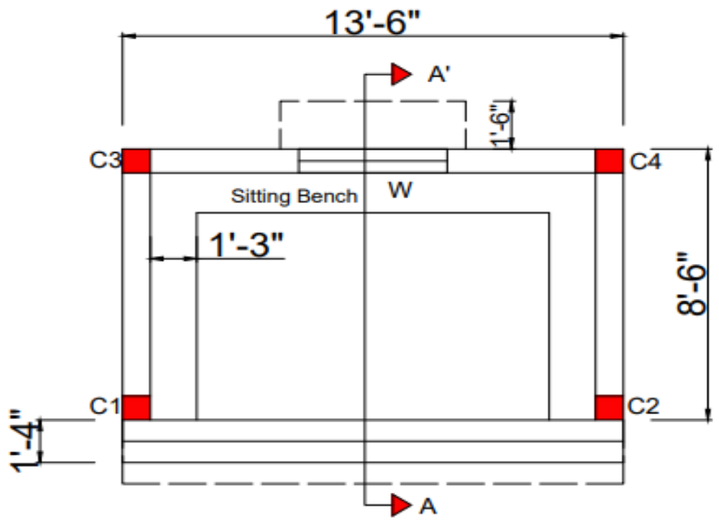
Project : BUS STOP					
ABSTRACT SHEET					
No	**Item**	**Quantity**	**Rate (rs)**	**Per cft**	**Amount (rs)**
1	**Earthwork**				
	A) Excavation	533.00	7	cft	3,731.00
	B) Soil filling in trench	117.62	4	cft	470.50
	C) soil filling in plinth	147.00	4	cft	588.00
				Total	**4,789.50**
2	**PCC**				
	A) P.C.C. Foundation	66.63	85.97	cft	5,727.75
	B) PCC at floor	21.00	78	cft	1,638.00
				Total	**7,365.75**
3	**Brick masonry up to plinth (1:6)**				
	A)up to plinth	225.14	68.26	cft	15,368.23
	B)up to slab	237.38	68.26	cft	16,203.22
				Total	**31,571.45**
4	**R.C.C Work (1:2:(2+1))**				
	A) Coping	15.38	121.74	cft	1,871.75
	B) Column	46.98	121.74	cft	5,719.35
	C) Lintel	15.38	121.74	cft	1,871.75
	D) Chhajja	11.39	121.74	cft	1,386.01
	E) G.F Slab	37.87	121.74	cft	4,609.99
	F) G.F Beam	24.75	121.74	cft	3,013.07
	Total	151.73		**Total**	**18,471.91**
5	**Plaster Work (12 mm, 1:4)**				
A	Inside Ceiling	84.00	24.78	sft	2,081.52
B	Inside Wall	372.00	24.78	sft	9,218.16
C	Outside Chhajja	81.65	24.78	sft	2,023.29
D	Outside Wall	512.52	24.78	sft	12,700.25
				Total	**26,023.21**
6	**Colour**				
A	Inside Wall	372.00	25.00	sft	9,300.00
B	Outside Wall	512.52	25.00	sft	12,813.00
C	Inside ceiling	84.00	25.00	sft	2,100.00
				Total	**24,213.00**
7	**Flooring**				
A	Tiles	84.00	100.00	sft	8,400.00
				Total	**8,400.00**
8	**Electric**				**5,000.00**
9	**Steel Bars**				
	8T	207.82	50.00	kg	**10,391.11**
	10T	138.52	50.00	kg	**6,926.05**
	12T	72.66	50.00	kg	**3,633.22**
			Total Amount		**1,46,785.21**



Elevation



Section A-A'



Plan

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) LAP LENGTH FOR BAR FOUNDATION, BEAMS, SLABS, LINTEL :- 57 TIMES THE DIA OF BAR.
4) LAP LENGTH FOR BAR COLUMN :- 50 TIMES THE DIA OF BAR. FOR M-20
5) PROVIDE CLEAR COVER TO MAIN REINFORCEMENT 2" FOR FOOTING, 1" FOR COLUMNS & 1" BEAMS, ½" FOR COPING, LINTEL, CHAJJA, LOFT, PARDI & SLAB.
6) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.
7) UNLESS OTHERWISE SPECIFIED STIRRUPS IN ALL BEAMS SHOULD BE KEPT **Ø8 @ 8"C/C**
8) SB1 SHALL BE PROVIDED IN SLAB WHERE PARTITION WALLS ARE DIRECTLY RESTING ON SLAB.
9) FROM WORK OF ANY CANTILEVER SLAB OF BEAM MUST NOT BE REMOVED TILL STRUCTURAL ENGINEER PERMISSION
10) THE BTM. OF ALL G.B. SHOULD BE KEPT 6" BELOW AT G.L,THE TOP OF ALL P.B. AT P.L.

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	BUS STOP
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KETUL J. AJVALIA (171350106001)
	NIRALI R. RAVAL (171350106015)

DESIGN PROPOSAL FOR BUS STOP

13.7 Reason for Students Recommending this Design

i. Anganwadi Centre

The Total children in our village are 428 (As per Census 2011). Our village has 3 Aanganwadi (in different regions of village), After the survey we found that the existing Anganwadi centres are not enough for the children. So, we decide to provide a Anganwadi in our village. the Anganwadi has one classroom and one kitchen. it is constructed in 300 sft. and its cost is 3.5 lakh INR.

ii. Public Drinking Water tap

There is no public drinking water tap is available in the village. Every village should have public drinking water tap for the villagers and also for the visitors. So, we give a proposal for the public drinking water tap in our village to providing pure water with good minerals. This water tap is located at the Centre of the village near primary school, milk co-operative society and community hall. So, it is fully utilized by the people. The total construction cost of the public drinking water is 75,000 INR.

iii. Primary Health Centre

Our village has no Primary health centre so the villagers are going to the Davol (7km) Village for to get Health facilities. So, for the better and quick health services we give proposal of primary health centre in our village. Every village has at least one type of health care facility So, as per this we give a proposal of the Primary Health Centre in our village. The primary health centre has two patient room, one doctor's room, one OPD. Total construction area of the centre is 1692 sft and approximate cost is 15.70 lakh INR.

iv. Post office

In our allocated village there is no separate post office and also not in nearby villages (Pamol, Dahemi, Naaman). so, we decided to provide a post office which is helpful to the villagers in communications with other cities. and the post office is providing a banking facility also. So, the villagers are put their savings (money) in to the post office. The post office constructed in 760 sft. and the construction cost is 5,92,000 INR.

v. Community Hall

In our village, Community hall is very old and it is in critical condition as well as it is small to use So, villagers don't use that community hall. Also, the community hall is used by the one of resident of village who doesn't has his own house. So, we decided to plan new design proposal of community hall.

vi. Bus stop

There is no bus stop in the Kasumbad village. So the villagers are pick up the bus from the Khadol bus station which is far from the village about 4km. So, we give the proposal of BUS STOP in Kasumbad village.

13.8 About designs Suggestions / Benefit of the villagers

Sr.No	Design proposal	Expenditure Amount (INR)	Benifits
1.	Anganwadi centre	3,50,000	➢ Provide Children heath facility ➢ Children care ➢ Pre-school activities
2.	Drinking water tap	75,000	➢ Provide pure drinking water ➢ Drinking water with all necessary minerals
3.	Primary Health centre	15,70,000	➢ Provide better health facilities as fast as possible.
4.	Post office	5,92,000	➢ Communication with other cities ➢ Money savings
5.	Community hall	38,00,000	➢ Social function ➢ Panchayat meeting
6.	Bus stop	1,47,000	➢ Improve transportation

Chapter: 14 Technical Options with Case Studies

14.1 Advanced Earthquake Resistant

Earthquakes are one of the most destructive forces of nature. Structures can suffer severe damage when an earthquake strike. That's why, seismic loadings must be taken into account when designing structures, especially skyscrapers. Let's roam around the world together and discover the top earthquake-proof structures and learn how buildings can be designed to resist extreme seismic loadings.

How do earthquakes happen?

As an engineer, in order to make solving a problem easier, it's important to understand what it is. So, what exactly is an earthquake and how do they happen?

Everyone knows about the existence of tectonic plates and how they influence the movement of the Earth's crust. Earthquakes happen when these tectonic plates move or collide with each other and release large amounts of energy. This is measured using the Richter scale.

The movement of these tectonic plates can generally be attributed to mantle convection, a phenomenon where warm mantle currents carry plates of lithosphere along like a conveyor belt. It may also be caused by the buoyant upwelling of the mantle at mid-ocean ridges. In this case, gravity causes the higher plate at the ridge to push away the lithosphere that lies further from the ridge. Another cause may be slab pull; it's a phenomenon where the older, colder plates sink at subduction zones. Subsequently, the cooler sinking plate pulls the rest of the warmer plate along behind it

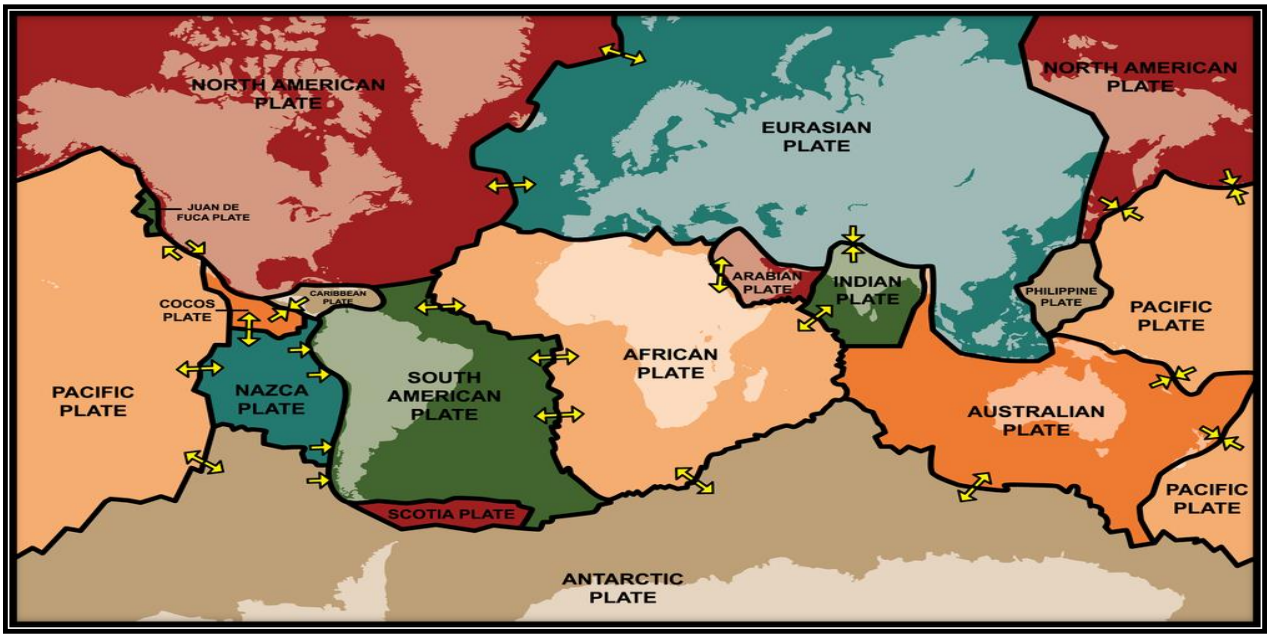


Figure 68 Tectonic plates

Seismic Zones in India

The varying geology at different locations in the country implies that the likelihood of damaging earthquakes taking place at different locations is different. Thus, a seismic zone map is required to identify these regions.

Based on the levels of intensities sustained during damaging past earthquakes, the 1970 version of the zone map subdivided India into five zones – I, II, III, IV and V. The maximum Modified Mercalli (MM) intensity of seismic shaking expected in these zones are V or less, VI, VII, VIII, and IX and higher, respectively. Parts of Himalayan boundary in the north and north-east, and the Kachchh area in the west were classified as zone V.

The seismic zone maps are revised from time to time as more understanding is gained on the geology, the seismic-tectonics and the seismic activity in the country. The Indian Standards provided the first seismic zone map in 1962, which was later revised in 1967 and again in 1970. The map has been revised again in 2002 and it now has only four seismic zones – II, III, IV and V. The areas falling in seismic zone I in the 1970 version of the map are merged with those of seismic zone II. Also, the seismic zone map in the peninsular region has been modified.

Chennai now comes in seismic zone III as against in zone II in the 1970 version of the map. This 2002 seismic zone map is not the final word on the seismic hazard of the country, and hence there can be no sense of complacency in this regard. The national Seismic Zone Map presents a large-scale view of the seismic zones in the country. Local variations in soil type and geology cannot be represented at that scale. Therefore, for important projects, such as a major dam or a nuclear power plant, the seismic hazard is evaluated specifically for that site. Also, for the purposes of urban planning, metropolitan areas are micro-zoned. Seismic micro-zonation accounts for local variations in geology, local soil profile,

Seismic Effects on Structures

Earthquake causes shaking of the ground. So, a building resting on it will experience motion at its base. In the building, since the walls or columns are flexible, the motion of the roof is different from that of the ground. This tendency of the superstructure to continue to remain in the previous position is known as inertia. Consider a building whose roof is supported on columns and taking the analogy of yourself on the bus: when the bus suddenly starts, you are thrown backwards as if someone has applied a force on the upper body, when the ground moves, even the building is thrown backwards, and the roof experiences a force, called inertia force. Clearly, more mass means higher inertia force. Therefore, lighter buildings sustain the earthquake shaking better.

The inertia force experienced by the roof is transferred to the ground via the columns, causing forces in columns. These forces generated in the columns can also be understood in another way. During earthquake shaking, the columns undergo relative movement between their ends. But, given a free option, columns would like to come back to the straight vertical position, i.e., columns resist deformations. In the straight vertical position, the columns carry no horizontal earthquake force through them. But, when forced to bend, they develop internal forces. The larger is the relative horizontal displacement between the top and bottom of the column, the larger this internal force in columns. Also, the stiffer the columns are (i.e., bigger is the column size), larger is this force. For this reason, these internal forces in the columns are called stiffness forces. Earthquake

causes shaking of the ground in all three directions – along the two horizontal directions (X and Y), and the vertical direction (Z). Also, during the earthquake, the ground shakes randomly back and forth (- and +) along each of these X, Y and Z directions.

All structures are primarily designed to carry the gravity loads, the vertical acceleration during ground shaking either adds to or subtracts from the acceleration due to gravity. Since factors of safety are used in the design of structures to resist the gravity loads, usually most structures tend to be adequate against vertical shaking. However, horizontal shaking along X and Y directions (both + and – directions of each) remains a concern. Structures designed for gravity loads, in general, may not be able to safely sustain the effects of horizontal earthquake shaking. Hence, it is necessary to ensure adequacy of the structures against horizontal earthquake effects.

Under horizontal shaking of the ground, horizontal inertia forces are generated at level of the mass of the structure (usually situated at the floor levels). These lateral inertia forces are transferred by the floor slab to the walls or columns, to the foundations, and finally to the soil system underneath. So, each of these structural elements (floor slabs, walls, columns, and foundations) and the connections between them must be designed to safely transfer these inertia forces through them. Walls or columns are the most critical elements in transferring the inertia forces. But, in traditional construction, floor slabs and beams receive more care and attention during design and construction, than walls and columns. Walls are relatively thin and often made of brittle material like masonry. They are poor in carrying horizontal earthquake inertia forces along the direction of their thickness. Failures of masonry walls have been observed in many earthquakes in the past. Similarly, poorly designed and constructed reinforced concrete columns can be disastrous.

The failure of the ground storey columns resulted in numerous building collapses during the2001 Bhuj (India) earthquake.

Figure 69 Collapse of RCC building during Bhuj earthquake 2001

What are the different types of earthquakes?

Did you know that there are about **millions** of earthquakes every single year? But don't worry, most of these are very small and virtually imperceptible. Some of them, however, can be incredibly destructive, crumbling buildings and robbing people of their lives and livelihoods.

Earthquakes generally fall under one of a few distinct categories. These are,

- Tectonic earthquakes.
- Volcanic earthquakes.
- Collapse earthquakes.
- Explosion earthquakes.

Tectonic earthquakes occur at plate tectonic boundaries. Sometimes, friction between tectonic plates causes them to lock together and become unable to move. However, the rest of the plate carries on moving, which leads to increased pressure on the locked section. Eventually, the locked section succumbs to the pressure and shatters, the plates move rapidly, releasing energy and causing an earthquake.

Volcanic earthquakes are quakes that result whenever tectonic activity also causes volcanic activity.

Collapse earthquakes are minor earthquakes that occur whenever something like a mine or underground cavern collapses.

Explosive earthquakes are any form of an earthquake that is caused by a massive explosion, like a nuclear weapon detonation. Like collapse earthquakes, these tend to be very minor.

Earthquakes are also sometimes caused by human activity such as the injection of fluids into deep wells, the excavation of mines, and the filling of large reservoirs.

Table 31 Magnitude of earthquake

Magnitude	Earthquake effects	Estimated number each year
2.5 or less	Usually not felt, but can be recorded by a seismograph.	9,00,000
2.5 to 5.4	Often felt, but only causes minor damage.	30,000
5.5 to 6.0	Slight damage to buildings and other structures.	500
6.1 to 6.9	May cause a lot of damage in very populated areas.	100
7.0 to 7.9	Major earthquake. Serious damage.	20
8.0 or greater	Great earthquake. Can totally destroy communities near the epicentre.	One every 5 to 10 years

To reduce the seismic effects on tall buildings several equipment is used like dampers or base isolation process.

In dampers

- viscous damper
- friction damper
- yielding damper
- magneto rheological fluid dampers
- tuned mass damper
- harmonic absorber can be used.

In base isolator

- magneto rheological elastomer
- elastomeric bearing system
- sliding system can be used.

One of the main elements of any earthquake-resistant building is **base isolation**.

What is base isolation?

The so-called base isolation is a technique developed by engineers to prevent - or at least minimize - the damage to buildings when exposed to earthquakes. These kinds of systems are used all over the world and are most prevalent in New Zealand, India, Japan, Italy, and the United States.

More traditional constructions, like fixed-base buildings, tend to be built directly onto the ground. While this is a sound practice for places that do not experience frequent earthquakes, it is highly advised against if not.

When an earthquake hits, the ground (and the building attached to it) moves with the quake's motion, causing massive damage to the building. To counteract this, most earthquake-proof buildings are isolated from the ground in some manner.

Figure 70 Base isolation system

This usually involves using flexible bearings or pads known as base isolators. These kinds of systems move during a quake, but they move to counteract the forces generated by the movement of the building.

Base isolators work in a similar fashion to car suspension systems, which allow a vehicle to travel over rough ground by isolating the interior and absorbing the shock of uneven ground, without throwing the passengers inside around.

According to the Science Learning Hub "during an earthquake, a building can move around **11 in (300 mm)** or more relative to the ground. Therefore, the use of base isolation also means there must be a way for movement during an earthquake to be accommodated. This usually means a "rattle space" or "moat" has to be put in place around the building so that the building doesn't crash into something nearby. Building services such as water, sewerage, and electrical all need to be designed to accommodate this movement without being damaged."

While base isolation can be a saving grace for many medium-rise brick or stone buildings, and can reinforce concrete ones, it is not suitable for all types of structures. Base isolators tend to have a limited ability to cope with tension.

This means that taller buildings have a very real risk of overturning or toppling during earthquakes if they have base isolators installed. For these kinds of buildings, other measures are required.

Base isolators are also not suitable for some sites due to other geotechnical and geographical reasons. For example, there may not be enough space to install them. They also require hard soil, not soft soil, to operate at peak efficiency.

1. **'Sabiha Gökçen' International Airport is one of the world's most earthquake-proof building**

One of the major airports to serve the historical city of Istanbul, it also happens to be one of the world's most earthquake-proof buildings. Called Sabiha Gökçen, it is one of the two international airports in Istanbul, Turkey, which is located near the **North Anatolian fault.**

It was designed by the engineering firm Ove Arup to have **300 base isolator systems** that can withstand an earthquake of up to a maximum of **8.0 Mw** (Magnitude moment). The base isolators can reduce lateral seismic loadings by **80%**, which makes it one of the largest seismically isolated structure in the world.

One of the major features of the airport that makes it so earthquake-resistant is its so-called "triple friction pendulum device". Architects Journal explains that "the whole terminal building sits on a platform that is, to a high degree, isolated from the ground below. This enabled the team to design the terminal almost as though it were situated in a non-seismic location, and to include features such as [structures with] large spans because the platform and pendulum devices mean that violent lateral ground movements will scarcely affect it."

The airport's triple friction pendulum bearing was manufactured by Earthquake protection system (EPS). They use the principle of a basic pendulum to prolong a structure's isolation during serious earthquake events.

When an earthquake hits the structure, the airport's earthquake-proofing structures move with small pendulum motions. Earthquake-induced displacements occur primarily in the bearings, so lateral loads and movements transmitted to the structure are greatly reduced.

Figure 71 'Sabiha Gökçen' International Airport

2. The 'Burj Khalifa' specially designed to resist earthquakes

This skyscraper doesn't really require any introduction. The Burj Khalifa is simply one of the most iconic supertall structures in the world. It also happens to be an earthquake-proof building!

The structure is composed of mechanical floors where outrigger walls connect the Perimeter columns to the interior walling. By doing this, the perimeter columns are able to support the lateral resistance of the structure. The verticality of the columns also helps with carrying the gravitational loads.

As a result, the Burj Khalifa is exceptionally stiff in both lateral and torsional directions. A complex system of base and foundation design was derived by conducting extensive seismic and geotechnical studies.

Figure 72 Burj Khalifa

14.2 Seismic Retrofitting of Buildings

SEISMIC ANALYSIS AND RETROFIT OF EXISTING MULTI STOREYED BUILDINGS IN INDIA – AN OVERVIEW WITH A CASE STUDY

SUMMARY

After the earthquake in Bhuj, Gujarat, in 2001, there has been a concerted effort to address the seismic vulnerability of existing buildings in India. This paper is part of a project, whose aim is to evolve methodologies to assess the seismic vulnerability of reinforced concrete three- to ten-storeyed, residential and commercial buildings and to propose retrofit measures for the structurally deficient buildings.

For the buildings addressed in the project, the common element deficiencies are inadequate shear capacity, core confinement and rebar splicing of columns; inadequate shear capacity, rebar anchorage and plastic hinge rotation capability of beams and inadequate confinement of beam-to-column joints. The presence of soft and weak storey at the open ground floor, in-plane discontinuity and out-of-plane offset of the ground floor columns and eccentric mass are commonly observed irregularities in the studied buildings. In absence of collector elements in the slab and proper detailing of the connections with the building frame, there is lack of integral action of the lateral load resisting elements.

The local retrofit strategies of column, beam, beam-to-column joint, wall and foundation strengthening are reviewed. Under global retrofit strategies, the addition of infill walls, shear walls and steel braces, and the reduction of the building irregularities are mentioned. A detailed case study is reported. In the conclusion, issues pertinent to retrofit are discussed.

INTRODUCTION

The earthquake at Bhuj, Gujarat, in 2001 has been a watershed event in the earthquake engineering practice in India. The code of practice for seismic analysis, IS 1893:2002 [1] has been revised to reflect the increased seismic demand in many parts of the country. Many existing buildings lack the seismic strength and detailing requirements of IS 1893:2002, IS 4326:1993 [2] and IS 13920: 1993 [3], because they were built prior to the implementation of these codes. This paper is part of a project, whose aim is to evolve methodologies to assess the seismic vulnerability of reinforced concrete (RC) three-to ten storeyed, residential and commercial buildings, particularly those located in the urban areas of earthquake zones V, IV and III, and to propose retrofit measures for the structurally deficient buildings. Several case studies have been performed and one such case study is presented in this paper. IS 1893:2002 is referred to as the 'Code' henceforth.

RETROFIT

Goals and objectives of retrofit

Retrofit strategy refers to options of increasing the strength, stiffness and ductility of the elements or the building as a whole. Several retrofit strategies may be selected under a retrofit scheme of a building. The goals of seismic retrofitting can be summarized as follows (IS 13935:1993)

1. Increasing the lateral strength and stiffness of the building.
2. Increasing the ductility and enhancing the energy dissipation capacity.
3. Giving unity to the structure.
4. Eliminating sources of weakness or those that produce concentration of stresses.
5. Enhancement of redundancy in the number of lateral loads resisting elements.
6. The retrofit scheme should be cost effective.
7. Each retrofit strategy should consistently achieve the performance objective.

To decide the retrofit scheme, a performance-based approach can be adopted. The performance-based approach identifies a target building performance level under an anticipated earthquake level. For retrofit of the buildings covered in this project, the basic safety objective can be selected. Under this objective, the dual requirement of life safety under design basis earthquake (DBE) and structural stability under maximum considered earthquake is aimed at.

BUILDING DEFICIENCIES

The following two sections highlight some common deficiencies observed in multi-storeyed RC buildings in India. The building deficiencies can be broadly classified as Local Deficiencies and Global Deficiencies.

Local Deficiencies

Local deficiencies lead to the failure of individual elements of the building. The observed deficiencies of the elements are summarized.

- **Column Deficiencies**
  a. Inadequate shear capacity
  b. Lack of confinement of column core. Lack of 135º hooks, with adequate hook length.
  c. Faculty location of splice just above the floor, with inadequate tension splice length.
  d. Inadequate capacity of corner columns under biaxial seismic loads.
  e. Existence of short and stiff columns.

- **Beams and Beam-to-Column Joints**
    a. Shear reinforcement not adequate for flexural capacity.
    b. Inadequate anchorage of bottom rebar.
    c. Inadequate plastic hinge rotation capability due to lack of confinement.

- **Slab-to-Column Connections**
    a. Absence of drag and chord reinforcement.
    b. Inadequate reinforcement at the slab-to-beam connections.

- **Structural Walls**
    a. Lack of adequate boundary elements.
    b. Inadequate reinforcement at the slab-to-wall or beam-to-wall connections.

- **Unreinforced Masonry Walls**
    a. Lack of out of -plane bending capacity.

- **Precast elements**
    a. Lack of tie reinforcement.

- **Deficient Construction**
    a. Frequent volume batching.
    b. Additional water for workability.
    c. Inadequate compaction and curing of concrete.
    d. Top 100 to 200 mm of column cast separately, leading to deficient plastic hinge region.
    e. Inadequate side face cover, leading to rebar corrosion.
    f. Poor quality control.

Global Deficiencies

Global deficiencies can broadly be classified as plan irregularities and vertical irregularities, as per the Code. The items left out are listed under miscellaneous deficiencies. Some of the observed irregularities are as follows.

- **Plan Irregularities**
    a. Torsional irregularity due to plan symmetry and eccentric mass from water tank.
    b. Frequent re-entrant corners.
    c. Diaphragm discontinuity due to large openings or staggered floors, along with the absence of collector elements.
    d. Out-of-plane offset for columns along perimeter.
    e. Nonparallel lateral load resisting systems (not observed in the building studied).

- **Vertical Irregularities**
    a. Stiffness irregularity, soft storey due to open ground storey.
    b. Mass irregularity (not observed in the building studied).
    c. Vertical geometric irregularity from set-back towers.
    d. In-plane discontinuity for columns along the perimeter of the building.
    e. Weak storey due to open ground storey.

- **Deficiencies in Analysis**
    a. Buildings designed as only gravity load resisting system.
    b. Neglecting the effect of infill walls.
    c. Inadequate geotechnical data to consider near source effects.
    d. Neglecting the P-Δ effect.

- **Lack of integral action of the lateral load resisting elements**
    a. The building performance is degraded due to the absence of tying of the lateral load resisting elements.
    b. The beams are not framed into the elevator core walls and spandrel beams between the perimeter columns are missing.

- **Failure of stair slab**

If the stair slab is simply supported without adequate bearing length, a collapse of the slab closes the escape route for the residents.

- **Pounding of buildings**

Another poor design concept is not providing adequate spacing between adjacent buildings or seismic joints between segments of a building.

RETROFIT STRATEGIES

Retrofit strategies that are viable for the type of buildings considered, are grouped under local and global strategies. These groups need not be watertight and strategies falling in either group are expected.

Local Retrofit Strategies

Local retrofit strategies include local strengthening of beams, columns, slabs, beam-to-column or slab-to-column joints, walls and foundations. Local strengthening allows one or more under-strength elements or connections to resist the strength demands predicted by the analysis, without affecting the overall response of the structure. This scheme tends to be the most economical alternative when only a few of the building's elements are deficient. The local retrofit strategies are grouped according to the elements.

- **Column Strengthening**

Column strengthening techniques include the following.

a. Concrete jacketing
b. Steel jacketing
c. Fibre reinforced polymer sheet wrapping

Concrete Jacketing

This method increases both strength and ductility of the columns. But, the composite deformation of the existing and the new concrete requires adequate dowelling to the existing column. Also, the additional longitudinal bars need to be anchored to the foundation and should be continuous through the slab. Frequently, these considerations are ignored.

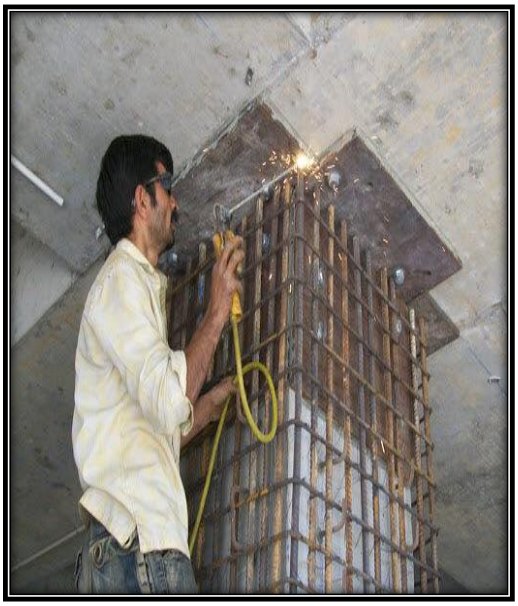


Figure 73 Column jacketing

Figure 74 Steel Jacketing

Steel Jacketing

Steel jacketing refers to encasing the column with steel plates and filling the gap with non-shrink grout. It is a very effective method to remedy deficiencies such as inadequate shear strength and inadequate splices of longitudinal bars at critical locations (Aboutaha [8]). But it may be costly and its fire resistance has to be addressed.

Fiber Reinforced Polymer Sheet Wrapping

The use of Fiber Reinforced Polymer (FRP) sheets is becoming popular in India (Mukherjee and Joshi [9]). FRP sheets are thin, light and flexible enough to be inserted behind service ducts, thus facilitating installation. In retrofitting of a column there is no significant increase in the size. The main drawbacks of FRP are high cost, brittle behavior and fire resistance.

Figure 75 Fiber Reinforced Polymer Sheet

- **Beam Strengthening**

Addition of Concrete

There are some disadvantages in this traditional retrofit strategy. First, addition of concrete increases the size and weight of the beam. Second, the new concrete requires proper bonding to the existing concrete. Third, the effects of drying shrinkage must be considered as it induces tensile stresses in the new concrete. Instead of regular concrete, fibre reinforced concrete can be used for retrofit.

Steel Plating

Gluing mild steel plates to beams is often used to improve the beam flexural and shear performances. The addition of steel plate is simple and rapid to apply, does not reduce the storey clear height significantly and can be applied while the structure is in use. Glued plates are of course prone to premature debonding (Swamy et al. [10]).

FRP Wrapping

Like steel plates, FRP laminates are attached to beams to increase their flexural and shear capacities. The amount of FRP attached to the soffit should be limited to retain the ductile flexural failure mode. Bonacci and Maalej [11] listed the failure modes of beams, strengthened with FRP laminates.

Use of FRP bars

FRP bars can be attached to the web of a beam for shear strengthening (Lorenzis and Nanni [12]). FRP bars can be used as tendons for external prestressing.

- **Beam–To-Column Joint Strengthening**

Concrete Jacketing

The joint can be strengthened by placing ties through drilled holes in the beam (Stoppenhagen et al. [13]). But the placement of such ties is difficult.

Concrete Fillet

Bracci et al. [14] suggested the use of a concrete fillet at the joint to shift the potential hinge region away from the column face to the end of the fillet.

Steel Jacketing

Steel jacketing helps in transferring moments and acquiring ductility through confinement of the concrete. Ghobarah et al. [15] proposed the use of corrugated steel jackets. Steel plating is simpler as compared to steel jacketing, where plates in the form of brackets are attached to the soffits of beams and sides of the column.

FRP Jacketing

The studies of El-Amoury and Ghobarah [16] have shown that the retrofitted specimens exhibit better efficiency in terms of strength, energy dissipation, lesser rate of stiffness degradation and ductility levels.

Figure 76 Wall Strengthening by Steel wire mesh

Wall Strengthening

A concrete shear wall can be strengthened by adding new concrete with adequate boundary elements. For the composite action, dowels need to be provided between the existing and new concrete. Steel braces or strips (Taghdi et al. [17]), FRP or steel sheets, external prestressing or reinforced grouted core can be employed for strengthening unreinforced masonry walls.

Foundation Strengthening is done by strengthening the footing as well as the soil (FEMA 356 [18]).

Global Retrofit Strategies

Global retrofit strategies aim to stiffen the building, by providing additional lateral load resisting elements, or to reduce the irregularities or mass.

- **Structural Stiffening**

Addition of Infill Walls

The addition of masonry infill wall is a viable option for the buildings, with open ground storeys, addressed in the project. Of course, masonry infill walls increase strength and stiffness of the building, but do not enhance the ductility. Infill walls with reinforced concrete masonry units can act as shear walls. For cast-in-place RC infill walls, the significant parameter that defines the lateral strength of the frame is the presence of dowels between a wall and the bounding frame. The use of modular precast panels involves minimal on-site casting and modest handling equipment. Connections between the panels and the frame are critical. Use of infill steel panels is an alternative to bracing system.

Addition of Shear Walls

New shear walls can be added to control drift. Critical design issues involved in the addition of shear walls are as follows.

a. Transfer of floor diaphragm shears into the new wall through dowels.
b. Adding new collector and drag members to the diaphragm.
c. Reactions of the new wall on existing foundations.

Addition of Steel Braces

A steel bracing system can be designed to provide stiffness, strength, ductility, energy dissipation, or any combination of these. Connection between the braces and the existing frame is the most important aspect in this strategy. The uses of prestressed tendons and unbonded braces have been proposed by some investigators to avoid the problems associated with the failure of connections and buckling of the braces, respectively.

Reduction of Irregularities

Torsional irregularities can be corrected by the addition of frames or shear walls. Eccentric masses can be relocated. Seismic joints can be created to transform an irregular building into multiple regular structures. Partial demolition can also be an effective measure, although this may have significant impact on the utility of the building. Discontinuous components such as columns can be extended beyond the zone of discontinuity. As mentioned earlier, walls or braces can alleviate the deficiency of soft and weak storey.

Mass reduction

Reduction of mass results in reduction of the lateral force demand, and therefore, can be used in specific cases in lieu of structural strengthening.

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

Advance modern construction practices / Techniques

Building construction methods have experienced significant facelift in recent times with innovative technologies being harnessed optimally for improving the qualitative index of buildings.

1. 3D Volumetric construction

As the name implies, the 3D volumetric construction involves the manufacture of 3D units in the form of modules in off site with all the internal and external finishes, services installed within it, that the only part remaining is the assembly.

Finished units are transported to site in various modules, basic structural blocks or final touched up units with all amenities installed, for assembly. Blocks can be erected rapidly at site and properties of concrete like fire resistance, sound resistivity, thermal resistance etc. are retained.

Figure 77 3D Volumetric Construction

The factory construction brings different unit of same product maintaining their quality throughout. Hence this method is best suited for repetitive projects so that rapid assembly of the products is possible.

Figure 78 Building constructed by 3d volumetric construction Techniques

2. Precast Flat Panel Modules

This method of construction involves the procedure of making floor and wall units off site. For this, separate factory outlets and facilities is required.

Once the panel units are made as per the design specification and requirements, they are brought to the site and placed. This method is best suited for repetitive construction project activities. This method is also called cross-wall construction.

Figure 79 Precast Flat Panel Module

3. Tunnel Formwork System

Figure 80 Tunnel Formwork System

Tunnel Form Construction Technique was invented over 50 years ago. The use of tunnel-form produces high quality monolithic structures. It eliminates the use of any subsequent wet trades (Plastering etc). It is basically an operation to cast walls and slabs in one operation in a daily cycle. This technique is highly systematic, earthquake proven and provides an ideal solution to the critical problem of sound transmission. It gives a sound reduction of 50 decibels.

Tunnel form is widely used in the construction of cellular structures with high degree of repetition such as:

- Prisons
- Hotels
- Student Accommodation (Hostels)
- Private Housings
- Commercial Developments

4. Flat Slab Construction

The flat slabs are structural elements that are highly versatile in nature. This is this versatility that it is used widely in construction. The flat slab provides minimum depth and faster construction. The system also provides column grids that are flexible.

Wherever it is necessary to seal the partitions to the slab soffit as a reason of acoustic and fire concerns, the flat slabs are a desirable solution. When compared with other forms of construction, the flat slabs are faster and more economic in nature.

The construction of flat slabs can be completed with good surface finish for the soffit, this enables to utilize he exposed soffits.

The flat slab construction is also a means of increasing the energy efficiency as this allows the exploitation of building thermal mass in the design of ventilation, heating and the cooling requirements.

Figure 81 Flat Slab

5. Precast Concrete Foundations

Figure 82 Precast Concrete Foundation

For the rapid construction of foundation, the precast concrete system can be employed. This method is more suited for a bespoke design.

Here, the elements required for the construction of foundation are constructed separately in the factory (off site) and brought to the site and assembled. The manufactured product must have the assured quality as specified by the designer.

The foundation assembled is mainly supported by concrete piles. During assembling, both the systems are connected together. These foundation systems help in increasing the productivity, increase quality, decrease the soil excavation quantity.

This is best suited for extreme and adverse weather conditions. When the construction is dealt on a highly contaminated ground, this system of construction is a best choice.

6. Insulating Concrete Formwork

The system of insulating concrete formwork (ICF) has twin walled panels that are either polystyrene panels or blocks are employed. These are built quickly to create the formwork as the wall of the buildings.

The formwork that is made is filled with concrete. This concrete is factory produced that have quality assurance so that a ready – mixed concrete. Mostly the mix is ready mix concrete. Higher level of thermal insulation is provided by expanded polystyrene blocks. The concrete core will provide good robustness and better sound insulation.

Figure 83 Insulating concrete formwork

Modern construction materials

1. Aluminium Foam

These panels are formed through air injection in molten aluminium and at a certain temperature, when air bubbles stabilize forming foam panels which create intriguing patterns and layers for opacity, texture, transparency and brightness. As per its manufacturing process, the foam panels can be formed with varied densities, shapes and visibility.

These sound absorbing panels create patterns within the interiors and plays a major role in shades and shadows. Aluminium foam used on the facade shows the totalitarian and infiniteness of the structure and adding the identity to its structure. Its manufacturing defines the material into three types- small, mid and large aluminium cell. Giving the "froth" look, this material classifies the future of metal facade with breathing pores.

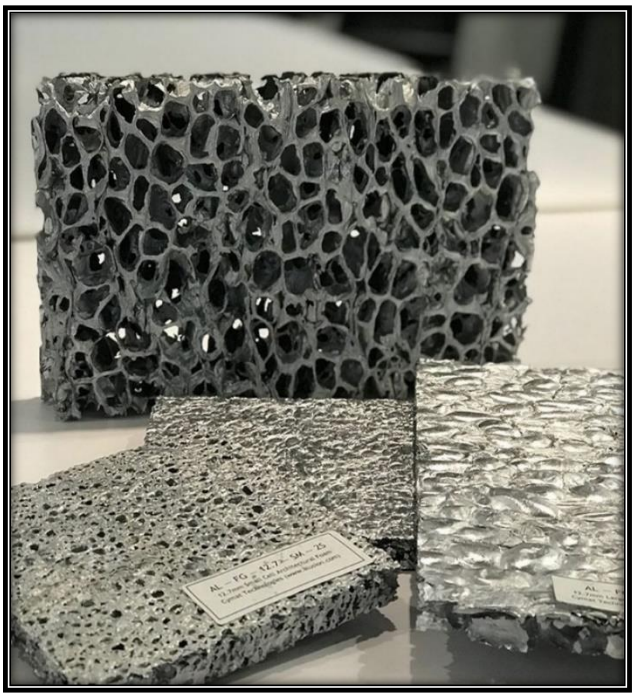


Figure 84 Aluminum Foam

2. Modular Bamboo

Modular Bamboo fits for the most versatile building construction material. Being light weight, availability in abundance and stronger than steel, this material can take any shape in construction and also act as a major earthquake resistant structure in various parts of the world. Bamboo can grow up to 4 feet in a couple of hours and is majorly used in low-cost housing in Philippines, Indonesia and other low-lying islands.

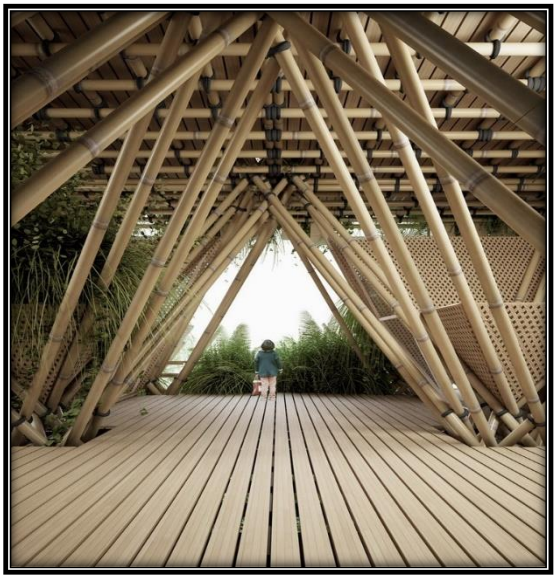


Figure 85 Creating Structure using bamboo

3. Cigarette Butt Bricks

There are about 1 billion smokers in the world. Do you imagine how much waste is produced in the world with just those cigarette butts alone? On sidewalks, around the buildings and almost everywhere! RMIT has come up with a solution to offset the waste and use it efficiently in the manufacturing of bricks. About 1% of the butts must be used in the production that would result in more sustainable, lighter and energy efficient building material. The result is an even fair product which increases the insulation properties of the material and solving the problems of the future.

Figure 86 Cigarette Butt Bricks

4. Light Emitting Cement

Dr José Carlos Rubio, from Mexico's University of San Nicolas Hidalgo, has created a light-emitting cement that has a life span of 100 years. By absorbing solar energy and returning it to the environment, he says the material will be able to light roads, highways and bicycle lanes without the need for electricity.

The main issue was that cement is an opaque body that doesn't allow the passing of light to its interior. So, he made a change in its microstructure to allow a partial entry of light into the interior for it to have this behaviour.

How Light Generating Cement is Made ?

There is a chemical reaction between cement dust and water, that can be compared to an effervescent pill; the main product of this reaction is a strong and resistant mixture that starts to become a gel, but there are also other unwanted sub products like some crystal flakes. These sub products when eliminated from the cement, reproduce a fluorescent material, capable to absorb radiation in the ultraviolet region of the spectrum and emit light in the visible region.

This material is totally ecological because it's made out of sand, dust and clay, and during his industrial making the only residue left is water steam. Production of Portland cement releases CO2 in the atmosphere which is the biggest contributors to greenhouse gas emissions.

By the morning, the road, highway or structure that's made out of this new cement can adsorb solar energy during the day and emit it during the night for around 12 hours. It can also be used in the new buildings, especially in rooms that don't require a lot of light, like bathrooms.

This material is ecological, natural and it has the same structural properties of Portland cement, and currently it exists in blue or green colour!

Figure 87 Light Emitting Cement

5. Self-Healing Concrete

Self-healing concrete is a new type of concrete. It imitates the automatic healing of body wounds by the secretion of some kind of material. To create self-healing concrete, some special materials (such as fibres or capsules), which contain some adhesive liquids, are dispensed into the concrete mix. When cracks happen, the fibres or capsules will break and the liquid contained in them will then heal the crack at once. However, self-healing concrete is only at the research stage. Its application in the concrete industry is still some way off.

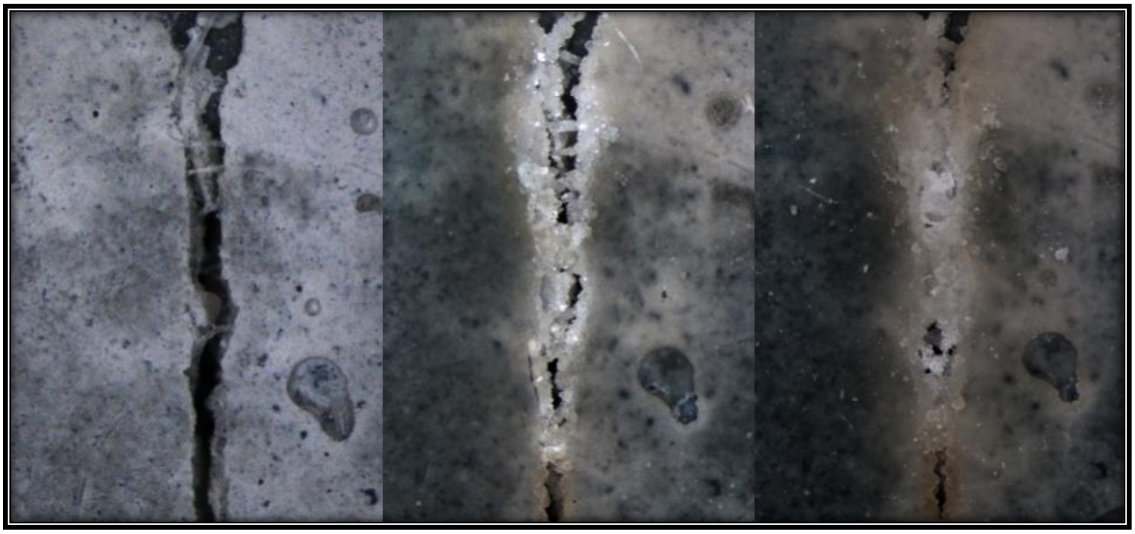


Figure 88 Self-Healing concrete

6. The Cabkoma Strand Rod

It is a thermoplastic carbon fibre composite used in the exteriors of the building solely for resiliency purpose and protecting the structures from earthquakes mainly in Japan. It is the lightest seismic reinforcement, delicate and hence extremely strong adding aesthetics to the structure.

Figure 89 The Cabkoma Strand Rod

Project Information:

- Name of the project: Komatsu Seiren's Head Office
- Architect: Kengo Kuma
- Location: Japan
- Building Type: Office

Easily transportable, sustainable and extremely strong building material creates tension and compression while supporting the structure. It transfers all the lateral loads hence protecting the building against any tremors. It is 5 times lighter than classic metal rods contributing to even a lighter structure.

7. Pigmented Concrete

Concrete is an achromatic symbol of strength that triggers harsh and roughness with human feelings when exposed. However, when appropriate pigmented admixtures added to cement, gravel, sand and water can result in coloured concrete mixtures. Other than aesthetics, it adds a sense of perspective and contrast with surroundings while reducing the dependence on paints and sealants.

Figure 90 Residential house constructed by Pigmented concrete

Project Information:

- Name of the project: Casa Terra
- Architect: Bernardes Arquitetura
- Location: Itaipava, Brazil
- Building Type: Residential

The reddish-brown texture of this house profoundly complements with the surrounding hills and the lush landscape. The walls are emulsified with pigmented concrete of iron oxide.

Modern construction Equipment

1. Excavator

Excavators are important and widely used equipment in construction industry. Their general purpose is to excavation but other than that they are also used for many purposes like heavy lifting, demolition, river dredging, cutting of trees etc. Excavators contains a long arm and a cabinet. At the end of long arm digging bucket is provided and cabinet is the place provided for machine operator. This whole cabin arrangement can be rotatable up to 360o which eases the operation. Excavators are available in both wheeled and tracked forms of vehicles.

Figure 91 Excavator

2. Back Hoe

Backhoe is another widely used equipment which is suitable for multiple purposes. The name itself saying that the hoe arrangement is provided on the back side of vehicle while loading bucket is provided in the front. This is well useful for excavating trenches below the machine level and using front bucket loading, unloading and lifting of materials can be done.

Figure 92 Back hoe

3. Bulldozer

Bulldozers are another type of soil excavating equipment which are used to remove the topsoil layer up to particular depth. The removal of soil is done by the sharp-edged wide metal plate provided at its front. This plate can be lowered and raised using hydraulic pistons. These are widely used for the removal of weak soil or rock strata, lifting of soil etc.

Figure 93 Bulldozer

4. Trenchers

Trenchers or Trenching machines are used to excavate trenches in soil. These trenches are generally used for pipeline laying, cable laying, drainage purposes etc. Trenching machines are available in two types namely chain trenchers and wheeled trenchers. Chain trenchers contains a fixed long arm around which digging chain is provided. Wheeled trenchers contain a metal wheel with digging tooth around it. To excavate hard soil layers, wheeled trenchers are more suitable. Both types of trenchers are available in tracked as well as wheeled vehicle forms.

Figure 94 Trenchers

5. Loaders

Loaders are used in construction site to load the material onto dumpers, trucks etc. The materials may be excavated soil, demolition waste, raw materials, etc. A loader contains large sized bucket at its front with shorter moving arm. Loader may be either tracked or wheeled. Wheeled loaders are widely used in sites while tracked or crawled loaders are used in sites where wheeled vehicles cannot reach.

Figure 95 Loaders

6. Tower Crane

Tower cranes are fixed cranes which are used for hoisting purposes in construction of tall structures. Heavy materials like pre-stressed concrete blocks, steel trusses, frames etc. can be easily lifted to required height using this type of equipment. They consist mast which is the vertical supporting tower, Jib which is operating arm of crane, counter jib which is the other arm carries counter weight on rear side of crane and an operator cabin from which the crane can be operated.

Figure 96 Tower Crane

7. Asphalt Paver

Paver or Asphalt paver is pavement laying equipment which is used in road construction. Paver contains a feeding bucket in which asphalt is continuously loaded by the dump truck and paver distributes the asphalt evenly on the road surface with slight compaction. However, a roller is required after laying asphalt layer for perfect compaction.

Figure 97 Asphalt Paver

8. Pile boring Equipment

Pile boring equipment is used to make bore holes in the construction site to install precast piles.

Figure 98 Pile Boring Equipment

9. Pile driving Equipment

Another heavy equipment used in construction site is pile driving equipment in case of pile foundation construction. This equipment lifts the pile and holds it in proper position and drives into the ground up to required depth. Different types of pile driving equipment are available namely, piling rigs, piling hammer, hammer guides etc. in any case the pile is driven into the ground by hammering the pile top which is done hydraulically or by dropping.

Figure 99 Pile driving Equipment

10. Transit mixer

Transit mixer is a multipurpose device that used to transport concrete mortar from a concrete batching plant. The transit mixer is loaded with dry material and water; The transit mixer consists of a drum with a spiral blade which has the ability to move in two directions. The purpose of the drum is to ensure the concrete remains in the liquid state; while it rotates on its own axis. This type of mixer has multiple purposes and helps deliver concrete to several locations; especially remote locations.

Figure 100 Transit mixer

The various **Equipments** are used in building construction may be as listed below,

- Vibrators for compaction of concrete, surface vibrators.
- M.S. tubular scaffolding, and formwork.
- Concrete mixers.
- Chain and pulley block.
- Grouting pumps.
- Sprayers for painting work.
- Tile cutters.
- Portable hand drilling machines.
- Horizontal trolleys, wheelbarrows.
- Pumps.
- Auto ramming concrete block machine.
- Sand washing machine.
- Vertical lifts, hoists, winches.
- Cranes.
- Earth excavators.
- Earthmovers.

14.4 Engineering Aspects of Soil mechanics - Environmental Impact Assessment

The term "soil" can have different meanings, depending upon the field in which it is considered.

To a geologist, it is the material in the relative thin zone of the Earth's surface within which roots occur, and which are formed as the products of past surface processes. The rest of the crust is grouped under the term "rock".

To a pedologist, it is the substance existing on the surface, which supports plant life.

To an engineer, it is a material that can be:

- built on: foundations of buildings, bridges
- built in: basements, culverts, tunnels
- built with: embankments, roads, dams
- supported: retaining walls

Soil Mechanics is a discipline of Civil Engineering involving the study of soil, its behaviour and application as an engineering material.

Soil mechanics studies how and how much soils deforms, how soils resist deformation, and estimates their strength under different boundary conditions and different loading conditions.

Loads of any civil engineering structure (such as bridges, pipelines, infrastructures, buildings, highways, oil and gas refineries, factories, dams, etc) will need to be transferred to and carried by the earth through a foundation system. Foundation engineering requires knowledge of soil mechanics (sometimes rock mechanics).

To protect our civilization against geo-hazards (such as slope instability issues, massive landslides, liquefaction, ground subsidence, and cracking of foundation of buildings, settlement, heave, swelling, sinkhole formation, shallow or deep isolated or connected cavity formation under infrastructures, caving soils, general subsidence, ground collapse, foundation disintegration, loss of bearing capacity, seepage and leakage, etc), we need to know the mechanical behaviour of problematic soils and mechanics of how these geo-hazards form and affect our civil engineering structures.

Soil Mechanics is the application of laws of mechanics and hydraulics to engineering problems dealing with sediments and other unconsolidated accumulations of solid particles, which are produced by the mechanical and chemical disintegration of rocks, regardless of whether or not they contain an admixture of organic constituents.

Soil consists of a multiphase aggregation of solid particles, water, and air. This fundamental composition gives rise to unique engineering properties, and the description of its mechanical behaviour requires some of the most classic principles of engineering mechanics.

Engineers are concerned with soil's mechanical properties: permeability, stiffness, and strength. These depend primarily on the nature of the soil grains, the current stress, the water content and unit weight.

In the Earth's surface, rocks extend up to as much as 20 km depth. The major rock types are categorized as igneous, sedimentary, and metamorphic.

- Igneous rocks: formed from crystalline bodies of cooled magma.
- Sedimentary rocks: formed from layers of cemented sediments.
- Metamorphic rocks: formed by the alteration of existing rocks due to heat from igneous intrusions or pressure due to crustal movement.

Soils are formed from materials that have resulted from the disintegration of rocks by various processes of physical and chemical weathering. The nature and structure of a given soil depends on the processes and conditions that formed it:

- Breakdown of parent rock: weathering, decomposition, erosion.
- Transportation to site of final deposition: gravity, flowing water, ice, wind.
- Environment of final deposition: flood plain, river terrace, glacial moraine, lacustrine or marine.
- Subsequent conditions of loading and drainage: little or no surcharge, heavy surcharge due to ice or overlying deposits, change from saline to freshwater, leaching, contamination.

All soils originate, directly or indirectly, from different rock types.

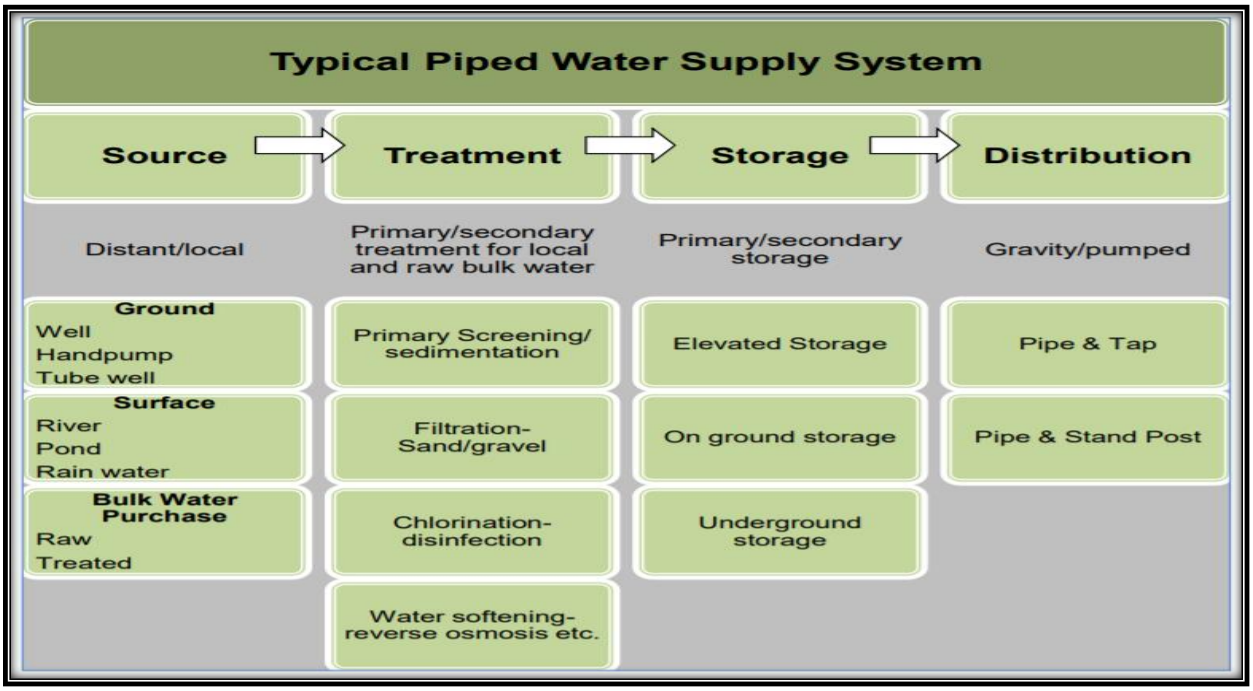
Geotechnical engineers have the potential for major impacts on the environment. Often they will be involved in site selection for major infrastructure works, large movements of soil with matching large energy consumption and the use of substantial amounts of raw and man-made materials. These impacts are an inevitable consequence of the work but the scale of the impacts becomes stark if environmental impact is considered as a function of added value.

Geotechnical projects are often undertaken with constrained budgets so not only is the environmental impact high but the added value low compared with, for example, a worker in a service industry. However, service industries cannot exist without the work of the geotechnical engineer and analysis of the whole supply chain is key. Those higher up the chain ‘buy in’ their environmental impact from those lower down the chain. To reduce the overall environmental impact, the higher members of the chain must be persuaded to spend some of the added value that they create to reduce the impact generated by those lower down the chain.

14.5 Water Supply- Sewerage System- Waste Water- Sustainable development techniques

Water supply system in village / town

Typical Village/town water supply system constitutes of a gravity/pumping based transmission and distribution system from local/distant water source with needed water treatment system.



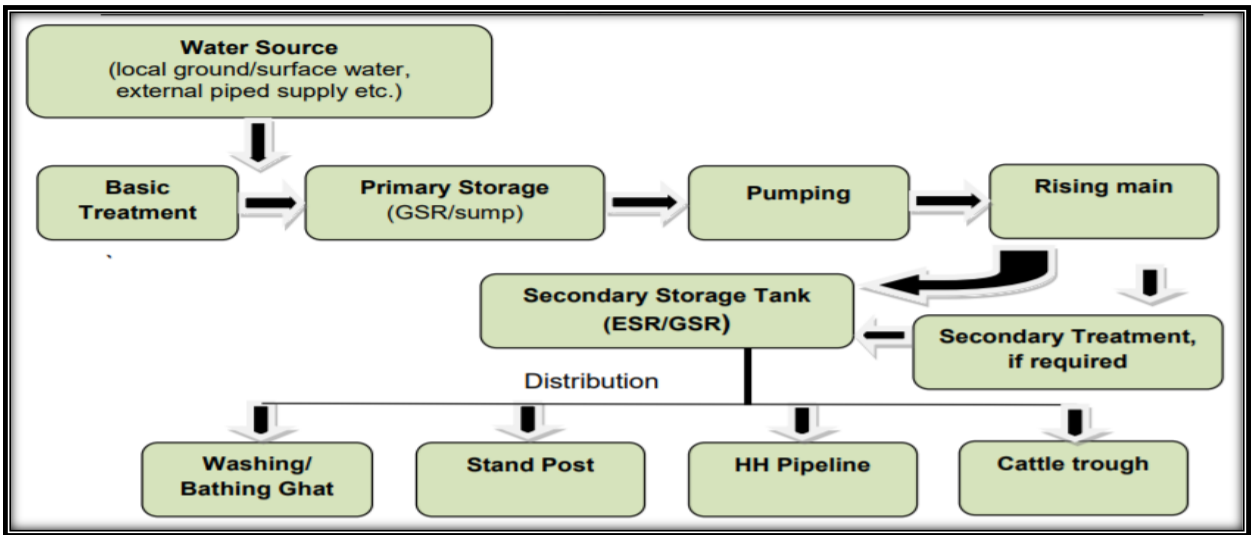


Figure 101 Standard Water supply System in Village

Sources	Openwell, Pond Tube well, Hand pump Pond, Dam site External pipe suppy Rain water harvesting
Village level Treatment	Reverse osmois system (RO), Chlorination Sedimentation, sand filter etc.
Storage	Elevated surface reservoir (ESR), Ground servucereservoir (GSR), Sump
Distribution	Main line, Sub-mail line, Branch pipe line Household level Tap, Stand post, washing unit

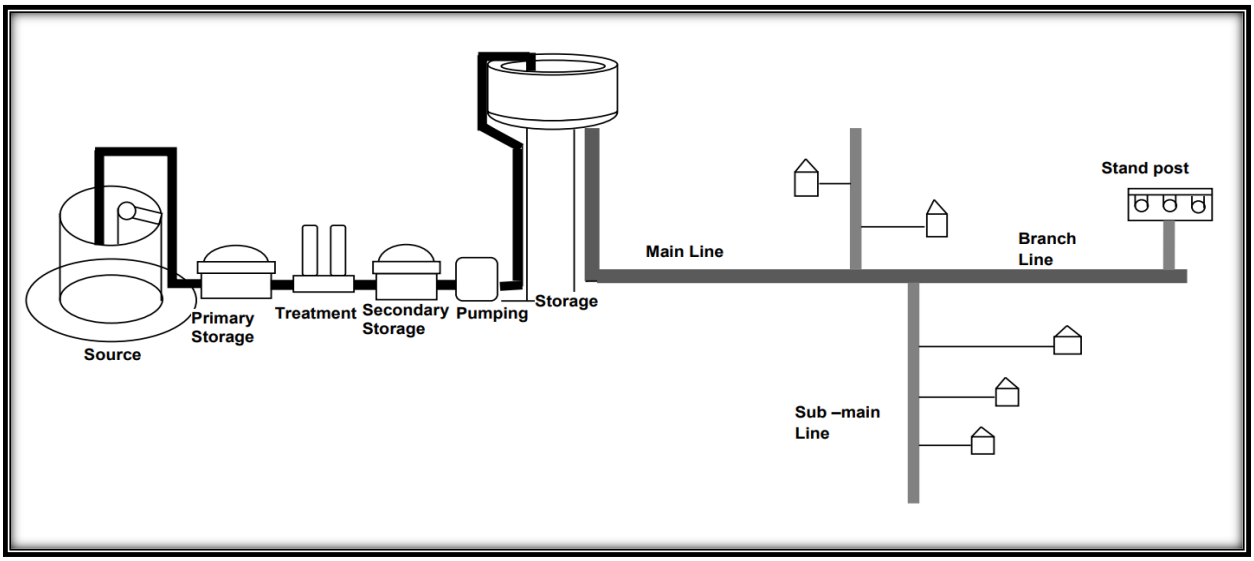


Figure 102 Water supply System in village

Water Treatment

Water from source is treated at village level and even at household level, if needed. If bulk water available from the distant source is treated and potable, then further treatment may not be required at village level. There are various processes of treatment based on the source and quality of water in specific region.

Village/town level water treatment systems are located mainly near head works. The treatment units are located in such a manner, where possible that flow of water from one unit to other can be done by gravity, so that additional pumping of water is not required. Sufficient area

should be reserved near the treatment units for further expansion in future. Basic treatment system at village/town level involves removal of suspended solids through sedimentation, removal of micro-organisms and colloidal matter through sand/gravel filters, water softening through reverse osmosis (RO) system, disinfection through chlorination and any other chemical/specialised treatment for removal of fluoride, salinity etc.

Treatment at household level is needed as there may be chances of water contamination while transmission of water. This mainly includes basic filtration for removal of any silt, etc.; boiling for removal of microorganisms or chlorination for disinfection.

It is very important to carry out water test in order to decide upon the type of treatment. It is also essential to carry regular water testing from various points starting from source to distribution points to maintain potable water quality.

Types of Water Treatment System at Village/Town Level

1. **Primary Screening**

Screens are fixed in the intake works or at the entrance of treatment plant so as to remove the floating matters as leaves, dead animals etc

2. **Sedimentation**

In this process, suspended solids are made to settle by gravity under still water conditions. The sedimentation tanks may be rectangular or circular in shape.

Advantages

- Plain sedimentation lightens the load on the subsequent process.
- The operation of subsequent purification process can be controlled in better way.
- Less quantity of chemicals is required in the subsequent treatment processes.

3. **Sedimentation with coagulation**

- This process is used when raw water contains fine clay and colloidal impurities and needs extra chemical treatment for them to settle unlike plain sedimentation. In this process certain chemical/coagulant are added in the process along with sedimentation for impurities to settle down. This process is useful in removal of colour, odour and taste from water. Turbidity and bacteria can also be removed to certain extent.
- Coagulants are added based on pH of water. Alum or aluminium sulphate is common and cheaper coagulants added in the process. They are added in powder or solution form to raw water through some mechanical means.

4. Filtration

- This involves treatment of water by passing it through bed of sand, gravel and other granular materials. This system is useful in removal of bacteria, colour, odour, taste
- This system is highly useful in removal of suspended impurities.
- The common type of filtration system is slow sand filter mainly used in rural/small urban areas. Such filter is made up of tank containing sand in top layer (size 0.2-0.3mm) up to thickness of 750-900 mm. Coarse sand layer is placed below fine sand layer up to 300 mm. The last layer is of graded gravel (2- 45 mm) up to thickness of 200-300 mm. Water from sedimentation tank is passed through sand filter tank. Average flow of water from such filter is about 2400-3600 litres/m2 /day. Hence, size of tank is decided upon daily requirement of water to be treated. The sand needs to be replaced every 6-8 weeks as it gets clogged with impurities. Gravel can be washed and cleaned and replaced again.

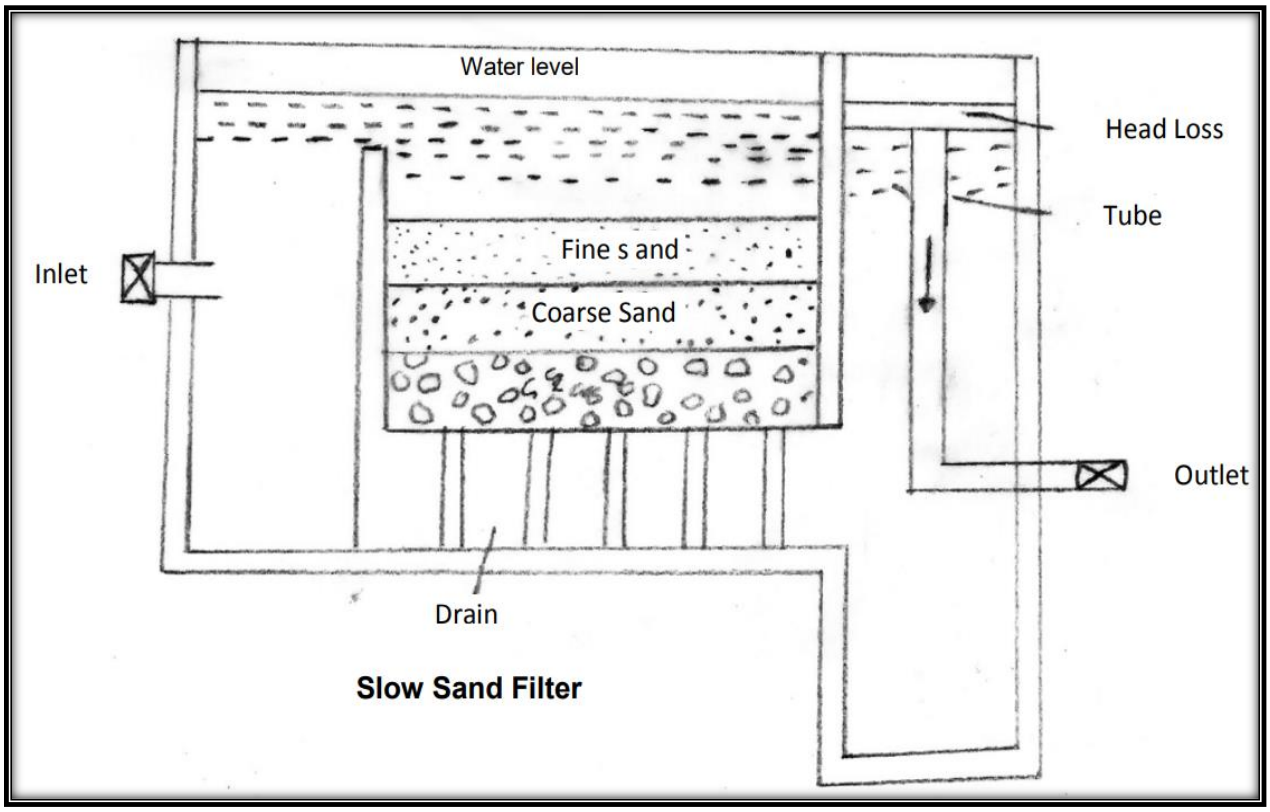


Figure 103 Sand filter

Chapter: 15 Smart and/or Sustainable features of Chapter 8 & 13 designs, Impact on society. (For Allocated village development, villager's happiness, comfortable and for enhancement of the village) (With the 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. b) If possible, List the sources of the funding available with the Village gram panchayat

Table 32 Design proposals with their benefits and cost

Sr.No	Design proposal	Expenditure Amount (INR)	Benifits
1.	Public Library	4,83,000	➢ Improve the knowledge of villagers. ➢ Create interest in reading
2.	Public Toilet	5,08,000	➢ Healthy environment ➢ Reduce spreading of diseases
3.	Paver Block	5,21,000	➢ Easy access in village ➢ Stop mud problem in rainy season
4.	Primary School	23,00,000	➢ Educated village ➢ Increase literacy rate
5.	Public Garden	5,70,000	➢ Increase happyness of villagers ➢ Increase greenery
6.	Rain water harvesting by bore well	35,000	➢ Increase Ground water table ➢ Solving problem of water scarecity
7.	Anganwadi centre	3,50,000	➢ Provide Children heath facility ➢ Children care ➢ Pre-school activities

8.	Drinking water tap	75,000	➢ Provide pure drinking water ➢ Drinking water with all necessary minerals
9.	Primary Health centre	15,70,000	➢ Provide better health facilities
10.	Post office	5,92,000	➢ Communication with other cities ➢ Money savings
11.	Community hall	38,00,000	➢ Social function ➢ Panchayat meeting
12.	Bus stop	1,47,000	➢ Improve transportation

Sources of Funding,

- Government funding
- Donation
- Commercial Loan
- From various government grants,
  - Pradhan mantri gram sadak yojana (PMGSY)
  - Swachchh Bharat Mission
  - Sansad Adarsh Gram Yojna (SAGY)
  - National Rural Health Mission
  - Mahatma gandhi national rural employment gurantee act 2005 (MGNREGA)
  - Water conservation scheme under MGNREGA
  - Shyam prasad mukherji Rurban mission (SPMRM)
- Funds collected by panchayat etc.

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?		Agriculture, Job
2	What are the chances of employment in village?	NO	
3	What are the special technical facilities in village?	Yes	WIFI in Panchayat, Smartphone
4	Is any debt on village dwellers?	Yes	
5	Are village people getting agricultural help?		
6	Is women health awareness Program organized in village?	Yes	
7	Are women having opportunity to work and income?	Yes	
8	Child girl education is appreciated in village?	Yes	
9	Facility of vaccination to child is available in village?	Yes	
10	Are village people aware about child vaccination and done to each and every child as per norms?	Yes	
11	Women help line number information is provided to village people?	Yes	
12	Is water scarcity in village? How many days per year?	No	daily available
13	Is village under any debt?		
14	Is any serious issue due to debt from bank or any person happened in village?		
15	Is any suicide like incident observed in village due to government policy, debt or threatening?		
16	Is any death of patient occurred due to unavailability of medical facility in village?		
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.		
18	Is village improvement is observed in comparative scenario from past to present?	Yes	
19	Is any unavoidable difficulty village people are facing? Any natural calamity is there?	No	
20	Life Living standard of girls and women is appreciated and uplifted in village?	Yes	

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

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

સરપંચ
ગ્રામ પંચાયત કસુંબાડ
તા.બોરસદ જી.આણંદ

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

Modern Farming Technology

❖ Vertical Farming: Concept, Techniques & Advantages

As urban populations continue to rise, innovators are looking beyond traditional farming as a way to feed everyone while having less impact on our land and water resources. Vertical farming is one such solution that's been implemented around the world.

By Vertical Farming, food crops can be cultivated easily in urban areas by planting in vertically stacked layers in order to save space and use minimal energy and water for irrigation.

In India, Vertical Farming is at nascent stages, however, there are few start-ups & Agri-tech companies working to revolutionise the field.

Figure 104 Vertical Farming

Background & Concept of Vertical Farming

In 1915, Gilbert Ellis Bailey coined the term "vertical farming" and wrote a book titled "Vertical Farming". In the early 1930s, William Frederick Gerick pioneered hydroponics at the University of California at Berkley.

In the 1980s, Åke Olsson, a Swedish ecological farmer, invented a spiral-shaped rail system for growing plants and suggested vertical farming as a means for producing vegetables in cities.

The modern concept of vertical farming was proposed in 1999 by Professor Dickson Despommier. His concept was to grow the food in urban areas itself utilizing less distance and saving the time in bringing the food produced in rural areas to the cities.

He intended in growing food within urban environments and thus have fresher foods available faster and at lower costs. Consequently, Vertical farming is conceptualised as cultivating and producing crops/ plants in vertically stacked layers and vertically inclined surfaces.

In the physical layout, the plants are vertically stacked in a tower-like structure. This way, the area required to grow plants in minimised. Next, a combination of natural lights and artificial lights is used to maintain a perfect environment for an efficient growth of the plants. The third parameter is the growing medium for the plants. Instead of soil, aeroponic, hydroponic or aquaponic growing mediums are used as the growing medium.

As the technique becomes scientific, efficiency of the process increases and as a result, vertical farming becomes sustainable requiring 95% less water as compared to other farming methods.

Techniques of Vertical Farming

1. Hydroponics
2. Aeroponics
3. Aquaponics

Advantages of Vertical Farming

Vertical Farming has several advantages, which makes it promising for the future of agriculture. The land requirement is quite low, water consumption is 80 percent less, the water is recycled and saved, it is pesticide-free and in cases of high-tech farms there is no real dependency on the weather.

A vertical farm makes farming within the confines of a city, a reality. And when the farms are nearby, the produce is quickly delivered and always fresh; when compared to the refrigerated produce usually available at supermarkets. Reduction in transportation reduces the fossil fuel cost & resulting emissions and thus also reduce the spoilage in transportation.

However, like everything else vertical farming has its own drawbacks. Initial capital costs for establishing the vertical farming system is the major problem. In addition there are costs of erecting the structures along with its automation like computerized and monitoring systems, remote control systems and software's, automated racking and stacking systems, programmable LED lighting systems, climate control system, etc.

- **Organic Farming**

Organic farming system in India is not new and is being followed from ancient time. It is a method of farming system which primarily aimed at cultivating the land and raising crops in such a way, as to keep the soil alive and in good health by use of organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (biofertilizers) to release nutrients to crops for increased sustainable production in an eco friendly pollution free environment.

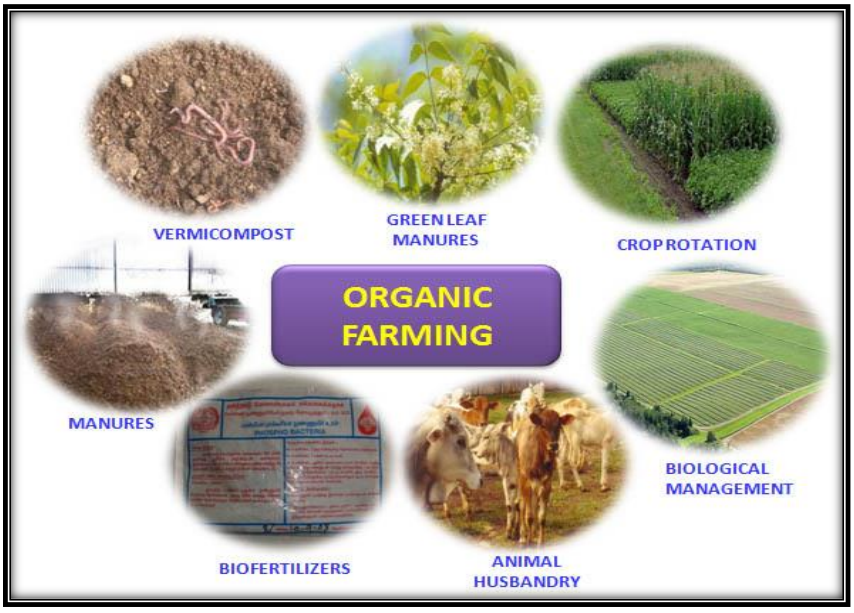


Figure 105 Organic Farming

As per the definition of the United States Department of Agriculture (USDA) study team on organic farming "organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection".

FAO suggested that "Organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs".

Need of organic farming

With the increase in population our compulsion would be not only to stabilize agricultural production but to increase it further in sustainable manner. The scientists have realized that the 'Green Revolution' with high input use has reached a plateau and is now sustained with diminishing return of falling dividends. Thus, a natural balance needs to be maintained at all cost for existence of life and property. The obvious choice for that would be more relevant in the present era, when these agrochemicals which are produced from fossil fuel and are not renewable and are diminishing in availability. It may also cost heavily on our foreign exchange in future.

The key characteristics of organic farming include

- Protecting the long term fertility of soils by maintaining organic matter levels, encouraging soil biological activity, and careful mechanical intervention
- Providing crop nutrients indirectly using relatively insoluble nutrient sources which are made available to the plant by the action of soil micro-organisms
- Nitrogen self-sufficiency through the use of legumes and biological nitrogen fixation, as well as effective recycling of organic materials including crop residues and livestock manures
- Weed, disease and pest control relying primarily on crop rotations, natural predators, diversity, organic manuring, resistant varieties and limited (preferably minimal) thermal, biological and chemical intervention
- The extensive management of livestock, paying full regard to their evolutionary adaptations, behavioural needs and animal welfare issues with respect to nutrition, housing, health, breeding and rearing
- Careful attention to the impact of the farming system on the wider environment and the conservation of wildlife and natural habitats

Irrigation Method

1. **Sprinkling irrigation**

- Sprinkler irrigation is similar to rainfall.
- In this type, water is pumped using a pipe system and then sprayed through sprinkler heads.
- With Sprinkler Irrigation field areas irrespective of their sizes can be covered efficiently.
- This irrigation method can be applied to all the types of soils since sprinklers with different discharge and outlet capacities are available on the market.

Figure 106 Sprinkle Irrigation

2. **Drip Irrigation**

- Drip irrigation can be defined as the method in which water drips slowly via a pipe system to the roots of the plants either from above or below the soil surface.
- It is also known as micro-irrigation by which both water and soil nutrients can be saved.
- A set up of valves, tubes, pipes, and emitters is used for drip irrigation.
- The best part about drip irrigation is that valves and pumps can be operated both manually and automatically with the help of a controller.

Figure 107 Drip Irrigation

3. **Surface Irrigation**

- Surface irrigation has been practiced and followed for many years now.
- It can be defined as a group of techniques where water is distributed over the surface of the soil gravity.
- In this type of irrigation, either the field is flooded (this is known as Basin Irrigation) or the water is fed into small channels (this is known as furrow irrigation).

Figure 108 Surface Irrigation

Chapter: 18 Social Activities – Any Activates Planned By Students

❖ **Swachh Bharat Abhiyan**

We organized Cleanliness programme under Swachh Bharat-Swasth Bharat Abhiyaan Programme. The main purpose of this programme was to create awareness among the villagers regarding Cleanliness and its benefits.

As a a part of swachhta Abhiyan, we decided to clean primary school compound. The one sweeper of school also wanted to help us. We picked booms and started cleaning the compound of school. We are total 6 students are join in this mission 4 students are swipe the garbage and collect at one particular place and the other students are picked up the garbage and filled in the trolly and after the collection of all garbage we are throwing the garbage in to the main dustbin.

These are the following Guidelines for the keep village clean,

- While traveling doesn't throw any wrapper, paper or any dry waste on road. Keep it in your bag or pocket (as it is a dry waste you can keep them in your bag/pocket).
- Keep paper bags with yourself to store wet waste and throw them in dustbin only.
- Spitting on roads (as it can be the reason of viral disease).
- Avoid chewing Pan-Masala, Gutka and Tobacco.
- Avoid use of plastic bag.
- Follow government's rules and regulations.
- If someone is breaking the rule then make them aware of it.
- Spread awareness to keep our village clean.

Chapter: 19 SAGY Questionnaire Survey form with the Sarpanch Signature

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Kasumbud Gram Panchayat: Kasumbad Ward No.

Block: Borsad District: Anand

State: Gujarat L S Constituency: Anand Parliamentry constituency

1. Family Identity and Size

Name of Head of Household	Mr. Jyantibhai J. Rabari							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
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	
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]
Jyantibhai J. Rabari	47	M	N	2		Y	Y	0
Sarikaben J. Rabari	44	F	N	2		Y	Y	0
Dinesh J. Rabari	22	M	N	1		Y	Y	0
Lalit J. Rabari	19	M	N	1		Y	N	0

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		✓
Children		

9. House & Homestead Data

Own House: Yes / No	No. of Rooms:
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: Electricity
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)	

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
→ Hide & seek → Tyre Rolling
→ Cricket

19. Do children play musical instrument (mention)

Schedule Filled By: Ketul , Nirali
Principal Respondent: Jyantibhai J. Rabari
Date of Survey:

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

I. Basic Information

a. Gram Panchayat: Kasumbad

b. Block: Borsad

c. District: Anand

d. State: Gujarat

e. Lok Sabha Constituency: Anand

f. Number of Wards in the Gram Panchayat: _____

g. Number of Villages in the Gram Panchayat: 01

h. Names of Villages: Kasumbad

→ Demographic Information

Number of Households 668 Total Population 3056 Male 1562 Female 1494

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	N	Davol (7KM)
b.	Nearest Primary Health Centre (PHC)	N	Davol (7KM)
c.	Nearest Community Health Centre (CHC)	N	Davol (7KM)
d.	Nearest Post Office		
e.	Nearest Bank Branch (Any)	N	BOI 4KM No Paid
f.	Nearest Bank with CBS Facility	N	BOI 4 KM No Paid
g.	Nearest ATM	N	Asodar chowkdi (4KM)
h.	Nearest Primary School	Y	
i.	Nearest Middle School	N	Pamol 4KM
j.	Nearest Secondary School	N	Pamol 4KM
k.	Nearest Higher Secondary School / +2 College	N	Borsad 10KM
l.	Nearest Graduate College	N	Borsad 10KM
m	Nearest ITI / Polytechnic Centre	N	Borsad 10KM
n	Kisan Seva Kendra (Charotar Kisan Sevа Mandal)	N	Borsad 10KM

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		
p	Nearest Agro Service Centre	N	Borsad 10km
p	MSP based Government Procurement Centre		
q	Milk Cooperative /Collection Centre	Yes	
r	Veterinary Care Centre	N	Jitodra 10 km
s	Ayurveda Centre		
t	E – Seva Kendra		
u	Bus Stop	N	Khadol 4 km
v	Railway Station	N	Anas 8.6 km
w	Library	N	Borsad 10 km
x	Common Service Centre	N	Aklav Road 11 km

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total N 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: 4

b. Number of villages without Angan Wadi Centres_____

Names of such villages: _____

_____

c. Schools (Number)

Primary Private: ~ Primary Govt.: Y

Middle Private: - Middle Govt.: -

Secondary Private: - 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)			✓		Shop Keeper	near village gate	
b.	Kerosene			✓			near chabutra	
c.	Other (mention)							

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 1 / Not Covered	Kasumbad	
b.	Hand Pump Coverage in Villages:	Covered / Not Covered		
c.	Coverage under Covered Drains:	Covered 1 / Not Covered	Kasumbad	
d.	Coverage under Open Drains:	Covered / Not Covered		
e.	Villages with Household Electricity Connection (Numbers)	Connected 1 / Not Connected	Kasumbad	

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	1040	d.	Pasture / Grazing Land	7.41	g.	Check Dam	–
b.	Irrigated Land		e.	Forests/ Plantations		h.	Wells/Bore Wells	
c.	Un-irrigated Land	160.62	f.	Other Common Land		i	Tanks /Ponds	

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

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)	
b)	Number of Households receiving pension (old age, widow, disability)	
c)	Number of eligible Households who are not receiving pension	
d)	Number of Households eligible for Ration Card	668
e)	Number of eligible HHs having ration cards	668
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	
h)	Number of active Job Card holders under MGNREGA	
i)	Number of Job Card holders who completed 100 days of work during 2013-14	
j)	Number of shops selling alcohol	0
k)	Number of BPL families	
l)	Number of landless households	
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	
q)	Number of Households headed by physically handicapped persons	
r)	Total number of Persons with Disability in the village	
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	

સરપંચ
ગ્રામ પંચાયત કસુંબાડ
તા.બોરસદ જી.આણંદ

Name and Signature of Surveyor and Respondent'

Ketul Ajvalia	Mr. Jayantibhai J. Rabari	Mr. Jitendrabhai M. Rabari	
Surveyor	PRI Respondent (Preferably Gram Panchayat Chairperson)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey

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: Kasumbad

b. Ward Number: _____

c. Gram Panchayat: Kasumbad

d. Block: Borsad

e. District: Anand

f. State: Gujarat

g. Lok Sabha Constituency: Anand

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

i. Names of Habitations / Hamlets:

Demographic Information

Number of Households 668 Total Population 3056 Male 1582 Female 1494

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	Within village
b.	Nearest Middle School	N	Borsad 10KM
c.	Nearest Secondary School	N	Borsad 10Km
d.	Kisan Seva Kendra	N	Borsad 10Km
e.	Milk Cooperative /Collection Centre	Y	
g.	Health Sub Centre	N	Davol (7Km)
h.	Bank	N	Napad (4KM)
i.	ATM	N	Asodar Chowkdi (4km)
j.	Bus Stop	N	Khadol 4Km
k.	Railway Station	N	Adas 8.6 Km

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

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	Borsad 10km
m	Common Service Centre	N	Ankalav road (11km)
n	Veterinary Care Centre	N	Jitodia 10KM

ii. Road Connectivity

a. Habitations connected by All-weather Roads 3 *(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 *(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 *(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: 01

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

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

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: 4

c. Schools (Number)

Primary Private: — Primary Govt.: 1

Middle Private: — Middle Govt.: —

Secondary Private: — Secondary Govt.: —

Higher Secondary Private: — Higher Secondary Govt: —

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	1040	d.	Pasture / Grazing Land	7.41	g.	Check Dam	–
b.	Irrigated Land		e.	Forests/ Plnatations		h.	Wells/Bore Wells	
c.	Un-irrigated Land	160.62	f.	Other Common Land		I	Tanks /Ponds	

ix. Entitlement Related Parameters		
1	Number of active Job Card holders under MGNREGA	
2	Number of active Job Card holders who have completed 100 days of work	
3	Number of shops selling alcohol	
4	Number of BPL families	
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'

Ketul Ajvalia & Niruli Raval	Mr. Jyantibhai J. Rabari	ગ્રામ પંચાયત કસુંબાડ તા.બોરસદ જી.આણંદ	
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

Chapter: 20 TDO-DDO-Collector email sending Soft copy attachment in the report

Gmail

ketul ajvalia <ketulajvalia43@gmail.com>

Existing and development scenario of "Kasumbad" village, Anand

1 message

Divyesh Mandali <dgm1993@gmail.com> Thu, May 13, 2021 at 10:22 AM
To: mam-anand@gujarat.gov.in, ddo-and@gujarat.gov.in
Cc: Vishwakarma Yojana <rurban@gtu.edu.in>, principal kite <principal@kitetech.ac.in>, ketul ajvalia <ketulajvalia43@gmail.com>, 17ce Nirali Raval <nirali1299@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 Kasumbad village profile of issues for development and our design work for them which is as below.

Village: Kasumbad		Population: 3056 (As per census 2011)
Key Issues	Remarks	Design proposal
Rain water harvesting	Increase ground water table	Borewell recharging system
Educational issues	Building of primary school needs reconstruction. Existing building is in bad condition	Primary school & Public Library
Road	The street road become muddy and filled potholes are there in rainy season so, the villagers have problem during passing on it	Paver block road
Health issues	PHC not available so, the villagers go to Davol PHC (7km)	Primary health centre
Community hall	The existing hall is too small for the use of any function.	Community hall
Drinking water tap	Villagers are facing problem in drinking water outside of house	Drinking water tap
Public Toilets	Some villagers do not have toilets in their houses, so we decided to provide public toilet in village.	Public toilet

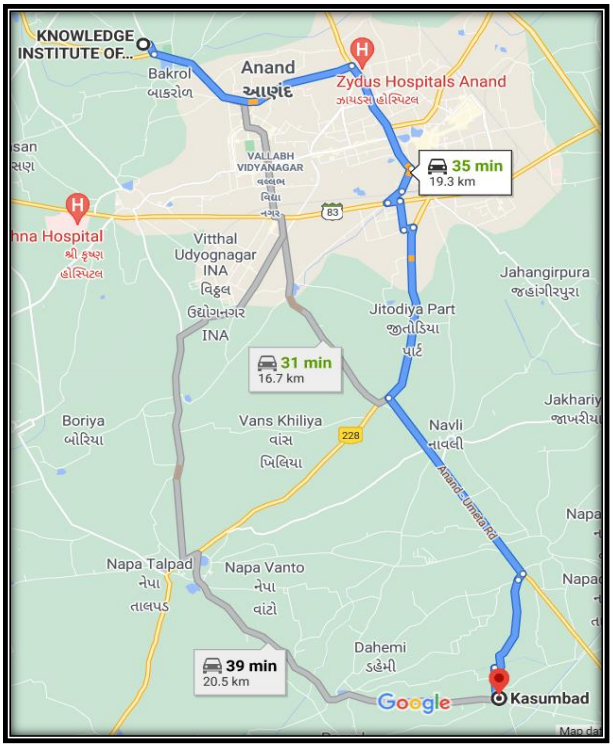
Sr.No	Design proposal	Expenditure Amount (INR)	Benefits
1.	Public Library	4,83,000	➢ Improve the knowledge of villagers. ➢ Create interest in reading
2.	Public Toilet	5,08,000	➢ Healthy environment ➢ Reduce spreading of diseases
3.	Paver Block	5,21,000	➢ Easy access in village ➢ Stop mud problem in rainy season
4.	Primary School	23,00,000	➢ Educated village ➢ Increase literacy rate
5.	Public Garden	5,70,000	➢ Increase happiness of villagers ➢ Increase greenery
6.	Rain water harvesting by bore well	35,000	➢ Increase Ground water table ➢ Solving problem of water scarcity
7.	Anganwadi centre	3,50,000	➢ Provide Children health facility ➢ Children care ➢ Pre-school activities
8.	Drinking water tap	75,000	➢ Provide pure drinking water ➢ Drinking water with all necessary minerals
9.	Primary Health centre	15,70,000	➢ Provide better health facilities
10.	Post office	5,92,000	➢ Communication with other cities ➢ Money savings
11.	Community hall	38,00,000	➢ Social function ➢ Panchayat meeting
12.	Bus stop	1,47,000	➢ Improve transportation

Chapter: 21 Comprehensive report for the entire village

Vishwakarma yojana is the final year project for the students of civil engineering. Gujarat Technological University is allotted important and prestigious project of Vishwakarma Yojana by the Government of Gujarat through Commissionerate of Technical Education from year 2012-13. Now, this project is reached in its 8th phase. The aim of the project is to provide urban amenities in rural areas but maintain the rural soul. The project provides "Design to Delivery" solution for development of villages in 'R-urban' areas. By the Vishwakarma yojana project, the students are getting real work experience of construction and are able to apply their technical knowledge to solve the problems. In this project students are meet the sarpnch, panchayat committee members and gram sevak etc. (all the stakeholders) in the village, survey the existing facilities then students are reimagining and redesigning the whole infrastructure of village.

We are selected the Kasumbad village for the development according to criteria of GTU. The village has the population of 3056 and total numbers of households are 668 according to census 2011. The village is located in Borsad taluka, Anand district. The village is 10km far from the borsad city and 14km from Anand city and 107km from the state capital Gandhinagar. It has an elevation of 29m above sea level. The total geographical area of the village is 486 hectares. Out of these 421 hectares are used for the agricultural purpose and 65 hectares are used for the residential purpose. The present facilities are available in the village is 24x7 electricity, sewage system, water supply system, post office, panchayat office, overhead water tank, Sahakari dudh Mandali, etc. There are 70% houses are kuccha. The village has bitumen road which is connected to the nearby villages and the internal roads of the villages are of R.C.C.

Map of Kasumbad village



Route of Kasumbad village from our college (19.3 km)

In this project we surveyed out the smart village (Dharmaj), ideal village (Gana) and allocated village (Kasumbad). After carried out physical survey, we compare 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 Kasumbad. We met the sarpanch and decided the lacking amenities which are fulfil basic need of village based on the priority. We design some of facilities and find out the cost of each projects.

After the survey we found some issues in the village. That issues are,

Table 33 Issues in Kasumbad village

Village: Kasumbad		Population: 3056 (As per census 2011)
Key Issues	Remarks	Design proposal
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Table 34 Design proposals for Kasumbad village

Sr.No	Design proposal	Expenditure Amount (INR)	Benifits
1.	Public Library	4,83,000	➢ Improve the knowledge of villagers. ➢ Create interest in reading
2.	Public Toilet	5,08,000	➢ Healthy environment ➢ Reduce spreading of diseases
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11.	Community hall	38,00,000	➢ Social function ➢ Panchayat meeting
12.	Bus stop	1,47,000	➢ Improve transportation

We also done some social activities in our village like, **Swachh Bharat Abhiyan**, Mask distribution and Spread awareness for COVID-19.

❖ Swachh Bharat Abhiyan

We organized Cleanliness programme under Swachh Bharat-Swasth Bharat Abhiyan Programme. The main purpose of this programme was to create awareness among the villagers regarding Cleanliness and its benefits.

As a part of Swachhta Abhiyan, we decided to clean primary school compound. The one sweeper of school also wanted to help us. We picked booms and started cleaning the compound of school. We are total 6 students are joined in this mission 4 students are swipe the garbage and collect at one particular place and the other students are picked up the garbage and filled in the trolly and after the collection of all garbage we are throwing the garbage in to the main dustbin.

Swachhta Abhiyan

❖ Mask Distribution

To prevent spreading of COVID-19 virus we are decided to distribute facemask in the village. So, we meet the sarpanch and told him that we want to do distribution of facemask in village and sarpanch was very happy after heard that and they also join us in this activity.

The sarpanch and gram sevak was led us in distribution of facemask and spreading awareness of COVID-19 virus.

Mask Distribution

Interaction with sarpanch and Talati

Photo with sarpanch of Kasumbad village