DETAIL PROJECT REPORT

VISHWAKARMA YOJNA: VIII
AN APPROACH TOWARDS RURBANISATION
RANGPAR(BELA) Village

MORBI District

PREPARED BY

STUDENT NAME	BRANCH NAME	ENROLLMENT NO.
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COLLEGE NAME
Government Engineering College, Rajkot.

NODAL OFFICERS NAME
Prof. K. J. Savalia

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 RANGPAR (BELA)

DISTRICT MORBI

Under

Vishwakarma Yojana: Phase-VIII

In partial fulfillment of the project offered by
GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA
During the academic year 2020-21.

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

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Date of Report Submission:	
Principal Name and Signature:	Prof. C. H. Vithalani
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Internal (Evaluator) Guide Name and Signature:	Prof. K.J. Savalia
College Name:	Government Engineering College - Rajkot
College Stamp:	

ABSTRACT

Vishwakarma Yojana is one of the initiatives towards Rurbanization by Government of Gujarat, which was allotted as a real time situation type project provide to GTU. The Students are meet all the citizen of a village, survey the existing facilities. Then they re-imagine and 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. By this project Students are experience a real work and able apply own technical knowledge on any real problem. This entails hard work, many student's visits to the village and do survey on his particular village.

The main objective of this Yojana is "**Creation of infrastructure - connectivity, civic and social infrastructure along with provision of alternative Economy generation is the key pillars that the concept hinges on."**

As per 2019 stats, Rangpar (Bela) villages comes under Morbi assembly & Morbi parliamentary constituency. Morbi is nearest town to Rangpar (Bela) which is approximately 9.1 km away. The location code or village code of Rangpar (Bela) village is 512672. Pin code of Rangpar (Bela) is 363642. The village comes under Rangpar panchayat. The total geographical area of village is 2747.69 hectares. Rangpar (Bela) has an agricultural land area of 2441.25 hectares. Rangpar (Bela) has a forest area of 69.48 hectares. Rangpar (Bela) has a residential area of 210.17 hectares. Rangpar (Bela) has a total population of 2123. Population consists of 1092 male and 1031 female. There are about 403 houses in Rangpar (Bela) village. Most of people engage with agricultural (Farming) occupation. Mainly 80% of pucca house hold and 20% kutcha. Village approach road is in good condition And Transportation facility are good & reach easily at the village with different ways. Irrigation mainly depend on well and rain water.

Rangpar (Bela) is a village which has large area and good population. There are some good physical facilities available like primary school & secondary school, banks, overhead water tank, underground drainage facilities, Gram-panchayat bhavan, Public Health Centre etc.

There are some basic facilities which are not available in village like Bio Gas Plant, Community Hall, Rain Water Harvesting System, Poor condition of Bus Stand, Children Park's etc.

In Future we will provide Social Infrastructure design for the village. It will include the design of CHC (Community Health Centre) and it is required to provide Child Welfare & Maternity Homes. Then we will also design Social-Cultural Infrastructure for the village. It will include recreational facilities like Public Library and Public Garden. We will also design Physical Infrastructure in the village.

Key Words: **Village development,**
Sustainable Development,
Community Involvement,
Connectivity,
Improvement in Technology.

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

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ABBREVIATIONS

SHORT NAME / SYMBOL	FULL NAME
PHC	Primary Health Center
CHC	Community Health Center
SDGs	Sustainable Development Goals
NRI	Non-Resident Indian
CCTV	Closed-circuit television
NRuM	National Rurban Mission
UDPFI	Urban development plans formulation and implementation
PHC	Primary Health Center
CHC	Community health center
IAY	Indira Aawas Yojana
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
PMGSY	Pradhan Mantri Gram Sadak Yojana
NREGA	National Rural Employment Guarantee Act
NGOs	Non-Governmental Organization
PURA	Provision of Urban Amenities in Rural Areas
PPP	Purchasing power parity
PPP	Public Private Partnership
ICT	Information and Communications Technology
BARC	Bhabha Atomic Research Centre
MSBTs	Multi Stage Biological Treatment Solution

CHAPTER - 1. IDEAL VILLAGE VISIT FROM DISTRICT OF GUJARAT STATE

1.1 Background & Study Area Location

Background

Lilakha is a Village in Gondal Taluka in Rajkot District of Gujarat State, India.
It is located 60 KM towards west from District headquarter Rajkot. Lilakha is located 295 KM away from State capital Gandhinagar. Lilakha has a population of 1098. There are 262 houses in the village. Mainly people here are involved in Agricultural activities. Lilakha has 620 hectares of agricultural land.

Study Area Location

Lilakha is situated in Gondal Taluka in Rajkot District, Gujarat. Lilakha pin code is 360320. Lilakha is located at 21.8022° N Latitude and 70.1841° E longitude.

Figure 1.1: Map of LILAKHA Village

Village/Village Code	Lilakha/513258
Gram Panchayat	Lilakha
Taluka	Gondal
District	Rajkot
State	Gujarat
Area	9.05 km^2
Population	1098
Population Density	121.32 per km^2
Household	262
Pin code	360320

[Table 1.1: Study of LILAKHA Village]

1.2 Concept: Ideal Village, Normal Village

1.2.1 Objectives

1. To make the replica village a –hub‖ that could attract supply for the growth of different villages in it is locality.
2. To Generate & maintain a society of co-operative living for wide-ranging and swift development.
3. To contribute towards social empowerment by attractive all section of group of people in thetask of rural development.
4. To provide easier, faster and cheaper access to urban markets for agricultural produce orother marketable commodities produced in such villages.
5. To contribute towards social empowerment by engaging all sections of the community in thetask of village development.

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

1. Pali (Gujarat)

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

2. Bangaon (Bihar)

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

3. Thrithala (Kerala)

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

4. Mawlynnog (Meghalaya)

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

1.2.3 The Idea of a Model/Smart Village

The ideas of smart village will also attention to multiple challenges such as unplanned urbanization, under development of village and smart villages. In smart village access sustainable energy services acts as a catalyst for development –enabling the provision of good education and health care, access to clean water, sanitation and nutrition, the growth of productive enterprise to boost income and enhanced security.

1.2.4 Ancient History of Civil

- discovery of urban settlements of Mohenjo-Daro and Harappa indicate existence of civil engineering & architecture, which blossomed to a highly precise science of civil

engineeringand architecture and found expression in innumerable monuments of ancient India.

- Several sump pots and latrines built oneabove the other were uncovered on Mound ET at **Harappa** (Now in Pakistan).
- Flush toilets were first used in the IndusValley Civilization. These existed in most homes and were connected to a sophisticated sewage mechanism. Thecivilization was prominent in hydraulic engineering.
- **Bhakra Dam** is a concrete gravity dam across the Sutlej River, and is in Bilaspur, Himachal Pradesh in northernIndia. The dam, located at a gorge near the (now submerged) upstream Bhakra village in Bilaspur district of Himachal Pradesh, is India's second tallest at **225.55 m (740ft.)** high next to the **261m** Tehri Dam.

Figure 1.2: Harappa

Figure 1.3: Bhakra Dam

1.3 Detail study of Lilakha Village

Demographic Detail

Particulars	Total	Male	Female
Total No. of Houses	151		
Population	1098	554	544
Child (0-6)	177	93	84
Schedule Caste	143	72	71
Schedule Tribe	0	0	0
Literacy Rate (%)	77.8126	83.48	78.27
Total Workers	284	244	39
Main Worker	279	-	-
Marginal Worker	15	9	6

[Table 1.2: Demographic Details of LILAKHA Village]

Infrastructure Detail

Drinking Water / Water Management Facilities

For drinking purpose there are two overhead water tanks in Lilakha village. One overhead tank has 5000 liters of capacity and other tank is of 2000 liters of capacity.
Water is supplied through underground pipes to the houses.

Sanitation

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

Wi-Fi

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

Public announcement

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

Security

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

Education

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

Community hall

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

Play ground

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

Gram panchayat

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

1.4 SWOT analysis of Ideal Village

Strength	
1. Basic physical infrastructure	**3. Recreational facilities**
• Water supply	• Quality of housing
• Transport	• Better connectivity
• Sewerage	• Public transport facilities
• Solid waste management	• Door to door solid waste collection
	• Street lightening
2. Basic social infrastructure	• Post office
• Health facilities	• Banking facilities
• Education facilities	• Temples

• Gram panchayat	• 66 KV sub-station
• Community hall	• Factories near village
Weaknesses	
1. Storm water network	2. Public Library
Opportunities	
1. Use modern technology	
Threats	
1. Water crisis	

[Table 1.3: SWOT Analysis of Ideal Village]

1.5 Future prospects of Development of the Ideal village

- Establishment of R.O. Plant for providing a pure drinking water for all people.
- For future prospect, the village Lilakha can use more advanced technologies for agricultural prospect and for other requirements also. They can make the village Wi-Fi zone and can improve the computer labs in the schools.
- They can also provide biogas plant in the village.
- There should be police station in the village for the safety purposes.

1.6 Benefits of the visits of Ideal village

- Example for set up a village development project.
- To get insight into the socio-economic and cultural realities of rural life.
- Can able to know different types of the facilities infrastructure likes physical, social, social cultural sustainable and repair and maintenance related and also know about the basic facilities about the village which have to provide for every poor village.
- Got information related various amenities from gram panchayat.
- We got ideas like which terms make it ideal village, which type of facilities available and how the management system of village was working as well react on some of problems.

1.7 Civil aspects required in Ideal village

We have observed the balance of commercial, residential and recreational land use in the Jarod villagebut as per the feedback which were given by villagers some facilities are lacking in the village from civil aspects and these are, Gas Pipelines, Biogas Plant, Cold Storage Area, Rain Water Harvesting, Solar Street Lights, Public WiFi Connection, Fire Station, etc.

Moreover, by providing skill development centers for the youth, panchayat should also focus on enabling the youth to setup the self-employment units. Water harvesting, Ground water recharge and improvement of village tanks/lakes are also projects to be pursued.

CHAPTER - 2.
RANGPAR (BELA) LITERATURE REVIEW

2.1 Introduction: Urban & Rural village concept

Urban:

In general, a rural area is a geographic area that is located outside the cities and towns. Typical rural areas have a low population density and small settlements. Agricultural areas are commonly rural, though so are others such as forests.

Rural areas are also known as 'countryside' or a 'village' in India. It has a very low density of population. In rural areas, agriculture is the chief source of livelihood along with fishing, cottage industries, pottery etc. According to the Planning Commission, a town with a maximum population of 15,000 is considered rural in nature. In these areas the panchayat takes all the decisions.

Rural:

For the Census of India 2011, the definition of urban area is as follows:

1. All places with a municipality, corporation, cantonment board or notified town area committee, etc.
2. All other places which satisfied the following criteria:
   - A minimum population of 5,000;
   - At least 75% of the male main working population engaged in nonagricultural pursuits; and
   - A density of population of at least 400 persons per sq. km.

An urban area characterizes by higher population density and vast human feature in comparison to areas surrounding it, but the term is not commonly extended to rural settlements such villages and hamlets.

2.2 Importance of Rural development

The National Rurban Mission (NRuM) follows the vision of "Development of a cluster of villages that preserve and nurture the essence of rural community life with focus on equity and inclusiveness without compromising with the facilities perceived to be essentially urban in nature, thus creating a cluster of "Rurban Villages".

- The objective of the National Rurban Mission (NRuM) is to stimulate local economic development, enhance basic services, and create well planned Rurban clusters.
- Bridging the rural-urban divide-viz: economic, technological and those related to facilities and services.
- Attracting investment in rural areas.
- Stimulating local economic development with emphasis on reduction of poverty and unemployment in rural areas.
- Spreading development in the region.

2.3 Ancient Villages / Different Definition of: Rural Villages

- **Rural: -**

- ✓ United states census (2000 census): -
  - A rural area as comprising open country and settlements with fewer than 2500 residents' areas designated as rural can have population densities as high as 999 per square mile as 1person per square mile.
- ✓ United states development of agriculture (2002 form bill):-
  - A rural area as any area other than a city or town that has a population of greater than 50,000inhabitants and the urbanized areas contiguous and adjacent to such town or a city.
- ✓ National geographic society: -
  - A rural area is an open swath of land that has few homes or other buildings and not verymany people.

➢ **Urban: -**

- ✓ National geographic society: -
  - "Urban area" can refer to towns, cities, and suburbs. An urban area includes the city itself, as well as the surrounding areas. Many urban areas are called metropolitan areas, or "greater," as in Greater New York or Greater London.
- ✓ United states census (2000 census): -
  - An urban area as "core census block groups or blocks that have a population density of at least 1,000 people per square mile (386 per square kilometer) and surrounding census blocks that have an overall density of at least 500 people per square mile (193 per square kilometer)".

2.4 Scenario: Rural / Urban village of India population growth

Agenda of census of India is to release of provisional population totals-Rural urban distribution. Population of Rural and Urban area. For the first in since independence, the absolute increase in population is more in urban areas that in rural areas.
According to the provisional reports released on 31 March **2011**, the Indian **population** increased to 1.21 billion with a decadal **growth** of 17.70%. Adult literacy rate increased to 74.04% with a decadal **growth** of 9.21%. The motto of the **census** was 'Our **Census**, Our **future**.'

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

[Table 2.1: Population of India]

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

- Rural-Urban Distribution: 68.84% & 31.16

- Level of urbanization increased from 27.81% in 2001 census to 31.16% in 2011.

Growth Rate of Literacy (in %)

The improvement in literacy rate in rural area is two times that in urban areas.

	2001	2011	Difference
India	64.8	74.0	+9.2
Rural	58.7	68.9	+10.2
Urban	79.9	85.0	+5.1

[Table 2.2: Growth Rate of Literacy]

- Literacy Rates (in %)
- The improvement in literacy rate in rural area is two times that in urban areas.
- The rural urban literacy gap which was 21.2% points in 2001, has come down to 16.1% points in 2011.

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

- Total population 60,439,692
- Total population of male: - 31,491,260
- Total population of female: 28,948,432
- Total population growth in decade is 19.28%
- Out of total population of Gujarat, 42.60% people lives in urban region and rest in rural.

Population of Gujarat		
Population	**2001**	**2011**
Male	26,385,577	31,491,260
Female	24,285,440	28,498,432
Total	50,671,017	60,439,692

[Table 2.3: Population of Gujarat]

Population Growth in Gujarat

Gujarat has witnessed a descent growth in its population in the last 50 years & 60 years. From a small figure of 16 Lakh in 1951, it has gone passed 5.07 Crore in 2001 & 6.04 Crore in 2011.

Description	Rural	Urban
Population	57.14	42.60 %
Total Population	34,694,609	25,745,083
Male Population	17,799,159	13,692,101
Female Population	6,895,450	12,052,982
Population Growth	9.31 %	36.00 %

[Table 2.4: Population Growth in Gujarat]

2.6 Rural Development Issues, Concerns & Measures

➢ Issues & Concerns

- Rural Development implies both the economic betterment of people as well greater social transformation. Increased participation of people in the rural development programs, decentralization of planning, and greater access to credit are envisaged for providing the rural people with better prospect.
- Many programs / plans such as IRDP, FWP, NREP, JRY and TRYSEM etc. have been developed and implemented for raising socio-economic sta- tus of the rural people.
- Policy for developing uplifting the lifestyle of the farmers.
- Policy of rural industrial development-integration off arming and industries, farmer's industrial co-operatives and industrial enterprises.
- Modernization of rural society and cultural policies and planning for transfer of loyalty and values from traditional technology to modern technology.

➢ Measures

- Sustainable development. / Higher living standards.
- Enough basic physical amenities.
- Sanitation facilities.
- Higher education.
- More job opportunities.
- You can get support for improving the environment.
- You can be compensated for poor farming conditions.

2.7 Various infrastructure guidelines With the Norms for Villages for the provisions of different Infrastructure Facilities

Facility	Planning commission norms	Required as per norms
Education		
Anganwadi	Each village	**1**
Primary school	Each village	**1**
Secondary school	Each village	**2**
Higher Seconday school	Per 15,000 Population	**1**
College	Per 125,000 Population	**1**
Tech.Training Institute	Per 100,000 Population	**1**
Agriculture Research Center	Per 100,000 Population	**1**
Medical Facility		
Gov./Panchayat Dispensary or Sub PHC or Health Centre	Each village	**1**
PHC & CHC	Per 20,000 Population	**1**
Child Welfare and Maternity Home	Per 10,000 Population	**1**
Hospital	Per 100,000 Population	**1**

[Table 2.5: Various Infrastructure & Guidelines for Village]

2.8 Ancient/ Existing Electrical concept study as a Literature Review for village development

- Land, water and forests are the primary resources of agricultural production, and are the capital vital to maintain human life and well-being. The use of these resources must be evenhanded with conservation to hold sustained national development, and to avoid environmental dilapidation and losses in agricultural productivity. The natural resource base provides many benefits to different groups of people in both urban and rural areas.
- Recent demographic pressures have changed the way that people use land, water and forests, and have contribute to a rife deterioration in the condition and productivity of these resources.
- In developing countries, population growth, migration, and resettlement are changing how people use land, and where they settle.

2.9 Other Projects / Schemes of Gujarat / Indian Government

Following are the projects/schemes by Govt. Sector:

i) Indira Aawas Yojana (IAY)
ii) Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)
iii) Pradhan Mantri Gram Sadak Yojana (PMGSY)

i.) Indira Aawas Yojana (IAY)

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

Objective:

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

ii.) 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 programs 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 principal role to Panchayats at all levels in its implementation and promises transparency through involvement of community at planning and monitoring stages.

iii.) Pradhan Mantri Gram Sadak Yojana (PMGSY):

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

and above in the plain areas and 250 persons and above in hill States, the tribal and the desert areas.

According to latest figures made available by the State Governments under a survey to identify Core Network as part of the PMGSY programme, about 1.67 lakh Unconnected Habitations are eligible for coverage under the programme. This involves construction of about 3.71 lakh km. of roads for New Connectivity and 3.68 lakh km. under upgradation. 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.

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

i) Non-Governmental Organizations (NGOs)

ii) Provision of Urban Amenities in Rural Areas (PURA)

i) Non-Governmental Organization (NGOs):

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

Definition of NGOs:

The term NGOs is used to denote / specify those organizations which undertake voluntary action and social movements.

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

ii) Provision of Urban Amenities in Rural Areas (PURA):

Objective of the Scheme:

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

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

The PURA Scheme (provision of Urban Amenities in Rural Areas) envisages rapid growth of rural India given enhanced connectivity and infrastructure, the rural population would be empowered

and enabled to create opportunities and livelihoods for themselves on a sustainable and growing basis.

The key characteristics of the scheme are:

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

Other Projects / Schemes:

In other projects for the development of the rural area is the Public Private Partnership (PPP).

Public-Private-Partnership - The Concept:

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

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

- Cost-effectiveness- since selection of the developer/ service provider depends on competition or some bench marking, the project is generally more cost effective than before.
- Higher Productivity-by linking payments to performance, productivity gains may Be expected within the programs/project.
- Enhanced Social Service- social services to the mentally ill, disabled children and delinquents etc. require a great deal of commitment than sheer professionalism. In such cases, it is Community/Voluntary Organizations (VOs) with dedicated volunteers who alone can provide the requisite relief.
- Recovery of User Charges- Innovative decisions can be taken with greater flexibility on account of decentralization. Wherever possibilities of recovering user charges exist, these can be imposed in harmony with local conditions.

CHAPTER - 3.
SMART CITIES / VILLAGE CONCEPT IDEA

3.1 Introduction: Concepts, Definitions and Practices

Concepts:
A smart village is one where sustainable energy sources are used as a measure of development and people have access to quality education and healthcare, access to clean drinking water, sanitation and nutrition, enhanced security, gender equality and democratic engagement.
Making a city "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.

Definition (Civil):
Strengthening and augmentation of sub-transmission and distribution infrastructure in rural areas including metering of distribution transformers feeders/consumer.

According to the Civil Engineering terminology the Smart City/ Smart Village can be defined as the City/Village fully developed by use of modern techniques & concepts of Civil Engineering like:

1. **Concept of green Building**
2. **Geo Polymer Concrete**

Figure 3.1: Smart Village Concept

3.2 Vision – Goals, Standards and performance measurement indicators

➢ Smart City Vision

- ❖ Urbanization is a growing trend. As more and more people gather together, smart systems and their integration need to be developed, not just to provide the necessary services to the people, but to do so effectively with the minimal impact on the environment.

➢ Goals

- ❖ Provide basic amenities as well as sustainable and smart infrastructure and increasing citizen 's accountability towards it.
- ❖ Identify the transport facility and need resident and business group of people and advantagetechnology can be used to address problems of safety and other facility.

- ❖ Improved quality of life through improved physical and social infrastructure and clean andgreen environment.
- ❖ Safer city for all groups and sections of the city.

➢ Smart Cities Standards:

- There are some standards activities for smart city which is kept in mind to develop any smartcity and you should at least be aware of below things.

1. **Strategic: -**
   - ✓ ISO 37120: Sustainable development of communities — Indicators for city services andquality of life.
   - ✓ ISO 37101: Sustainable development & resilience of communities – Management systems–General principles & requirement.
2. **Process: -**
   - ✓ The development by the BIS of a Smart city framework standard (PAS 181) falls into the Process category: —It provides practical, _how-to _advice, reflecting current good practice as identified by a broad range of public, private and voluntary sector practitioners engaged in facilitating UK smart cities.

Smart Cities Performance Measurement Indicator's

People	**Prosperity**	**Planet**
1. Health 2. Safety 3. Access to services 4. Education 5. Diversity & social cohesion 6. Quality of housing 7. Environment	1. Employment 2. Equity 3. Green economy 4. Economic performance 5. Innovation 6. Attractiveness & Competitiveness	1. Energy & Mitigation 2. Material, Water & Land 3. Climate resilience 4. Pollution 5. Ecosystem
Governance	**Propagation**	
1. Organization 2. Community involvement 3. Multi-level governance	1. Scalability 2. Reliability	

[Table 3.1: Smart Cities Performance Measurement Indicator's]

3.3 Technological Options

Technological Options for Smart Cities

- ➢ Digital libraries
- Digital libraries in schools across the city. Some 13 schools in Delhi have been selectedfor this. 3D printing labs have been set up in 10 schools.
- ➢ LED lights

- LED lights to replace streetlights, pelican crossing, 3D zebra crossing, street furniture, Wi-Fi network, CCTV cameras and environment sensors. In Delhi, pilot on Mother Teresa Crescent Road.

➢ Water ATM:

- Water ATM is device to extract water from mini sewage treatment plants and use water for gardening, house cleaning, washing of cloths, etc.

➢ Book parking through your smartphone

- Mobile app to pre-book parking slots for better regulation of parking spaces. In Delhi, the workawarded has been awarded for the same.

➢ Smart toilets

- These smart toilets will have water ATM, vending machine and sanitary napkin vending machine.

Civil Related Technology: -

1. Concept of green Building
2. Geo Polymer Concrete
3. Modern Township planning
4. Smart Traffic management
5. Waste management system, Etc.

1. Concept of green Building:

A **'Green building'** is a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment. Green buildings preserve precious natural resources and improve our quality of life.

Figure 3.2: Concept of Green Building

There are a number of features which can make a building 'green'. These include:

- Efficient use of energy, water and other resources.
- Use of renewable energy, such as solar energy.
- Pollution and waste reduction measures, and the enabling of re-use and recycling.
- Good indoor environmental air quality.
- Use of materials that are non-toxic, ethical and sustainable.
- Consideration of the environment in design, construction and operation.
- Consideration of the quality of life of occupants in design, construction and operation.
- A design that enables adaptation to a changing environment.

Any building can be a green building, whether it's a home, an office, a school, a hospital, a community centre, or any other type of structure, provided it includes features listed above.
However, it is worth noting that not all green buildings are – and need to be - the same. Different countries and regions have a variety of characteristics such as distinctive climatic conditions, unique cultures and traditions, diverse building types and ages, or wide-ranging environmental, economic and social priorities – all of which shape their approach to green building.

2. Geo Polymer Concrete:

Geopolymer concrete is a type of concrete that is made by reacting aluminate and silicate bearing materials with a caustic activator. Commonly, waste materials such as fly ash or slag from iron and metal production are used, which helps lead to a cleaner environment. This is because the waste material is actually encapsulated within the concrete and it also does not have to be disposed of as it is being used. Geopolymer concrete is does not require heat to make it and it does not produce carbon dioxide. Standard Portland cement-based concrete requires both heat and carbon dioxide.
Geopolymer concrete is one of the building materials that has become more popular in recent years due to the fact that it is significantly more environmentally friendly than standard concrete. If you want any more information about geopolymer concrete, check out our concretors page or speak to your local concretor.

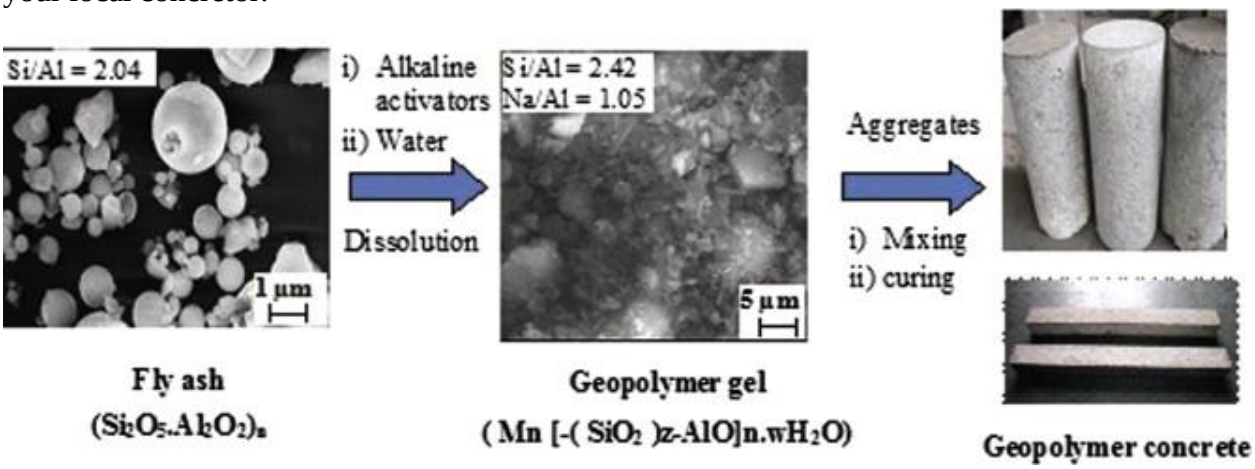


Figure 3.3: Content of Geopolymer Concrete

Advantage of Geopolymer Concrete

- Geopolymer concrete has significant advantages over standard concretes.
- It is much longer lasting than standard concrete and requires little repair, thus saving huge amounts of money that would otherwise have to be spent on repairing and maintaining concrete based infrastructure.

- You might be interested to learn that geopolymer concrete is the modern equivalent of the ancient concretes such as those used by the Romans that have survived for thousands of years.
- Geopolymer concretes will safely last for hundreds of years while standard concretes will last for tens of years.

3. Smart Traffic management:

Smart Traffic Management is a system where centrally-controlled traffic signals and sensors regulate the flow of traffic through the city in response to demand. Upgrading and integrating all the signals on the main roads in the city will:

- Reduce everyday congestion markedly, by smoothing traffic flows and prioritizing traffic in response to demand in real time.
- Reduce pollution throughout the city: stop-start driving is inefficient and polluting.

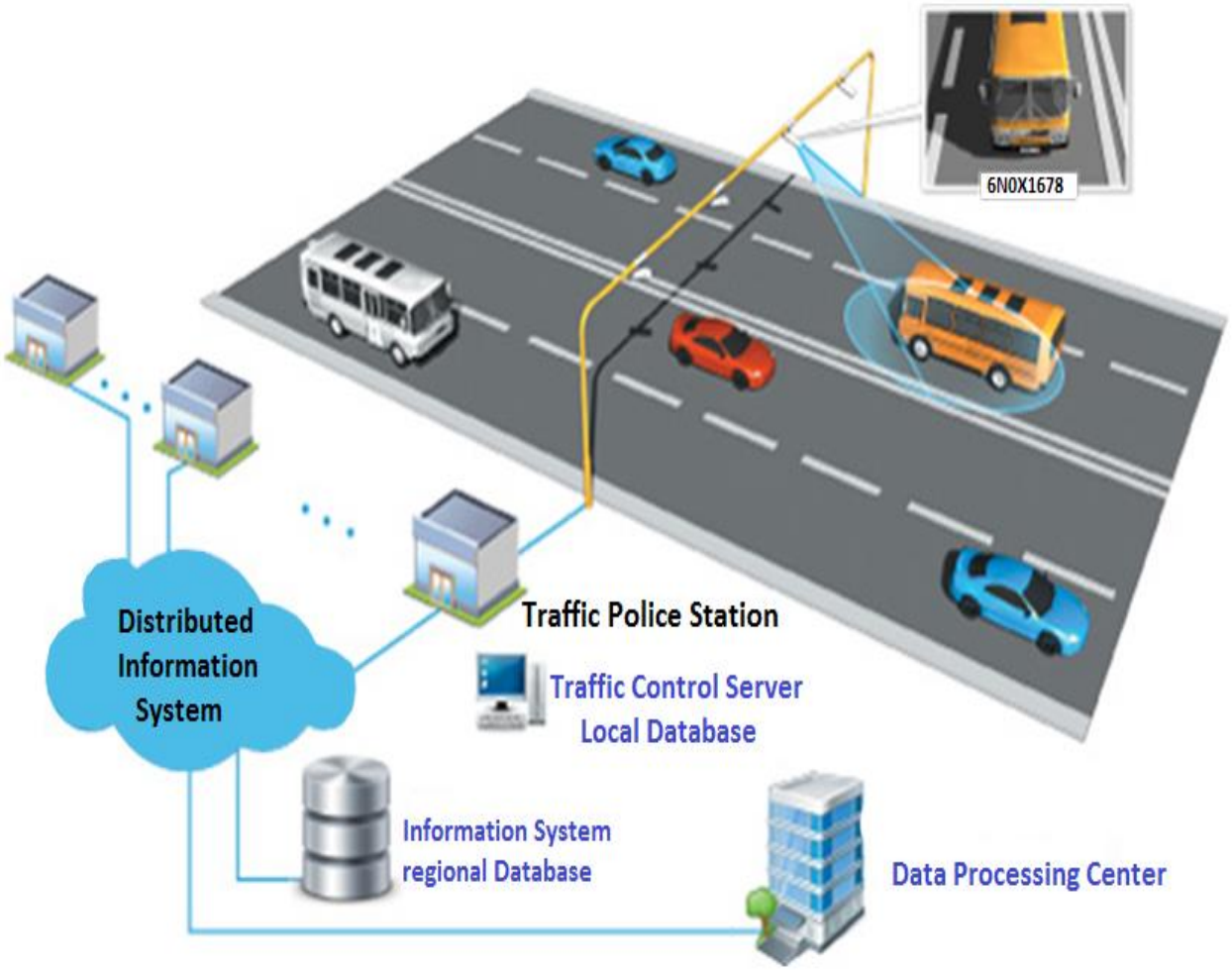


Figure 3.4: Smart traffic Management System

It will also provide a perfect opportunity to install monitoring equipment to collect much more detailed traffic and journey data than we have now. Each set of traffic lights will have communication equipment that can be used to transmit (anonymous) vehicle data, either from ANPR cameras or Bluetooth detectors, and CCTV feeds (where appropriate).

ANPR (Automatic Number Plate Recognition) software uses OCR (Optical Character Recognition) capabilities for automatic recognition of vehicles number plates. ANPR allows you reliably identify vehicles with restrictions (stolen car, not licensed, unpaid fines, etc…), alerting the authorities when they have passed through inspection, allowing immediate action such as seizure of the vehicle, surrender of passengers and any other action.

When passing by the camera, ANPR get a photo of the vehicle's number plate, registering it on an images database, with date, hour and camera information, allowing a lot of consults and a more effective traffic management.

Systems commonly use InfraRed (IR) lighting to allow the camera to take the picture at any time of the day. ANPR technology tends to be region-specific, owing to plate variation from place to place.

Traffic control systems use ANPR units which provide details about the movement and flow of vehicles around the road network. These details can highlight the problem areas and help to make incident management decisions. The photograph of the car and the driver can be stored and retrieved if there is a need for evidence in disputes or crime situations.

3.4 Road map and Safe Guards

To become a digital city, governments will need an appropriate set of solutions that will help them advance to the next stage of ICT maturity. The more a city takes advantage of the potential offered by ICT in terms of the provision of digital services and an integrated urban network, the higher its level of ICT maturity. In many ways, this is easier for newer cities in emerging markets, which are just now investing in urban infrastructure.

Figure 3.5: Road map for Smart Village

For example, Losail City in Qatar, Maslar City in the For example, Losail City in Qatar, Maslar 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 in moving 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.

Indeed, in some cases it is impossible as the buildings cannot accommodate new technologies. However, becoming a digital city is not so stark a choice that urban authorities either achieve this revolution or fail. Rather, even taking small steps, particularly for established cities, toward becoming more digitized and offering enhanced digital services provides a variety of benefits. In some cases, established cities can use the disruptive power of digitization to leapfrog some of the obstacles.

3.5 Issues & Challenges

Funding:

One of the biggest challenges is having a streamlined funding for the development of smart cities. It was decided that each Smart City will receive 500 Crore over the period of 5 years by Central Government. But this amount won't be sufficient. To match the contribution of central government

there should be some contribution from the state government too in order to create sustainable funding to take the smart cities from pilot phase to execution and then completion. There are many private firms that are providing funding but it requires to be in proper process. Technology: There are certain technologies that are a part of the project and it is expensive to use them. Because of the advancement, some technologies are borrowed from other countries which makes it more expensive. This hinders the success of smart city project. Another challenge is in the discovery of technology and the need for a medium that can bring technology users and creators together to adopt faster platforms.

3.6 Smart Infrastructure - Intelligent Traffic Management

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

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

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

3.7 Cyber Security or any other concept

- Cyber Security-
  - Hybrid cloud workload protection platforms (CWPP) provide information security leaders with an integrated way to protect these workloads using a single management console and a single way to express security policy, regardless of where the workload runs.

- Smart Data Centre-
  - Smart Data Center Facilities Solution provides a modern foundation for distributed cloud applications.

Figure 3.6: Cyber Security

3.8 District Cooling and Heating / Green building

District Cooling and Heating

- District heating and Cooling Systems are a heat source plant that installs chillers and boilers for a group of neighboring buildings centrally for heating and cooling in district units.
- The cold water and hot water produced by the heat source plant is supplied to each building through regional pipes built inside the district to use for cooling and heating.

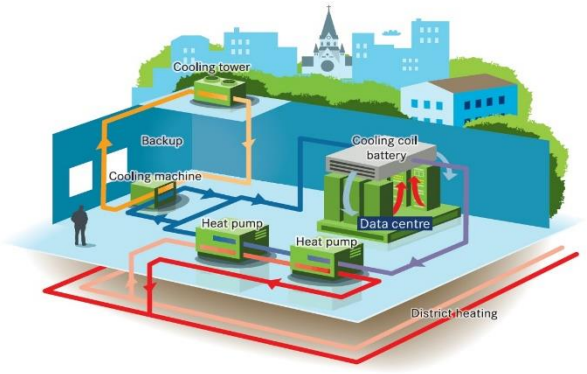


Figure 3.7: District Cooling & Heating

Green Buildings

Even if you are not an architect, contractor, developer, building owner, or realtor, chances are you have heard the term **green building** or **sustainable building**. You may even live or work in a green or **high-performance building**.

Since childhood, I have been fascinated by buildings-the way they look, how they are built and function, and especially their ability to positively impact how people live and work. When a former employer and client embarked on a green building program, I took the opportunity to learn as much as I could about green design and green building.

Conventional buildings have a substantial impact on the health and wellbeing of people and the planet. They use resources, generate waste, and emit greenhouse gases throughout their life cycle which can be 50, 75, or more years.

Green building is not new. Humans been building with local materials such as mud, straw, wood, and stone, and using renewable energy from the sun, the wind, and water for thousands of years.

Today, green building is the practice of designing, constructing, and operating buildings to:

- Minimize resource use
- Reduce waste and negative environmental impacts
- Maximize occupant health and productivity
- Decrease life cycle costs

A green building

- Makes efficient use of land, materials, energy, and water.
- Generates minimal or no waste.
- Provides a healthy indoor environment for its occupants.
- Restores, improves, or enhances the natural environment.
- Installing energy-efficient windows and doors.
- Using lower-VOC (volatile organic compounds) like paints and others.

3.9 Strategic Options for Fast Development

- For developing smarter city, city and national leaders need to plan a comprehensive urbanization strategy, taking advantage of the latest developments in technology, creating employment opportunities, and supporting economic activities that will improve quality of life for citizens.
- Redevelopment will affect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density.
- Greenfield development will introduce most of the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, plan financing and plan implementation tools (e.g. land pooling/ land reconstitution) with provision for affordable housing, especially for the poor.

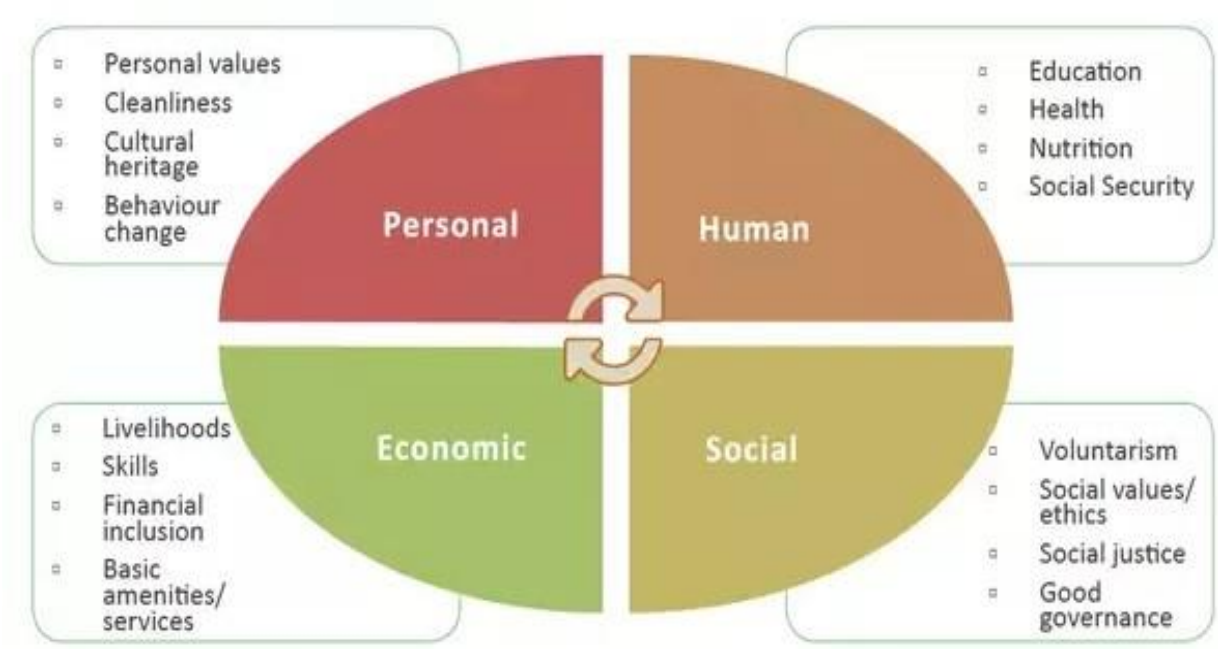


Figure 3.8: Holistic Development

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

➢ Technologies

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

➢ Role of Indigenous Technologies

- Bhabha Atomic Research Centre (BARC) has developed several water purification devices and desalination techniques, as a part of its research and development efforts towards the betterment of society. These technologies or products are backed by robust design concepts and pilot plant studies, which can cover the needs of households, communities, industries and metropolis.
- A novel idea of coating polysulfide on a porous candle resulted in the development of a "Point of Use" water purifier. Unlike other devices available in the market which only deactivates the micro-organisms, this device physically eliminates them. This device does not require any electricity or any addition of chemicals.
- Removal of suspended particulates, colour and odour are additional benefits available in these units. A typical unit provides nearly sufficient water per day at 3 meters pressure head and can withstand up to 40 psig pressure (2.76 bar).

3.11 Initiatives in village development by local self-government

- Transforming existing Indian cities into Smart Cities or building new ones is a colossal task. Cities need to be able to assess their current situation and determine the critical capabilities needed to enable a Smart City.
- In the past "government as provider" approach, the priorities were to secure budget allocations and develop projects.
- To help cities address these issues, the All-India Institute of Local Self-Government (AIILSG) is assisting Raipur, Bilaspur, Chandigarh, Karnal and Faridabad in preparing for the proposal for the nationwide City challenge being contested among 100 potential Smart Cities.
- The Housing Policy and the NCU statement implicitly give higher priority to two otherrequirements.
- The reform of policies and regulations that now inhibit development initiatives by the people.
- More efficient resource management and the building of institutional capacity.

3.12 Smart initiatives by District Municipal Corporation

- Urban India faces an enormous challenge: managing its gigantic load of solid waste.
- Recently Rajkot Municipal Corporation is taking a step for developing toward smart city.
- Its vision to develop Rajkot as smart, livable and iconic city of Gujarat with inclusive growth.
- Municipal incorporation occurs when such municipalities become self-governing entities under the laws of the state or region in which they are located. Frequently, this event is noticeable by the award or declaration of a municipal contract.

3.13 Any Project contributed working by Government / NGO

DRDA Administration

- Pradhan-Mantri Aawas Yojana (Grameen)
- MGNREGA-2005
- Monitoring and Evaluation
- National Social Assistance program
- Pradhan-Mantri Gram Sadak Yojana
- PMRDFs
- RURBAN (NRuM)
- Training

PROJECTS/ SCHEMES BY PRIVATE SECTOR

1. MoRD schemes
2. Non- MoRD schemes
3. Financing
4. Capital Grant under RURA

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

- The so-called smart development of infrastructure is hardly strictly divided into two polarized sets of frameworks, rural and urban.
- Indian smart development, it is necessary to consider both spaces simultaneously, their mutual interconnections and take into account that significant changes in one will affect the other and another way around.
- Seen in the worldwide context, there are several initiatives promoting or using the concept of the Smart villages.
- Smart Village initiative: new thinking for off-grid communities worldwide and IEEE Smart Village: Empowering off-grid communities are both worldwide active and striving to meet the SDG 2030, especially goal 7, Affordable and Clean Energy.
- The first one promotes access to sustainable energy as a main catalyst for the development ofgood education and healthcare systems, access to clean water, sanitation, economic growth, enhanced security, gender equality, etc.
- The activities of the Initiative are taking place in six large regions, namely East Africa, West Africa, South Asia, South-East Asia, South America, and Central America, Caribbean, Mexico—the so-called developing world with limited possibilities to access (educational, electrical, economic and other) infrastructure.
- Smart development solutions were therefore mainly addressing the ways to create opportunities for local employment and alleviate the living conditions.

Chapter - 4.
About Rangpar (Bela) Village

4.1 Introduction

4.1.1 Introduction about Rangpar (Bela) Village details

Village	Rangpar (Bela)
Gram Panchayat	Rangpar
Taluka	Morbi
District	Morbi
State	Gujarat
Area	27.47 km^2
Population	2123
Population Density	77.28 per km^2
Household	403
Pin code	363641
Village code	512672

[Table 4.1: Introduction about RANGPAR (BELA) Village]

4.1.2 Justification / need to study

In India there are 640 districts, (200 backward) 6,50,000 villages (1,25,000 backward) The Government takes responsibility for uplifting rural and poorer regions. There is lot of public spending to improve the infrastructure, water and sanitation in theseareas. But not much improvement achieved in most of the villages. Vishwakarma Yojana helps inbetter and fast development of rural areas. By providing urban facilities in rural areas, decrease this rate of migration & also increasestandard of living of people of rural areas. The basic need of this study is to provide facilities in the villages for the Rurban Development. Implement the different Physical and Social infrastructural facilities in the villages and to lessen the urban migration of people of the village. So, for this purpose information of village is to be collected like Drainage Facility, EducationFacilities, Health Facilities, Transportation Facilities, Banking Facilities, and Public Toilets etc.

65% of the population of the country lives on agriculture which contributes only 15 % to the country's GDP. If we compare this with China which has a similar sector contribution to the GDP, only 30% of people depend on agriculture whereas in country like USA just 2% of the people are dependent on agriculture. Urbanization addresses this concern and imbalance by providing alternate jobs to rural masses dependent upon agriculture. So, it is very important to develop rural area compare to urban one.

4.1.3 Study Area (Broadly define)

Study area mainly includes study of Rangpar (Bela) Village which is situated at Morbi Taluka in Morbi District of Gujarat State, India. Besides them are some villages like Bela, Jetpar, Kerala, Khareda & Vankda, etc. The Vishwakarma Yojana is aimed to Rurban development of the village. For that purpose, study area is decided for taking detail information of the village. The study area

includes education, social life, basic needs of the person, economic growth of village, transport facilities etc.

Education includes various facilities like Anganwadi, Primary School, Secondary School, etc. Medical Facility includes study of Gov. / Panchayat Dispensary, Health Centre, PHC & CHC, Child Welfare and Maternity Home, Hospital etc.

4.1.4 Objectives of the study

Following are the various objectives of study….

- To provide insufficient basic physical infrastructure facilities like Water Supply, Transportation, Sewerage and Solid Waste Management etc.
- To provide insufficient Social infrastructure facilities like health and education facilities and to ensure proper delivery of facilities to village dwellers.
- To promote integrated development of rural areas with provision of quality housing, better connectivity, employment opportunities and supporting physical and social infrastructure.
- To provide Internal roads within village settlement & efficient mass transportation systems between clusters of villages to improve connectivity.
- To Identification sanitation facilities that are needed to be improve like sewerage and drainage line, dumping facilities, Electricity connections.
- Refurbishing of village lakes, water tanks and wells, construction of rain water harvesting structures for sustainable Development.

4.1.5 Scope of the study

- To reduce urban city pressure and lower the migration rate.
- Due to providing urban facilities development of village will be possible.
- To improve health and livelihood of people.
- To improve education facility.
- The study will focus the development trend, growth of the village, and find out the problems related to the physical development of the area and infrastructure services of the village.

4.1.6 Methodology

- First of all, we studied what are the various goals and different objectives and aspect of Vishwakarma Yojana and also studied various basic definitions related to the project like rural area, urban area, urbanization etc.
- After this we contacted our village (Rangpar (Bela)) surpanch, talati-mantri and different gram-panchayat members.
- Then after we frequently visited the Rangpar (Bela) village for the purpose of collecting various data related to various facilities and amenities and survey of different aspects related to physical, infrastructural, social facilities.
- Gap analysis is done based on data collected through survey of village. And various suggestions are made by us on development of village. And based on this suggestion we will design proposed facilities in the village according to the need and population of that village.

4.1.7 Available Methodology for development of related to Civil

- Green house
- Renovation of Grampachayat
- Bore well in cremation
- Water tank

4.2 Rangpar (Bela) Study Area Profile

4.2.1 Study Area Location with brief History land use details

Here is a map showing boundary line of Rangpar (Bela) village in Morbi district; which is taken from google.com.

Figure 4.1: Map of RANGPAR Village

4.2.2 Base Location map, Land Map, Gam Tal Map

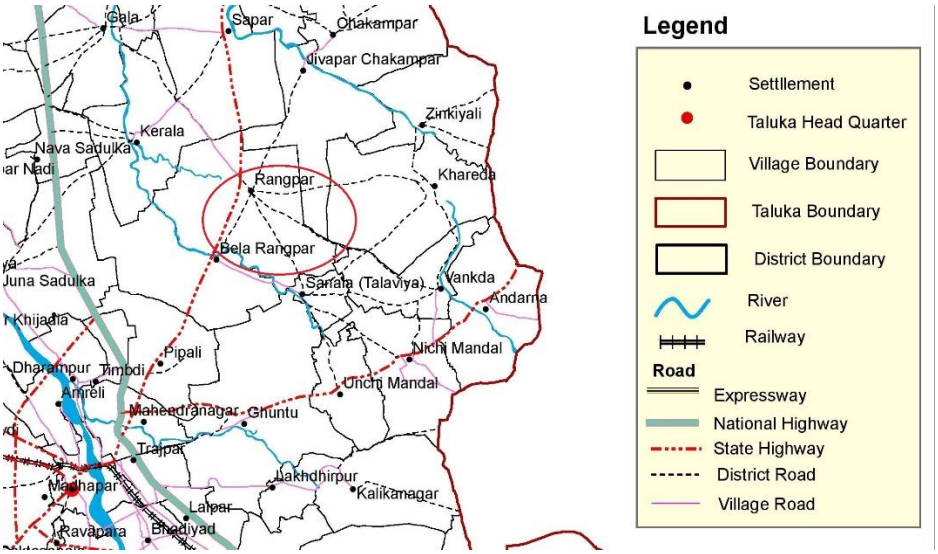


Figure 4.2: Base Map & Gam Tal Map

4.2.3 Physical & Demographical Growth

Total Households	**403**
Total Rangpar Village Population	2123
Total Male Population	1092
Total Female Population	1031
Sex Ratio	105.9165

[Table 4.2: Physical & Demographical Growth]

4.2.4 Economic generation profile / Banks

- The major population of Rangpar (Bela) village is Farming and other some people is doing businessand services.
- Some people are engaged with labor work.

4.2.5 Actual Problem faced by Villagers and smart solution

Sr.no	Problems	Smart solution
1	In summer village does not have sufficient water	Water harvesting
2	There is bus stand not in good Condition	Renovate Bus station
3	There is no college	College can be built
4	In village stolen activities are occur	CCTV camera

[Table 4.2: Problem Faced by Villagers and Smart Solution]

4.2.6 Social scenario-Preservation of traditions, Festivals, Cuisine

→ **Social scenario-**

Sr. No.	Details	Population
Total Population		
1	**Male**	**1092**
2	**Female**	**1031**
Total numbers of family		
1	**Total B.P.L Family**	**403**
Village Literacy rate		
1	**Male literacy rate**	**77.93%**
2	**Female literacy rate**	**62.07%**
3	**Total literacy rate**	**79.27%**

[Table 4.3: Social Scenario of Village]

→ **Preservation of traditions-**

- In this village all people are engaged to preservation of tradition because all people are connected to nature by profession like their occupation is Farming so, people are daily connected with nature.

→ **Festivals-**

- In this village all people are enjoying all festivals like Diwali, Janmashtami, ide, Dhuleti etc…

→ **Cuisine-**

- Generally, people of village are cuisine their food in old type of stove with to burn a wooden material etc.….
- But nowadays people are use morden stove.

4.2.7 Migration Reasons

Reasons of migration

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

4.3. Data Collection Rangpar (Bela)

4.3.1 Describe Methods for data collection

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

4.3.2 Primary details of survey details

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

4.3.3 Average size of the House

All house is built in size of average is 50*30 & 50*15 foot. All house has 1 floor only average. Total no. house of village is 403.

→ **Geo-Tagging of House**

Rangpar (Bela) village is located in Morbi taluka in Morbi district of Gujarat state. It is located 30 KM towards west from district headquarter Morbi. 380 KM from state capital Gandhinagar.

4.3.4 No. of Human being in One House

The no. of human being in one house is approximately 3 to 5 persons.

4.3.5 Material available locally in the village

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

Material Out Sourced by the villagers

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

4.3.6 Geographical Detail

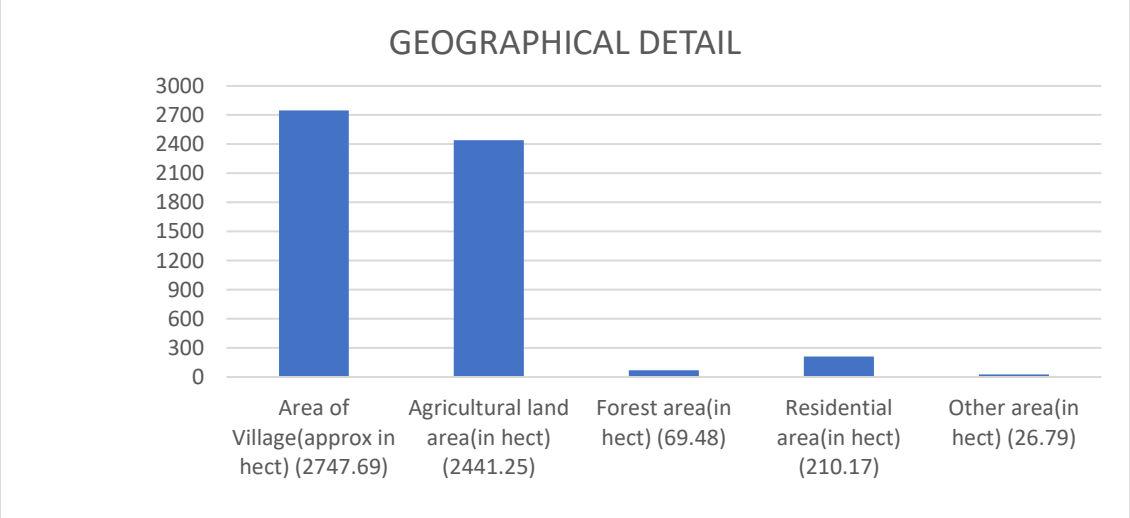


Figure 4.3: Graph of Geographical Detail

4.3.7 Demographical Detail

Sr. No.	Census	Population	Male	Female	No. of House Holds
1.	2001	1719	892	827	349
2.	2011	2123	1092	1031	403

[Table 4.4: Demographical Detail]

Cast wise Population Details

Census Parameter	Census Data
Total Population	2123
Total No. of Houses	403
Female Population	1031
Total Literacy Rate %	79.27%
Female Literacy Rate %	62.7%
Scheduled Tribes Population	0
Schedule Caste Population	159
Child Population (0-6 years of age)	242
Boy Child Population	130
Girl Child Population	112

[Table 4.5: Cast Wise Population Detail]

4.3.8 Occupational Detail

Three Major Occupation in the Village	1. Farming (60%)
	2. Factory's Labor Work (30%)
	3. Business (Shop) (10%)

[Table 4.6: Occupational Detail]

4.3.9 Agricultural Details

Main source of income in this village is farming. Farmers use drip irrigation system to do farming. The main agricultural crops grown in the village are Cottons, Peanuts and Castor. Total Agricultural land is 2441.25 hectares.

4.3.10 Manufacturing HUB / Ware House

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

4.3.11 Tourism Cluster

There is no tourism cluster in the village.

4.4 Infrastructure Details

4.4.1 Drinking Water / Water Management Facilities

For drinking purpose there are two water supplies in Rangpar (Bela) village. One water supplies which name is BHOLE WATER SUPPLYS has 5000 liters of capacity and other water supplies which name is BAPA SITARAM WATER SUPPLYS has 2000 liters of capacity.
Water is supplied through a vehicle to the houses.
There is one overhead tank available but it is not working condition. And a lake is also available near the village. But that water is not worth drinking.

Figure 4.4: Bhole Water Supply

4.4.2 Drainage Network / Sanitation Facilities

In village well maintain Underground drainage facility is available. All drainage is fullycovered with R.C.C. cap.

4.4.3 Transportation & Road Network

Transportation

For local transportation buses are available but most of the people/public uses auto rickshaws and private vehicles.

State Road Transport bus service is available in the village. But there is no bus station are available in working condition.

Nearest Railway Station is at distance of about 13.7 kms at Morbi town. In village there are no railway station available.

Road network

All the internal street of village is constructed by cement concrete (C.C.).privet vehicles also available like rickshaw, private vehicle, etc.

Figure 4.5: Internal Road Network

4.4.4 Housing condition

There are 403 houses in the village, out of which 80% households are pucca and 20% kutcha.

Figure 4.6: Housing Condition

4.4.5 Social Infrastructure Facilities

Health Facilities:

There is a Public Health Centre (PHC) in the village. Right now, it is made new.

Figure 4.7: Public Health Center - Rangpar (Bela)

Education Facilities:

There are 1 Anganwadi & 1 Government primary school are available in village. And also, there is 1 government secondary school in the village.

Figure 4.8: Education Facilities

Community Hall
There is no community hall in the village.
Library
There is no public library in the village.

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

Existing condition of the public building is in good condition.
There is a one Gram Panchayat building in good condition in village.

4.4.7 Technology Mobile/ WIFI / Internet Usage Details

Most of the people in the village not use smart phones. There is good network coverage in the some of residential area of the village. But There is no Wi-Fi in the village.

4.4.8 Sports Activity as Gram Panchayat

There is no sports activity by the gram panchayat.

4.4.9 Socio-Cultural Facilities

Public Garden
There is no public garden or park or playground in the village.
Pond
There is one pond in the village. Solid waste is disposed in the surroundings of the pond area. So, proper solid waste management and development of pond is necessary.

4.4.10 Other Facilities

There are no any other facilities in village.

4.4.11 Any Other Details

There is a post office in the village.

Figure 4.9: Post Office

4.5 Electrical Concept

4.5.1 Renewable energy source planning particularly for villages

There are no one available Renewable energy sources in village. So, we can do in future to add a plan of renewable energy sources as a Solar system.

4.5.2 Irrigation Facilities

For Irrigation purpose there are main use of Rain water. And also use for the bore well water & In some areas passed though canal. Therefore, it helps to supply canal water to the area.

4.5.3 Electricity Facilities with Area

In Rangpar (Bela) village there are 2 - 66 KV Power stations are available. So, facility of electricity is sufficient.

Figure 4.10: 66-KV Power Stations

4.6 Existing Institution like - Village Administration - Detail Profile

4.6.1 Gram Panchayat

There is one gram-panchayat available in the village. There is in very good condition.

Figure 4.11: Rangpar Gram Panchayat

4.6.2 Bachat Mandali

There is no bachat mandli in the village.

4.6.3 Dudh Mandali

There is no dudh mandali in the village. It is a required infrastructure in the village as there are many people in the village working in animal husbandry.

4.6.4 Mahila forum

There is no mahila forum in the village.

4.6.5 Plantation for the Air Pollution

There are many trees are available in the village. So, in the village air pollution is low.

4.6.6 Rain Water Harvesting

There is no infrastructure for rain water harvesting in the village.

Chapter - 5.
Technical Options with Case Studies

5.1 Concept

5.1.1 Advance Sustainable construction techniques / Practices

Advance construction techniques

Advanced construction technologies are commonly described as including (amongst many others) advanced forms of:

1. 3D printing.
2. Materials.
3. Building information modelling (BIM).
4. Computer aided design and computer aided manufacturing (CAD/CAM).
5. Computer numerical control.
6. Construction Innovation Hub

Solid & Liquid Waste Management

Concept of the solid waste management Technology options for composting of wastes-

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.

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. At this time, you will notice your pile settling which is a good sign that the pile is working properly.

2. Nadep Method:

The NADEP method of making miracle compost was first invented by a farmer named N. D. Pandharipande living in Maharashtra (India). The method, which has become popular among the farmers in Western India, now bears his name.

The process basically involves placing selected layers of different types of compostable materials in a simple, mud-sealed structure designed with brick and mud water. The system permits conversion of approximately 1 kg of animal dung into 40 kg of rich compost which can then be applied directly to the field. The multiplication factor is significant in view of the fact that in the tropics, there is rapid decomposition of organic materials in the soil. This organic matter must be replaced and replenished if agricultural fertility is not to go on declining. The problem is there that a scarcity of compostable materials, particularly animal dung, prevailing within the country. Thus, even if all available organic materials, including dung, were religiously and scrupulously collected, they would still not be sufficient to replace the organic constituents of the vast quantities of India's fast-degrading soils. The NADEP method of composting actually enables the farmers to get around the difficulty of the generation of mass and to increase the quantity of compost rapidly within a given frame of time and without any significant additional expense.

3. Vermi composting:

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

Concept of liquid waste management

1. Stabilization pond system for waste water treatment:

Waste or Wastewater Stabilization Ponds (WSPs) are large, man-made water bodies in which blackwater, greywater or faecal sludge are treated by natural occurring processes and the influence of solar light, wind, microorganisms and algae. The ponds can be used individually, or linked in a series for improved treatment. There are three types of ponds, (1) anaerobic, (2) facultative and (3) aerobic (maturation), each with different treatment and design characteristics. WSPs are low-cost for O&M and *BOD* and pathogen removal is high. However, large surface areas and expert design are required. The effluent still contains nutrients (e.g. N and P) and is therefore appropriate for the reuse in agriculture , but not for direct recharge in surface waters.

Design Criteria:

Anaerobic ponds are built to a depth of 2 to 5 m and have a relatively short detention time of 1 to 7 days. Facultative ponds should be constructed to a depth of 1 to 2.5 m and have a detention time between 5 to 30 days. Aerobic ponds are usually between 0.5 to 1.5 m deep with a detention time of 15 to 20 days.

If used in combination with algae and/or fish harvesting, this type of pond is effective at removing the majority of nitrogen and phosphorus from the effluent. Ideally, several aerobic ponds can be built in series to provide a high level of pathogen removal.

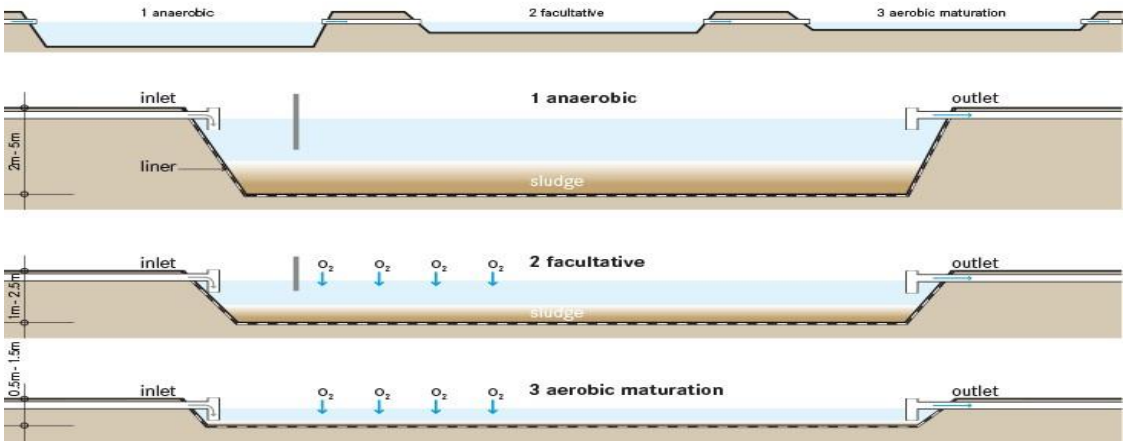


Figure 5.1: Typical scheme of a waste stabilization system

Only slightly polluted wastewater may be discharged directly into primary facultative ponds. Depending on the requirement for the final effluent in terms of pathogen reduction, only anaerobic and facultative ponds are necessary in some instances.

Pond	BOD Removal	Pathogen Removal	HRT
Anaerobic Pond	50 to 85%	-	1 to 7 days
Facultative Pond	80 to 95%	-	5 to 30 days
Maturation Pond	60 to 80%	90%	15 to 20 days

[Table 5.1: Comparison of the treatment performance of different waste stabilization ponds]

Liquid Waste Management in Maharashtra

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

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

Various types method for drainage system:

1. Storm water drains

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

The amount of water they would be expected to carry in a storm. More extreme floods occur relatively infrequently; to provide a safety margin, the maximum

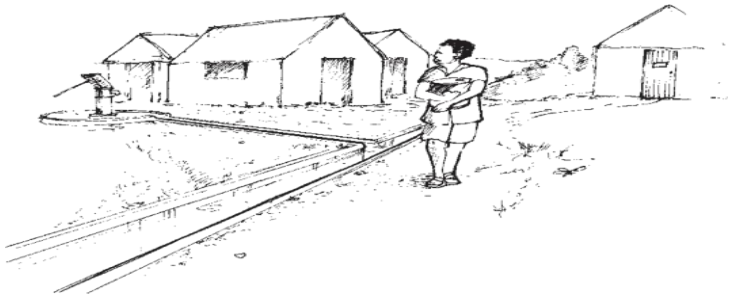


Figure 5.2: Storm water drain through a village

2. Combined drains

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

3. Buried drains and combined sewers

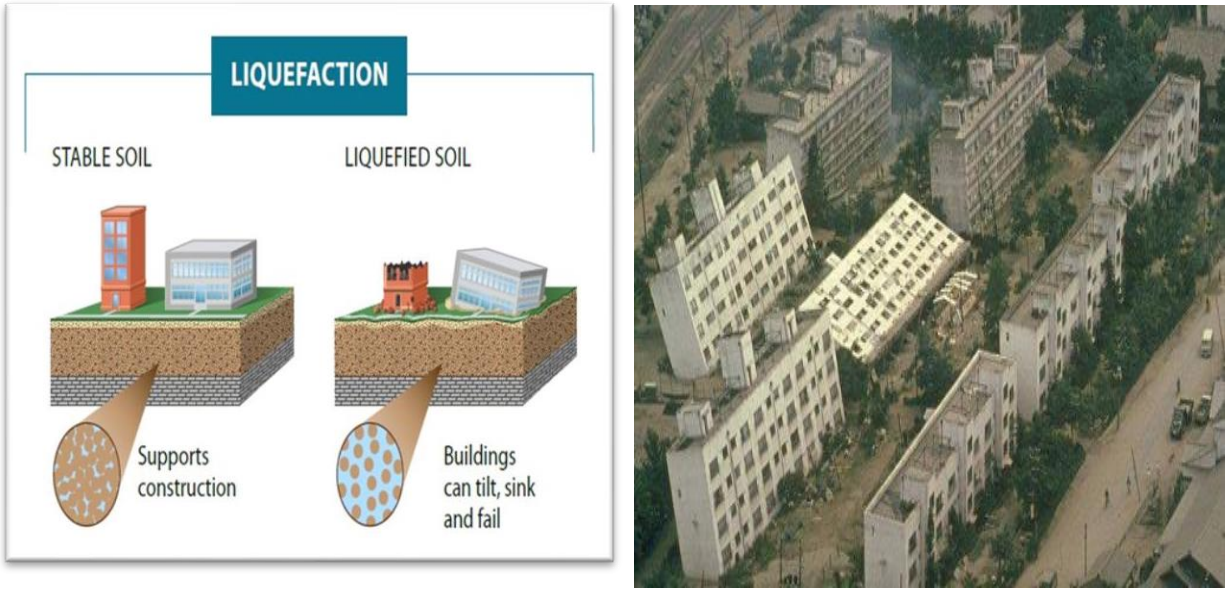
Drains may also be incorporated into sewerage systems and be buried. This is more appropriate for urban areas, but can be considered in rural areas if the village roads are paved and if flood flows are significant. Buried drains have inlet chambers at regular intervals, usually along roadsides, that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

5.1.2 Soil Liquefaction

Soil liquefaction, also called **earthquake liquefaction**, ground failure or loss of strength that causes otherwise solid soil to behave temporarily as a viscous liquid. The phenomenon occurs in water-saturated unconsolidated soils affected by seismic S waves (secondary waves), which cause ground vibrations during earthquakes. Although earthquake shock is the best-known cause of liquefaction, certain construction practices, including blasting and soil compaction and vibro flotation (which uses a vibrating probe to change the grain structure of the surrounding soil), produce this phenomenon intentionally. Poorly drained fine-grained soils such as sandy, silty, and gravelly soils are the most susceptible to liquefaction.

Soil liquefaction occurs when a saturated or partially saturated soil substantially loses strength and stiffness in response to an applied stress such as shaking during an earthquake or other sudden change in stress condition, in which material that is ordinarily a solid behaves like a liquid. In soil mechanics, the term "liquefied" was first used by Allen Hazen in reference to the 1918 failure of the Calaveras Dam in California. He described the mechanism of flow liquefaction ofthe embankment dam as: If the pressure of the water in the pores is great enough to carry all the load,it will have the effect of holding the particles apart and of producing a condition that is practically equivalent to that of quicksand… the initial movement of some part of the material might result in accumulating pressure, first on one point, and then on another, successively, as the early points of concentration were liquefied.

Type of soil causes liquefaction : Poorly drained fine-grained soils such as sandy, silty, and gravelly soils are the most susceptible to liquefaction.



Figurer 5.3: Soil Liquefaction

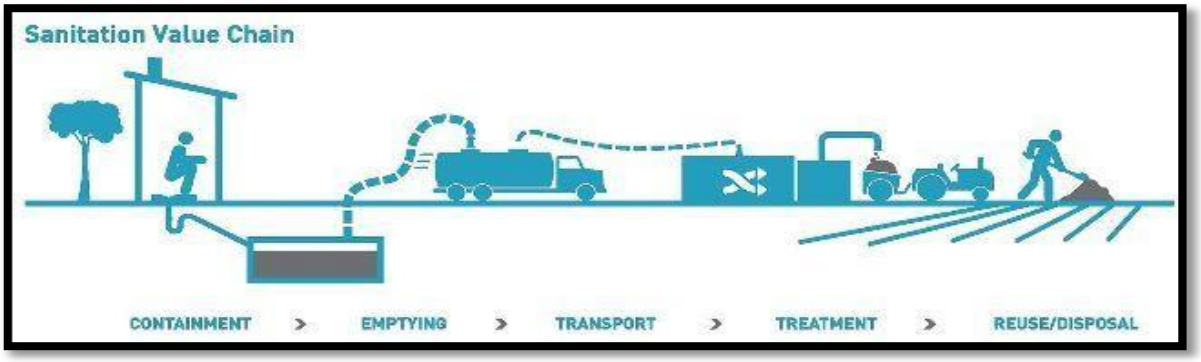
5.1.3 Sustainable Sanitation

The main objective of a sanitation system is to protect and promote human health by providing a clean environment and breaking the cycle of disease.

To qualify as sustainable sanitation, a sanitation system has to be economically viable, socially acceptable, technically and institutionally appropriate, and protect the environment and natural resources.

Most sanitation systems have been designed with these aspects in mind, but they fail far too often because some of the criteria are not met. In fact, there is probably no system which is absolutely sustainable. The concept of sustainability is more of a direction than a state to reach. Nevertheless, it is crucial that sanitation systems are evaluated carefully with regard to all dimensions of sustainability.

Since appropriateness to the context is such a core criterion for sustainable sanitation, there is no one-size-fits-all sanitation solution. However, taking into consideration the entire range of sustainability dimensions, it is important to observe some basic principles when planning and implementing a sanitation system.



Figurer 5.4: Sanitation value Chain

5.1.4 Transport Infrastructure / system

Various types of roads

Asphalt roads:

One of the most popular types of construction ever since its inception in the early 1920 s is asphalt paving. In this construction technique a layer of asphalt is laid on top of an equally thick layer gravel base. Advantages of this form of road construction are that the pavement produces relatively little noises, its relative low cost compared to other material, and that is relatively easy to repair and maintain as well. However, asphalt is known to be significantly less durable and strong than other choices, and isn't the best for the environment either.

Concrete roads:

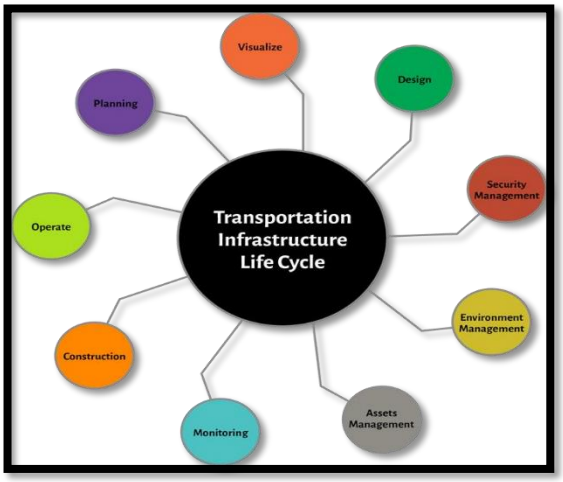
Concrete is another popular choice for roadways, though it is typically only used for local roads and not for other types of construction. Concrete is more long lasting than asphalt and significantly stronger as well, but is quite expensive to lay and maintain.

Composite roads:

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

Recycling:

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



Figurer 5.5: Transportation System

Bituminous Solutions:

Bituminous and other temporary solutions are types of construction that are only suitable for use on very low-traffic thoroughfares. Chip sealing techniques, thin membrane surfacing, and Otta

sealing are all examples of bituminous surface options. These are all more commonly employed as sealing coats or finishes than as full road surfaces.

5.1.5 Vertical Farming

Vertical farming is the practice of growing crops in vertically stacked layers. It often incorporates controlled-environment agriculture, which aims to optimize plant growth, and soilless farming techniques such as hydroponics, aquaponics, and aeroponics. Some common choices of structures to house vertical farming systems include buildings, shipping containers, tunnels, and abandoned mine shafts. As of 2020, there is the equivalent of about 30 ha (74 acres) of operational vertical farmland in the world. The modern concept of vertical farming was proposed in 1999 by Dickson Despommier, professor of Public and Environmental Health at Columbia University. Despommier and his students came up with a design of a skyscraper farm that could feed 50,000 people. Although the design has not yet been built, it successfully popularized the idea of vertical farming. Current applications of vertical farming coupled with other state-of-the-art technologies, such as specialized LED lights, have resulted in over 10 times the crop yield than wouldreceive through traditional farming methods. The main advantage of utilizing vertical farming technologies is the increased crop yield that comes with a smaller unit area of land requirement. The increased ability to cultivate a larger variety of crops at once because crops do not share the same plots of land while growing is another sought-after advantage. Additionally, crops are resistant to weather disruptions because of their placement indoors, meaning less crops lost to extreme or unexpected weather occurrences. Because of its limited land usage, vertical farming is less disruptive to the nativeplants and animals, leading to further conservation of the local flora and fauna. Vertical farming technologies face economic challenges with large start-up costs compared to traditional farms.In Victoria, Australia, a "hypothetical 10 level vertical farm" would cost over 850 times more per cubicmeter of arable land than a traditional farm in rural Victoria. Vertical farms also face large energy demands due to the use of supplementary light like LEDs. Moreover, if non-renewable energy is usedto meet these energy demands, vertical farms could produce more pollution than traditional farmsor greenhouses.

Figure 5.6: Vertical Farming

5.1.6 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure

Mechanism: In the case of Reinforced concrete structure the ingress of moisture or air may leadto corrosion of steel, cracking and spalling of the concrete cover thereby reducing durability of the concrete structure. Repair has been suggested as the protective solution for damaged structure due to corrosion. Corrosion of reinforcing steel is a significant economic and safety problem,preventing many buildings from attaining their design life. It is now a must look into field as corrosion of reinforcing steel is seen almost in every 10 out of 100 constructions within a life of 10 years. Nowadays the increase content of pollutants in the city atmosphere has very much affected the lifespan of RCC structures. The increased content of pollutants includes a very high rates of Sulphates and Chlorides which when these mixes with rain water and falls over these structures and damages the visible parts.

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

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

5.1.7 Sewage treatment plant

Sewage treatment plant is a plant where waste water is treated. **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. Sewage treatment may also be referred to as wastewater treatment. However, the latter is a broader term that can also refer to industrial wastewater. For most cities, the sewer system will also carry a proportion of industrial effluent to the sewage treatment plant that has usually received pre-treatment at the factories to reduce the pollutant load. If the sewer system is a combined sewer, then it will also carry urban runoff (stormwater) to the sewage treatment plant. Sewage water can travel towards treatment plants via piping and in a flow aided by gravity and pumps. The first part of the filtration ofsewage typically includes a bar screen to filter solids and large objects that are then collected in dumpsters and disposed of in landfills. Fat and grease are also removed before the primary treatmentof sewage.

The term "sewage treatment plant" (or "sewage treatment works" in some countries) is nowadays oftenreplaced with the term wastewater treatment plant or wastewater treatment station. Sewage can be treated close to where the sewage is created, which may be called a "decentralized" system

or even an"on-site" system (in septic tanks, biofilters or aerobic treatment systems). Alternatively, sewage can becollected and transported by a network of pipes and pump stations to a municipal treatment plant. This is called a "centralized" system (see also sewerage and pipes and infrastructure).

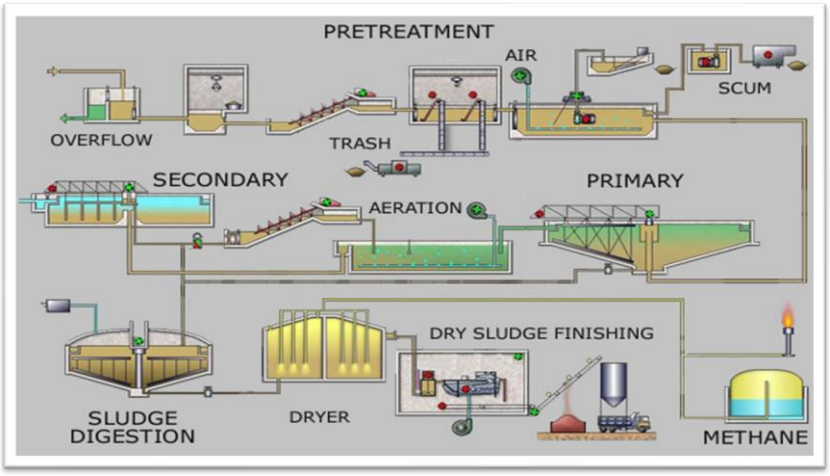


Figure 5.7: Sewage Treatment Plant

5.1.8 Technical Case Study On "Mundra Port"

Mundra Port is the largest private port of India located on the north shores of the Gulf of Kutch near Mundra, Kutch district, Gujarat. Formerly operated by Mundra Port and Special Economic Zone Limited (MPSEZ) owned by Adani Group, it was later expanded into Adani Ports & SEZ Limited (APSEZ) managing several ports.

Mundra Port is India's first multi-product port-based special economic zone (SEZ). The company currently has an annual cargo handling capacity 338 MMT as of February 2015.

The development of Adani Port & Special Economic Zone Limited was conceptualised by the entrepreneur Mr. Gautam Adani. Mundra Port was the first one to be developed in October 1998 with just one berth. In a short span of just 12 years Mundra Port achieved 10 crore (100 million) metric tonnes of commercial cargo in a year thereby becoming India's largest commercial port. Mundra Port has registered the fastest CAGR of over 35% in the port sector across India.[2]

The Mundra Port is located in the Northern Gulf of Kutch, in route major maritime routes and connected through rail, road, air & pipelines. This makes it a preferred gateway for cargo bound westwards. The port has been designed to handle all types of cargo viz. containers, dry bulk, break bulk, liquid cargo and automobiles.

Mundra Port has a capacity to handle 338 MMT of cargo per annum – the largest amongst all operational ports in India. Mundra Port handled 11.28 crore (112.8 million) MT of cargo in the financial year 2013–14 and is the largest commercial port of India in term so volume of cargo handled.

Mundra Port has not only pioneered the concept of deep draft integrated port model, but also of port based SEZ. The multi-product SEZ consisting Mundra Port and its surrounding areas is planned to be spread over 135 square kilometres (13,500 hectares). Currently, notified Multi-product SEZ is spread over an area of 6,473 Hectare, with an additional 168 Hectares notified as a Free Trade Warehousing Zone.

In FY 2019–20, Mundra Port handled 139 million tonnes of cargo.

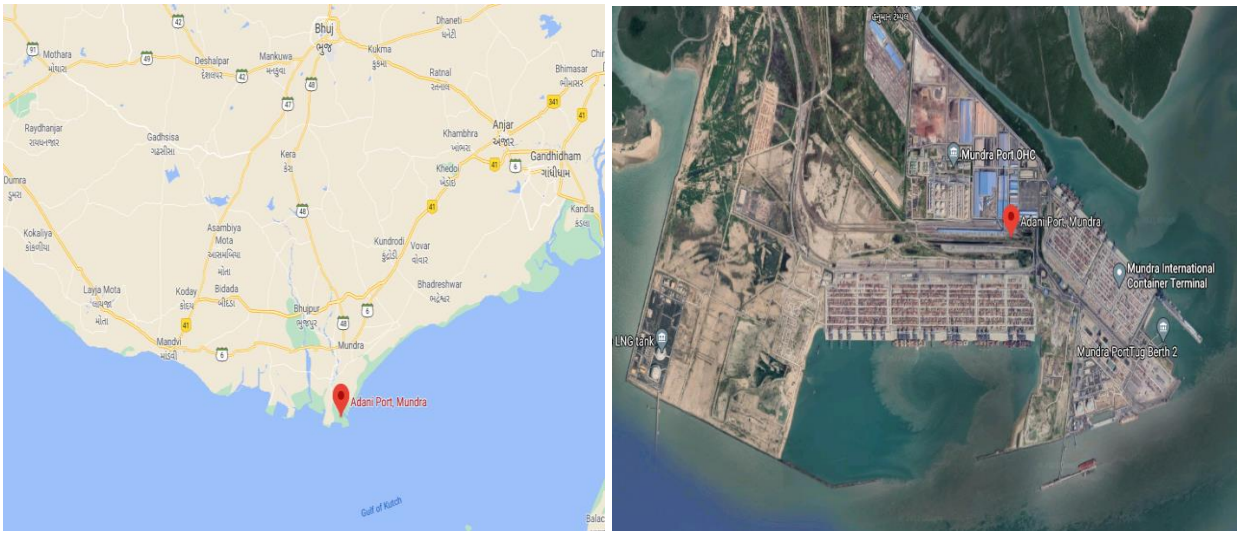


Figure 5.8: Mundra Port Location

History-

The Port of Mundra is a private port and is also a special economic zone. Incorporated in 1998 as Gujarat Adani Port Limited (GAPL), the company began operating in 2001. The combined company was renamed Mundra Port and Special Economic Zone Limited.

In 1994, the Gujarat Maritime Board (GMB) approved setting up a captive jetty at the Port of Mundra. In 1998, a joint-sector company, the Gujarat Adani Port Ltd., was incorporated and multi-purpose berths 1 and 2 at Terminal I began operating. MT Alpha-2, a small tanker was the first ship anchored on 7 October 1998. In 1999, multi-purpose berths 3 and 4 opened at Terminal I.

In 2001, the Port of Mundra signed a concession agreement with GMB for development, operation, and maintenance of the port at Mundra. Also in 2001, the private Mundra-Adipur railway line was completed and in 2002, it was integrated with the Indian Railways.

In 2002, Guru Govind Singh Refineries Ltd. signed an agreement with the Port of Mundra to handle crude oil in the port. In 2002, additional agreements were signed with Indian Oil Corporation Limited to set up a single-point mooring facility and handle crude oil at Mundra. In 2003, a sub-concession agreement was signed to add a container terminal in the Port of Mundra, and the terminal began operating that year. In 2005, Adani Port Limited and Gujarat Adani Port Limited were merged. In late 2005, the single-point mooring became operational.

The Mundra Special Economic Zone was incorporated in 2003. It became India's first multi-product port-based special economic zone. Two new berths at Terminal II became operational to handle bulk cargo. A double-stack container train began to operate. The Mundra Special Economic Zone Ltd. and Adani Chemicals Limited were merged with Gujarat Adani Port Ltd., and the company name was changed to Mundra Port and Special Economic Zone Limited (MPSEZ) in 2006.

In 2007, two more berths for bulk cargo were added at Terminal II, and the terminal trial run operations began. A service agreement was signed with Tata Power to produce power for handling

coal cargo imports. Also in 2007, equity shares in MPSEZ were offered to the public and employees and were listed on the National Stock Exchange and Bombay Stock Exchange. A service agreement was signed in 2008 with Maruti Suzuki India Ltd. to handle exports of automobiles.

MPSEZ expanded its port operations and changed its name to "*Adani Ports and Special Economic Zone Limited*" (APSEZ) on January 6, 2012.

The port is part of the Maritime Silk Road that runs from the Chinese coast to the Mediterranean, and via the Upper Adriatic region to Central Europe and the North Sea.

Funding-

Total capital cost for the proposed development is estimated to be Rs. 958.0 Cr. The cost estimates of various heads are worked out based on current rates. These costs are excluding cross country conveyors from jetty to plant as well as pipelines to respective units and other financial and soft costs etc.

An overall implementation program for the construction of proposed multipurpose berthing and backup yard has been prepared. The estimated construction period is 36 months.

Sr. No.	Particulars	Total Amount (In CR)
1.	Dredging and Land raising	18
2.	Multipurpose Berths development	229
3.	Equipment	180
4.	Backup area development including warehouses	103
5.	Liquid Tank farm	218
6.	Supporting Infrastructure	86
7.	PMC, Contingency and others etc.	125
8.	Total	958

[Table 5.2: Cost Estimate]

Port Layout & Infrastructure-

The port has a deep draft that facilitates large vessels including fully laden capsize vessels to dock alongside its berth.

Mundra Port has commodity-specific storage areas. The port has 2,25,000 sq. metres of closed godowns and 3,150,000 sq. metres of open storage yards for storage of import or export cargo within the port premises. The Liquid Terminal at ASPEZ consists of 97 tanks of different sizes and attributes with a total storage capacity of 4,25,000 kilolitres for storage of various liquid commodities.

Mundra Port has also developed adequate infrastructure for evacuation of cargo keeping in mind the concept of the inverted funnel. According to the concept, the capacity of a port's evacuation infrastructure should be more that its marine infrastructure.

Mundra Port has developed commodity-specific infrastructure for handling, storage and evacuation of cargo. The Fertilizer Cargo Complex (FCC) is a fertiliser handling facility. The FCC has 2 operational lines with 44 bagging machines with a capacity to bag 660 nos. of 50-kg bags per minute and a capacity to load and evacuate 8–10 rakes per day i.e. 25,600 tonnes per day.

The steel yard is a steel storage area spread over 1,20,000 sq. metres and consists of equipment for handling steel cargo. The steel yard is equipped with 8 Goliath cranes and 2 mobiles cranes with vacuum lift attachments, 6 forklifts with multiple attachments to handle steel coils, slabs and plates, 1 reach stacker and 60 trailers for internal transportation.

Besides the port area there is a large land area for development. A part of this area is now notified and functional SEZ which is now largest port based Multi product SEZ of the country. This SEZ is suited to service the hinterland of north and northwest India which account for two-thirds of India's GDP. The area is connected with National road, rail and pipeline network. Being spread over an area of 84 km^2 it includes port, container terminals, rail, airport, container freight station and storage tanks.

Mundra Port is being developed as a business location for sectors like light and heavy engineering, project cargo, auto and auto component, textiles and apparel, pharmaceuticals dyes and specialty chemical, agriproduct processing, plastic processing, timber and furniture, global trading, metal and mineral etc.

It claims to have considerable distance advantage over other ports to most destinations in Rajasthan, Haryana, Punjab, Delhi-NCR, Uttar-Pradesh, Madhya-Pradesh, Jammu & Kashmir, Himachal Pradesh and Uttarakhand.

Figure 5.9: Mundra Port Layout & Infrastructure

Coordinates	22.746°N 69.700°ECoordinates: 22.746°N 69.700°E
Location	North shores of the Gulf of Kutch near Mundra, Kutch district, Gujarat, India.
CEO	Karan Adani

Type	Port
Material	Steel framing, reinforced by concrete and brass coating, bronze cladding
Area	135 Sq. Km.
Annual cargo tonnage	139 million tonnes (2019-2020)
Annual container volume	3,480,000 TEU (2016-2017)
Terminals	10
Operated by	Adani Ports & SEZ Limited (APSEZ)
Owned by	Adani Group
Website	https://www.adaniports.com/Ports-and-Terminals/Mundra-Port

[Table 5.3: Mundra Port details]

Milestone's -

- 1998 October – Mundra Port commences commercial operations with one berth.
- 2006 April – Notification issued for Special Economic Zone (SEZ) at Mundra
- 2007 - Offer Initial Public Offer (IPO) for 40,250,000 equity shares of ₹10 each of Mudra Port and Special Economic Zone Ltd. to public and employees with price band of ₹400 – ₹440.
- 2010 - Constructed a four lane 1.5 km long dedicated RoB at a cost of ₹50 crore. This is the first private four-lane RoB within port area in India capable of withstanding a load of 100 MT to smoothen and speed up cargo movement.
- 2010 - World's largest fully mechanised coal import terminal with 6 crore (60 million) tonnes per year capacity was put into operation.
- 2011 - Terminal Three commences operations
- 2012 - Name changed to Adani Ports and Special Economic Zone Limited
- 2012 - Doubling of the rail connectivity between Mundra and Adipur completed. Mundra Port now has a private rail network of 117 km.
- 2014 - Adani's Mundra Port crosses 100 MMT mark of cargo handling in a year. Mundra Port Ltd., India's largest port developer and operator is part of the Adani Group.

Terminals and berth-

The marine infrastructure at Mundra Port consists of ten (10) berths for handling dry bulk & break bulk cargo, three (3) berths for handling liquid cargo, six (6) container berths including a Ro-Ro berth, three (3) mechanised import cargo berths and 2 single point moorings for crude oil imports. The mechanised import cargo berths can handle vessels with maximum draft of 19 metres and other berths can handle vessels with maximum draft of 17 metres. The SPM facility offers a draft of 32 metres.

The port has its own fleet of tugs and pilots. Mundra Port also owns a fleet of dredgers to carry out the capital and maintenance dredging activities and thereby ensuring that Mundra Port has the deepest draft amongst all ports in India.[18]

Mundra Port Coal Terminal is the world's biggest coal importing terminal. It can handle 4 crore (40 million) tonnes of coal annually. It was built at a cost of ₹2,000 crore (US$280 million).

Port Connectivity-

Mundra Port offers inland connectivity via rail track, road network, airport and cross country pipelines.

Rail:

Mundra Port Ltd. is connected with the Indian Railway network by a developed and maintained 76-km rail line from Mundra to Adipur. The rail infrastructure is capable of handling 130 trains per day including double stack container trains and long-haul trains.

Road:

Mundra Port is connected to the hinterland in northern and western parts of India through the National Highway 8A Extn. & State Highways 6 & 48. The port has constructed a four-lane rail-over-bridge (ROB) in the proximity of the port to ensure that two modes of transportation i.e. road & rail, do not impede each other's movement.

Air:

Mundra Airport is a licensed airport in 'private category' with air traffic control (ATC) which is operated by the Airports Authority of India (AAI). The nearest commercial airports are at Bhuj (65 km) and Kandla (60 km). The company plans to extend the current runway at Mundra to 4,500 metres. It has also installed a precision approach path indicator (PAPI), and approach and runway lighting for safe night landings for aircraft. Mundra Port plans to upgrade an international air cargo hub with night landing facility.

Pipelines:

Mundra Port is connected to the northern hinterland with three cross-country pipelines. One feeds the IOCL Panipat refinery, second crude oil pipeline feeds Bathinda refinery and third is a white oil line which feeds the national capital region.

Features-

FINANCIAL & SOCIAL BENEFITS TO THE LOCALS:

The Adani Foundation is the Corporate Social Responsibility arm of Adani Group, an integrated infrastructure conglomerate that is committed to inclusive growth and sustainable development in not only the communities it operates in, but also in contributing towards nation building. The focus of the activities are mainly on three major dimensions of human development which include expansion of sustainable livelihood opportunities, improving the status of health and education and broadening the range of choices by creating rural infrastructure. The aim is to walk with the communities, help people look ahead, make the right choices and secure a bright and beautiful future, together. The Foundation conceptualizes its purpose by consolidating the activities under four broad working areas that are as follows:

- Education
- Community Health
- Sustainable Livelihood Development

- Rural Infrastructure Development

Adani Foundation has already done extensive work in this region considering the above thematic areas. However, need based assessment will be a continual action during the entire construction as well as operation phases of the proposed project. On the basis of the outcomes of the assessment, support for the above-mentioned core areas will be provided to the locals.

ISSUES FACED DURING THE CONSTRUCTION:

- Around the coastline of India, Adani's plans to expand major ports have been condemned by community groups for their impacts on coastal ecology, wetlands, fish stocks and fishing communities. The group's port activities are carried out by Adani Ports and Special Economic Zone Ltd (APSEZ) which has major operations at 10 dispersed locations around the coastline of India.
- In the far north-western Indian state of Gujarat is Adani's massive port at Mundra. According to the company, the Mundra port is India's biggest commercial port and the country's biggest coal import terminal. The port and adjacent industrial complex comprise the company's Special Economic Zone (SEZ) – the location of major plants such as coal-fired power stations and an Adani Wilmar palm-oil refinery.
- When complaints were made about the impacts of Adani's industrial development at Mundra in 2013, an investigative committee found that there had been numerous violations of environmental guidelines, including widespread destruction of mangroves, blocking of creeks, potential contamination of groundwater by saline discharges, and problems with disposal of ash. The failure of various levels of government to address these issues or to penalise the company was described as a 'sign of the spread of crony capitalism'.
- About 300 km south-east of Mundra is the Adani port of Hazira. A port expansion here attracted controversy in 2016 when India's National Green Tribunal fined the company's subsidiaries over $US3 million for carrying out work without environmental clearance. The tribunal passed its order in response to a petition filed by Hazira Fishermen Committee that challenged the project on the grounds of damaging the ecology and displacing more than 300 families. The issue led to litigation and eventually the Supreme Court cleared the Adani companies and cancelled the fine.

Advantages of Mundra Port

- Our natural and location advantages, including a deep-water draft that enables us to accommodate larger vessels that require a deep-water berth, and protection from severe weather that enables us to handle cargo throughout the year.
- Proximity to the northern interior of India and major maritime trade routes which provides us with a strategic position to service the significant population of the landlocked north and northwest regions of India which generates significant port traffic.
- Land with port back-up area and infrastructure which provides us with sufficient resources for future expansion, and SEZ advantages.

- Access to rail, road and pipeline network that provides us with a competitive advantage over competing ports in attracting larger volumes of cargo.
- Strategic arrangements and established customer relationships with certain companies.
- Experienced management team that has demonstrated the ability to manage significant expansion plans and capital expenditures while maintaining our recent income and profit growth.
- you can ship large volumes at low costs - a freight forwarder can consolidate consignments to reduce costs.
- shipping containers can also be used for further transportation by road or rail.

Disadvantages of Mundra Port

- Shipping by sea can be slower than other transport modes and bad weather can add further delays.
- Routes and timetables are usually inflexible.
- Tracking your goods' progress is difficult.
- You have to pay port duties and taxes.
- Further transportation overland will be needed to reach the final destination.
- Basic freight rates are subject to fuel and currency surcharges.

Chapter - 6.
Swatchh Bharat Abhiyan (Clean India)

Strategic Technology options for Swatchh Bharat Abhiyan (SBA) (Clean India)

According to Census 2011, India's urban population is 377 million or 31% of the total population. These numbers are expected to increase to 600 million by 2031. The Census 2011 also showed that in 4,041 statutory towns, close to eight million households do not have access to toilets and defecate in the open (7.90 million). Weak sanitation has significant health costs and untreated sewage from cities is the single biggest source of water resource pollution in India. This indicates both the scale of the challenge ahead of the Indian cities and the huge costs incurred from not addressing them.

6.1 Swatchhta needed in allocated village - Existing Situation with photograph

In Rangpar (Bela) Village there are no need to improvement in Swatchhta. Because of there are government workers are working & cleaning entire village the period of 6 months.

Figure 6.1: Swatchhta in Rangpar

6.2 Guidelines/Implementation in allocated village with Photograph

Guideline for the process of implementation of SBA Mission Objectives

1. Elimination of open defecation.
2. Eradication of Manual Scavenging.
3. Modern and Scientific Municipal Solid Waste Management.
4. Generate awareness about sanitation and its linkage with public health.
5. Capacity Augmentation for ULBs to create an enabling environment for private sector participation in Capex (capital expenditure) and Opex (operation and maintenance) Mission Strategy.
6. The estimated cost of implementation of SBM (Urban) based on unit and per capita costs for its various components is Rs. 62,009 Crore.

7. The Government of India share as per approved funding pattern amounts to Rs. 14,623 Crore. In addition, a minimum additional amount equivalent to 25% of GOI funding, amounting to Rs. 4,874 Crore shall be contributed by the States as State/ ULB share.
8. The balance funds are proposed to be generated through various other sources of fund which are, but not limited to:
    A. Private Sector Participation
    B. Additional Resources from State Government/ ULB
    C. Beneficiary Share
    D. User Charges
    E. Land Leveraging
    F. Innovative revenue streams
    G. Swachh Bharat Kosh
    H. Corporate Social Responsibility
    I. Market Borrowing
    J. External Assistance

Mission Components

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

6.3 Activities Done by Students for allocated village with Photograph

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

Figure 6.2: Cleanliness of the Rangpar

Chapter - 7.
Village condition due to Covid-19

7.1 Taken steps in allocated village related to existing situation

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

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

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

Due to the lockdown there were no jobs in the cities, therefore lots of people who resided in the cities came back to the village which increased the risk of coronavirus in the village.

Therefore, quarantine center was established in the school premises for the people coming from cities outside of the village. The people were quarantined for 14 days in the quarantine facility before they can go to their homes in the village Their daily needs were satisfied by the gram panchayat in collaboration with the district authorities and state government.

Arogya Setu App

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

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

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

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

All villagers are following Government of India Guidelines.

1. Wear a Mask
2. Use Hand Sanitizers
3. Social Distance's

7.2 Activities Done by Students for allocated village Clean with Photograph

We have taken a permission from Talati and Sarpanch for doing one awareness regarding COVID -19 in the Rangpar(Bela) village and then we did awareness camp regarding COVID-19. In that awareness camp we have distributed some face masks to the villagers for the protection against COVID-19 and aware them about COVID-19 situation in India and told them to take precautionary measures like wear a mask perfectly, wash hands regularly, maintain social distancing in public and avoid crowdy area & firstly make yourself home quarantined if you fill any COVID-19 symptom in your body.

7.3 Any other steps taken by the students / villagers

During interaction with the Talati, he told us that quarantine place and home quarantine facility were implemented during the lockdown. In the COVID-19 situation cleaning, fogging and sanitization were done in the village.

Figure 7: Availability of Hand Sanitizers

Chapter - 8.
Sustainable Design Planning Proposal (Prototype Design) - Part - I

8.1 Design Proposals

8.1.1. Sustainable Design (Civil)

BIO-GAS PLANT -

Bio gas plant is one of the plants for renewable energy sources. It transforms rural village in to clean village and also provide gas as energy source and gives fertilizer at end.

1. BASIC THINGS -

Total numbers of animals in village = 300 Approx.
As per standard data assume per day dung of animal = 10.5 Kg. (Approx.)

So, total per day dung = 300 * 10.5 = 3150 Kg. /day

2. DESIGN OF DIGESTER -

Assume retention period (RT) = 70 days.
Assume mixing proportion of solid and water is 1:2.

Now total amount of slurry per day (S_d) = Total per day dung + Water amount
= 3150 + (2*3150)
= 9450 Kg. /day
= 9450 Lit./day
= 9.45 m^3 / day

Digester volume (V_d) = Sd * RT
= 9.450 * 70
= 661.5 m^3

Assume cylinder shaped bio gas plant.
Provide total 6 numbers of units in different areas, so digester volume becomes for one unit = 661.5 ÷ 6 = 110.25 m^3
So, provide = 110 m^3

Total digester volume (Vd) = $\pi r^2 h$
110 = πr^2 (h = 10 m)

So, Dimensions of digester are, H = 1 m
R = 0.6 m

3. DESIGN OF GAS HOLDER -

Assume digester temperature = 26-28 ˚C
Now from following fig find Gd by taking RT = 70 days
Specific gas production Gd = 37 Lit. / Kg. / day

Daily gas production G = Gd × Feed volume
= 37 × 3150
= 116550 Lit.
= 116.55 m^3

Now assume gas holder capacity = 60 %

Gas holder volume = Daily gas production × Capacity of holder
= 116.55 × 0.60
= 69.93 m^3
So, take Gas holder volume = 70 m^3

Now for 6 units provide volume of holder of each unit = 70 ÷ 6
= 11.666
Take it = 12 m^3

Provide cylinder shaped holder; so…

Volume = $\pi r^2 h$
12 = πr^2 (h = 1 m)

So, Dimensions of Gas holder are, H = 1 m
R = 6 m

4. DESIGN OF INLET & OUTLET -

Total volume of slurry mix per unit = 94.50 ÷ 6 = 15.75 m^3 / day

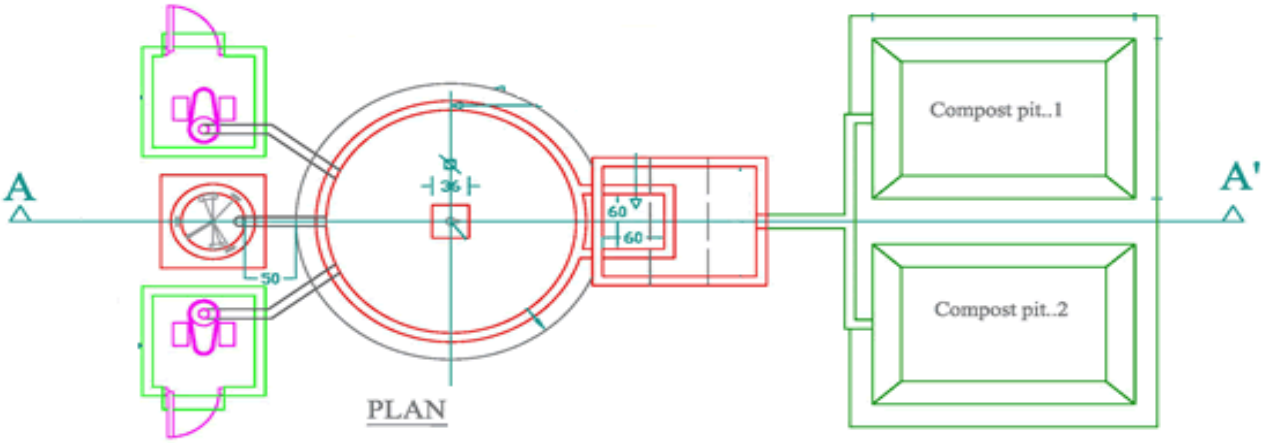
Assume two-time filling operation in plant; so, take total volume of slurry = 15.75 ÷ 2
= 7.87 m^3 / day
Take it = 8 m^3 / day

Provide rectangular tank…
So... Total volume for one time mixing of slurry = L × B × H
8 = L × B × (H=1m)

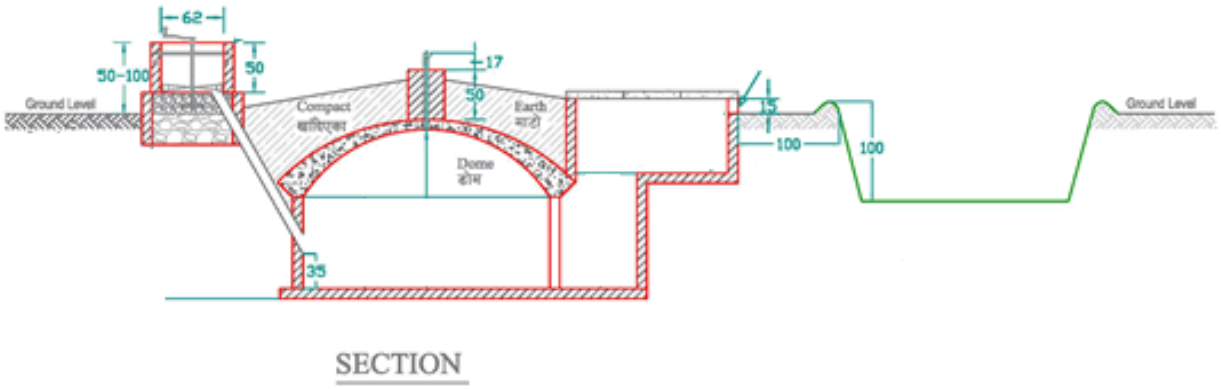
So, Dimension of inlet are, L = 3 m
B = 3m
H = 1 m

Here 8 m^3 / day required < 9 m^3 / day provided.
Hence, OK 👍

Provide same size for outlet tank also.



(A.) PLAN



(B.) SECTION

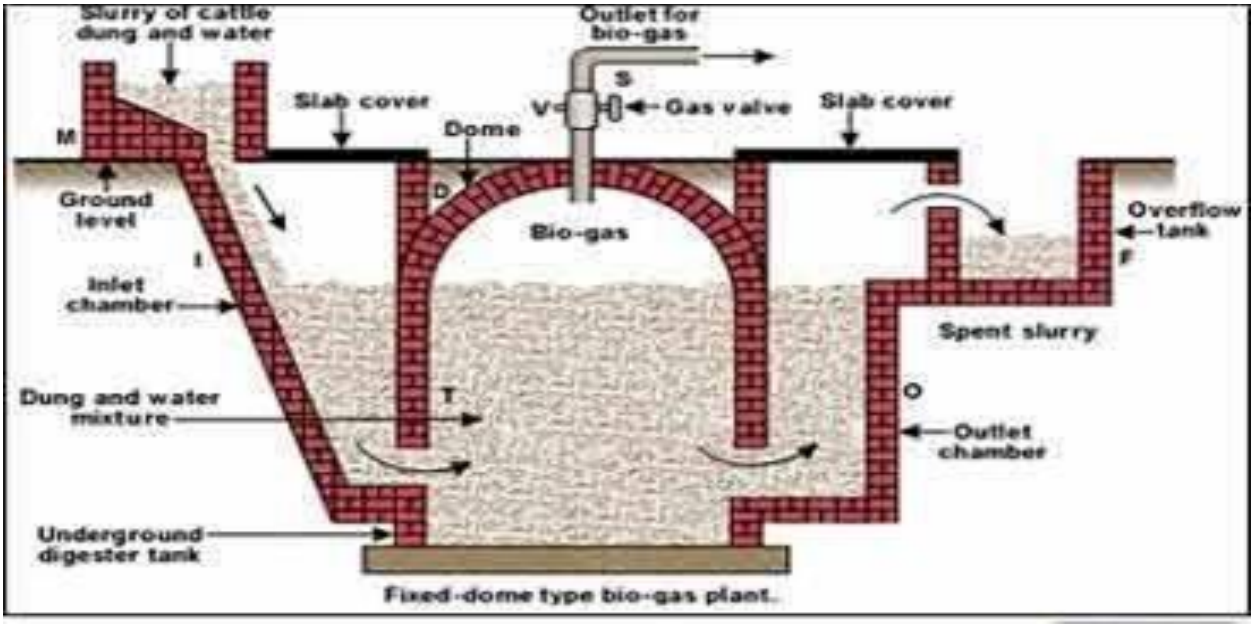


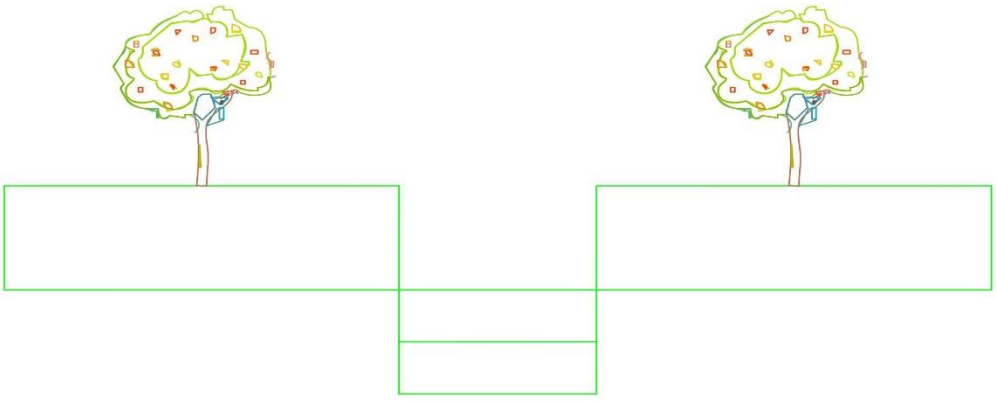
Figure 8.1: Bio-Gas Plant

8.1.2. Physical design (Civil)

CHILDREN PARK -

Children's park is far from being the simple provision most people believe. A swing, a slide and a climbing frame are not, on their own of great benefit to the growing child. To provide fully for children requires a sophisticated approach to siting, design and selection of equipment and surfacing. There are not proper facilities for children playground so we proposal for playground.

(A.) PLAN



(B.) ELEVATION

Figure 8.2: 3D View of Children's Park by using AutoCAD

Here, we share google drive link,
In this link there are files of Children Park in all formats.
https://drive.google.com/drive/folders/12YFRCjcX4wzQVVSOpJSFFH_pJ1pZejVl?usp=sharing

1. TOTAL CENTERLINE LENGTH -

= 2*length + 2*width
= 2*15.5 + 2*10.5
= 52 m

2. CALCULATION (For Wall) -

Measurement Sheet:

Item No.	Item Description	No.	Length	Breadth	Height	Quantity
1	Excavation	1	52	0.7	0.3	10.92 m^3
2	PCC	1	52	0.7	0.1	3.64 m^3
3	First step	1	52	0.5	0.2	5.2 m^3
4	Wall	1	52	0.4	0.9	18.72 m^3
Deduction:	Gate	2	2	0.4	0.9	(-)1.44 m^3
						Total = 37.04 m^3

[Table 8.1: Quantity Calculation for Park]

Abstract Sheet:

Item Description	Qty.	Rate	Per	Amount (Rs.)
Material:				
Brick	14078 nos.	4	m3	56312
Sand	7.965 kgs	800	m3	6372
Cement	38 bags	280	bag	10640
Labour:				
Male coolie	3	200	Day	600
Female coolie	2	200	Day	400
				Cost = **74324 Rs.**

[Table 8.2: Cost Calculation for Park]

Water charges = 0.02 x 74324
= **1486.48 Rs.**

Contractor profit = 0.1 x 74324
= **7432.4 Rs.**

Total Cost = 74324 + 1486.48 + 7432.4
= **83242.88 Rs.**

8.1.3. Social design (Civil)

RAIN WATER HARVESTING SYSTEM -

Water is our most precious natural resource and something that most of us take for granted. We are now increasingly becoming aware of the water to our survival and its limited supply.

The Harvesting of rainwater simply involves the collection of water from on surfaces which rain falls, and subsequently storing this water for later use. Normally water is collected from the roofs of the buildings and stored in rainwater tanks.

1. IMPORTANCE -

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

2. DESIGN -

We are providing Roof Top Harvesting System for the Primary School of the village Rangpar (Bela) and which is granted by the Life N.G.O. It is having length of 85 ft. and width of 30 ft.
Catchment Area (A) = 85 x 30 = 2550 ft^2 = 273.21 m^2
Average Annual Rainfall = 1.15 m
Average rate of Rainfall = 625 mm/hr
Runoff co-efficient = 0.85

Step: 1
The maximum amount of rainfall that can be harvested potentially
= 337.21 x 0.85 x 1.15
= 231.87 cum.

Step: 2
From IS: 15797: 2008,
Table no: 1, Interpolating the value of the value of water availability = 232 cum.

Step: 3
Calculation of Downpours:

$$\text{No. of Downpours} = \frac{\text{Roof drainage area}}{\text{Max. roof drainage area served per downpour}}$$

$$= \frac{237.21}{53}$$

= 4.47
= 5

Step: 4
Diameter of gutter and width of G.I. sheet.
Rainfall Intensity = 60 mm/hr
From IS: 15797: 2008, table-3 [Cl. 6.1(b)]
By interpolating the values,
D = 125.44 mm = 125.50 mm
B = 219.89 mm = 225 mm

Therefore, providing 5-inch diameter of gutter and 9-inch width of the G.I. Sheet.

Step: 5
Estimating the size of Conveyance Pipe.
From table A-4, Guidelines for Rain Water Harvesting System handbook by Canada Authority
By interpolating the values, we got 5 inches for pipes.

Step: 6
Estimating the size of the required system.
V = t x n x q | from IS: 15797: 2008, cl. 6.3
Where, V = Volume of tank, in liters
t = Length of Dry season, days
n = number of peoples using that tank
q = Consumption in liters per capita per day

V = 245 x 292 x 135 = 9657900 liters = 9658 m^3
We have to design for 1000 m^3 of water.

We are providing underground rectangular tank of size 17.5 m x 17.5 m x 3.5 m
Considering free board = 150 mm
Water Depth = 3.5 – 0.15 = 3.35 m
Volume = 17.5 m x 17.5 m x 3.35 m = 1025.937 m^3 = 1025937 liters

3. MEASUREMENT SHEET -

Sr. No.	Particular	Nos.	L	B	H	Quantity	Total Quantity
1.	Excavation for Foundation for depth more than 3.3m including sorting out and stacking of useful material and disposing off	1	17.5	17.5	3.5	1071.8 m^3	1071.8 m^3

	the excavated stuff up to 50 m lead.						
2.	Providing and laying Cement Concrete 1:3:6 (1 cement: 3 coarse sand: 6 stone aggregate 40 mm nominal size) and curing complete excluding cost of formwork in foundation	1	17.5	17.5	0.10	30.625 m^3	30.625 m^3
3.	Providing and laying controlled cement concrete M15 for curing complete excluding the cost of formwork & reinforcement including curing Walls Slabs	 4 2	 17.5 17.5	 3.5 17.5	 0.10 0.10	 24.50 m^3 61.25 m^3	85.75 m^3
4.	Deduction of Manholes from the top slab	2	0.60	0.60	0.10	0.072 m^3	61.25 - 0.072 = 61.178 m^3
5.	Providing H.Y.S.D. bar reinforcement for R.C.C work including bending binding and placing in position	85.67 m3	@	70 kg/m^3		60 kg	60 kg

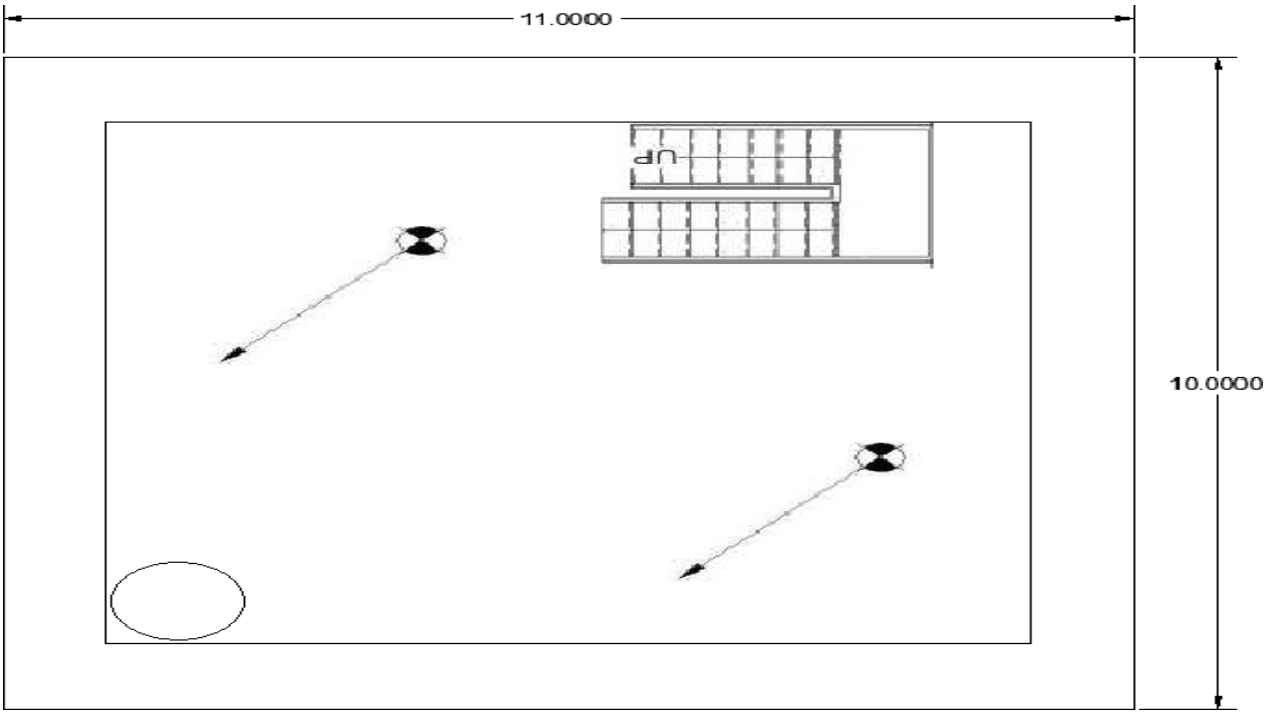
[Table 8.3: Quantity Calculation for Rain Water Harvesting System]

4. ABSTRACT SHEET -

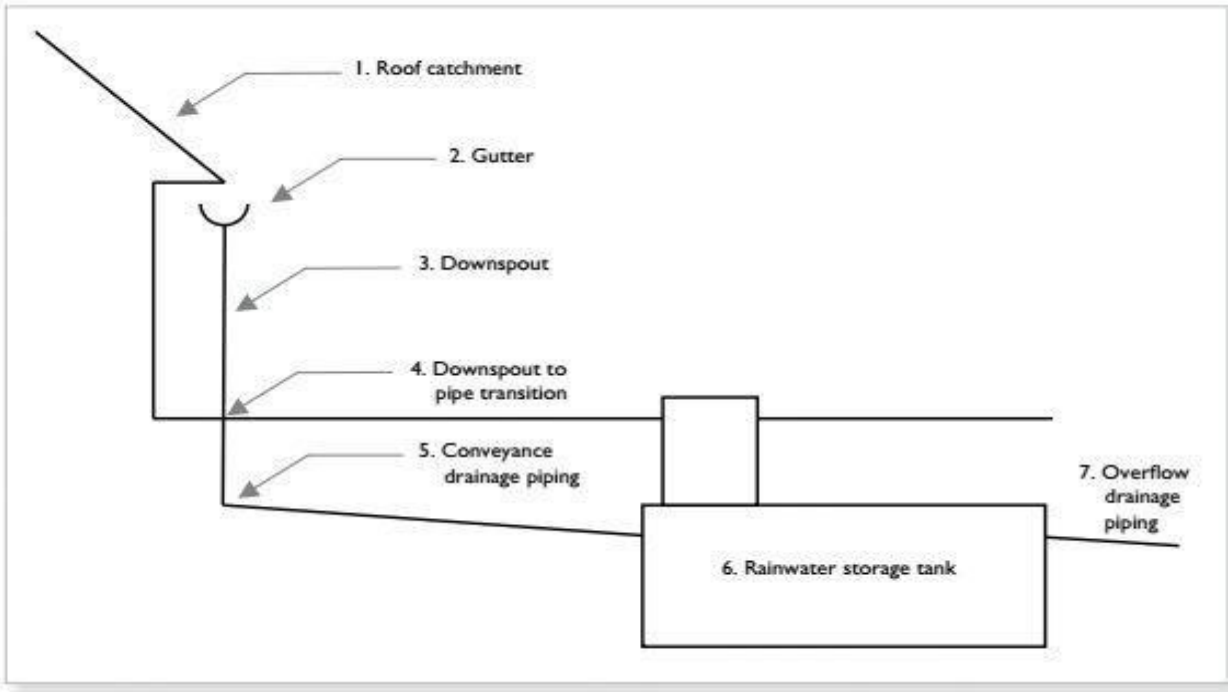
Sr. No.	Particular or Item	Quantity	Rate (in Rs.)	Per	Amount (in Rs.)
1.	For Excavation of foundation	1071.8	124.00	Cum	13290.320
2.	Providing and laying P.C.C (1:3:6) excluding cost of formwork	30.625	293.20	Cum	8979.250
3.	Providing and laying controlled cement concrete M15 for the walls excluding cost of reinforcement	24.50	407.70	Cum	9988.650
4.	Providing and laying concrete and finishing smooth curing including the cost of formwork but excluding the cost of reinforcement in R.C.C slab	61.25	592.70	Cum	36302.875

5.	Reinforcement	60	40.00	Kg	2400.00
					Total Rs. = 70959.395
					Say Rs. = **70960.00**

[Table 8.4: Cost Calculation for Rain Water Harvesting System]



(A.) PLAN



(B.) SECTION

Figure 8.3: Rain Water Harvesting System

8.1.4 Socio-Cultural design (Civil)

COMMUNITY HALL -

Community centers or community centers are public locations where members of a community tend to gather for group activities, social support, public information, and other purposes. They may sometimes be open for the whole community or for a specialized group within the greater community.

Community centers generally perform many (though rarely all) the following functions.

- As the place for all-community celebrations at various occasions and traditions.
- As the place for public meetings of the citizens on various issues.
- As the place where politicians or other official leaders come to meet the citizens and ask for their opinions, support or votes ("election campaigning" in democracies, other kinds of requests in non-democracies).
- As a place where community members meet each other socially.
- As a place housing local clubs and volunteer activities.
- As a place that community members (and sometimes others), can rent cheaply when a private family function or party is too big for their own home. For instance, the non-church parts of weddings, funerals etc.
- As a place that passes on and retells local history.
- As a place where local non-government activities are organized.

Village halls can provide the venue for retail services for the community, under certain circumstances. In today's society rural community buildings have a Multi-purpose role, serving as a social center, arts center, sports center and, in some cases, providing education, health or retail services Licensing changes.

1. COMMUNITY HALL WITH REFERENCE TO RANGPAR (BELA) VILLAGE -

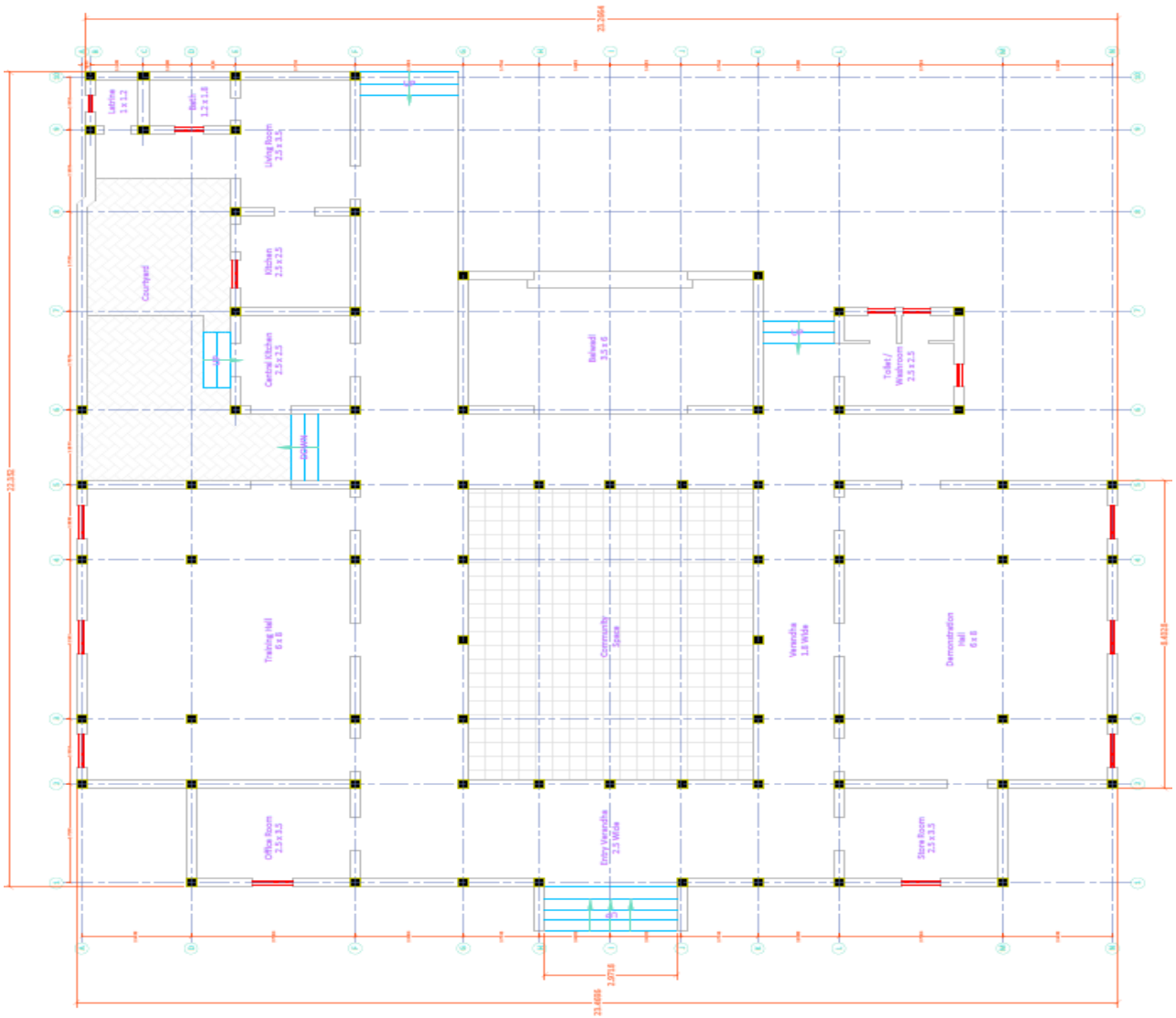
As show before in gap analysis that there is no community hall in Rangpar (Bela) village. And as per UDPFI guide lines one community hall is required for 1000 populations.

Population of Rangpar (Bela) village is around 2500, so as per UDPFI guide lines one community hall is necessary for village of 2000 Sq. m for various purposes and for recreational facilities.

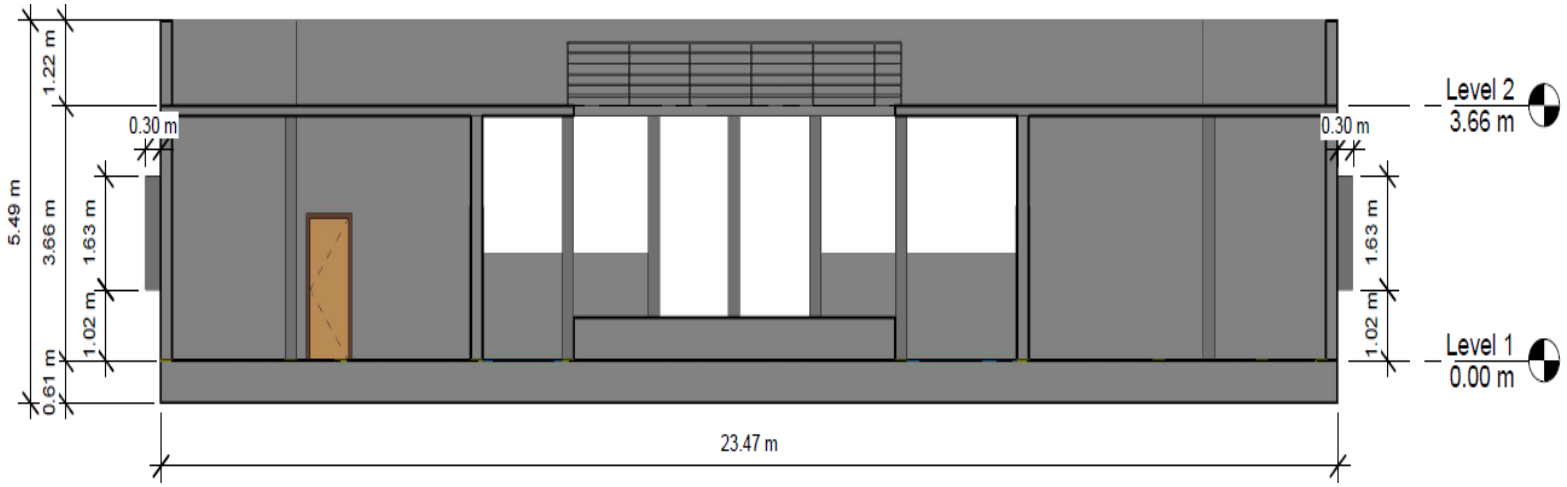
Following image shows the community hall specially designed for Rangpar (Bela) village and for its population.

It contains one central hall with two multi-purpose room (can be used as kitchen) and one office.

Except it contains four rooms for residential purpose, two large size storage rooms for various storage purposes. There are two toilets blocks separate for men and women. It also has large ground open to sky which serves for various purposes and also have parking facility for comfort of their users.



(A.) PLAN



(B.) SECTION

Figure 8.4: Design of Community Hall by using Revit

Measurement sheet:

Sr. no	Description of item	Nos	Length(m)	Breadth(m)	Height (m)	Quantity
1	**Excavation for foundation**		23.46	0.91	0.81	17.29m^3
					Total	**17.29m^3**
2	**P.C.C. in foundation**		23.46	0.91	0.50	10.67m^3
					Total	**10.67m^3**
3	**Brick work in foundation**					
	Step 1		22.66	0.61	0.30	4.14m^3
	Step 2		23.86	0.51	0.20	2.43m^3
	Step 3		25.06	0.41	0.46	4.72m^3
					Total	**11.23m^3**
4	**Brick work**					
	Brick work (9Ⅱ)	55	26.28	0.23	3.50	1189.22m^3
	Brick work (4Ⅱ)	3	13.14	0.10	3.50	13.8m^3
					Total	**1203.02m^3**
5	**Deduction from wall**					
	D	2	2.14	0.23	2.30	2.26m^3
	D1	4	0.92	0.23	2.13	1.80m^3
	D2	6	0.75	0.10	1.98	0.89m^3
	W	3	1.52	0.23	1.40	1.46m^3
	W	1	1.52	0.10	1.40	0.21m^3
	W1	3	1.21	0.10	1.40	0.50m_3
	W2	3	0.95	0.10	1.40	0.40m^3
					Total	**7.52m^3**
6	**R.C.C. lintel & chajja**					
	Door	2	2.25	0.25	0.15	0.17m^3
	Door 1	4	1.21	0.25	0.15	0.18m^3
	Door 2	6	1.06	0.25	0.15	0.23m^3
	Window for 9Ⅱ	3	1.82	0.25	0.15	0.20m^3
	Window for 4Ⅱ	1	1.82	0.25	0.15	0.07m^3
	Window 1	3	0.10	0.25	0.15	0.02m^3
	Window 2	3	0.10	0.25	0.15	0.02m^3
	Ventilation	2	0.76	0.10	0.15	0.02m^3
	Window chajja	4	1.82	0.25	0.15	0.27m^3
	Door chajja	2	2.44	0.25	0.15	0.02m^3
					Total	**1.20m^3**
7	**Parapet wall**					
	wall	1	35.40	0.23	0.91	7.40m^3
					Total	**7.40m^3**
8	**Plaster**					
	Outside plaster		34.75		4.50	156.38m^2
					Total	**156.38m^2**
9	**Deduction from outsideplaster**					
	Door	2	2.25	-	2.29	10.30m^2

	Window	4	1.40	-	1.50	8.40m^2
					Total	**18.70m^2**
10	**Inner side plaster**					
	Office room	1	2.5	-	3.5	8.75m^2
	Training hall	1	6	-	8	48m^2
	Central kitchen	1	2.5	-	2.5	6.25m^2
	Kitchen	1	2.5	-	2.5	6.25m^2
	Living room	1	2.5	-	3.5	8.75m^2
	Bath	1	1.2	-	1.8	2.16m^2
	Balwadi	1	3.5	-	6	21m^2
	Store room	1	2.5	-	3.5	8.75m^2
	Toilet	1	2.5	-	2.5	6.25m^2
	Demonstration hall	1	6	-	8	48m^2
					Total	**164.16m^2**
11	**Celling plaster**					
	Office room		2.29	1.98	-	4.53m^2
	Training hall		4.11	2.16	-	8.88m^2
	Central kitchen		2.34	2.57	-	6.01m^2
	Kitchen		1.52	1.22	-	1.85m^2
	Living room		1.52	1.22	-	1.85m^2
	Bath		1.22	0.91	-	1.11m^2
	Balwadi		1.22	2.13	-	2.60m^2
	Store room		2.34	0.96	-	2.24m^2
	Toilet		1.37	2.16	-	2.95m^2
	Demonstration hall		1.22	2.18	-	2.65m^2
					Total	**34.67m^2**

[Table 8.5: Quantity Calculation for Community Hall]

Based on it we have done the estimate of community hall with S.O.R. 2019-20 of Gujarat state. Following table is showing the total estimate and their rates and the total amount of money required for construction.

Abstract sheet:

Sr.no	Description of Item	Quantities	Rate	Unit	Amount
1	Excavation	17.29	85	m^3	1470
2	PCC	10.67	3200	m^3	34144
3	Brick work in foundation	11.23	3200	m^3	35936
4	Brick work in super-structure	1203.02	3500	m^3	4210570
5	RCC work in slab,chajja & lintel	15.74	8800	m^3	138512
6	Plaster work in c.m.(1:3) for inside & outside & celling	355.21	150	m^2	53281
7	Wood work for door & window	45.94	7800	m^2	358332
8	Marble flooring	55.90	500	m^2	27950
9	Cement	1882	350	Bag	658700

10	Sand	9.28	800	m^3	7424
11	Aggregate	15.56	1000	m^3	15560
12	Bricks	72861	4	No	291444
13	Steel (HYSD)	725	50	Kg	36250
14	Binding wire	8.25	20	Kg	165
			Total (Rs.)		58,69,738
			Add 2% of water charge		1,17,395
			Add 10% Contractor Profit		5,86,974
			Grand Total (Rs.)		**65,74,107**

[Table 8.6: Cost Calculation for Community Hall]

8.1.5 Smart Village Design (Civil)

DRY COMPOSE PUBLIC TOILET -

There are no toilets in some house in village of some area. So, we develop the public cum private dry compose toilet.

1. CONVENTIONAL SANITATION SYSTEMS: DRAWBACK & LIMITATIONS -

The sanitation practices promoted today are either based on hiding human excreta in deep pits ('drop-and-store') or on flushing them away and diluting them in rivers, lakes and the sea ('flush-and discharge'). Drop-and-store systems can be simple and relatively low-cost but have many drawbacks. Often, they cannot be used at all in crowded areas, on rocky ground, where the groundwater level is high or in areas periodically flooded. They require access to open ground and the digging of new pits every few years.

Flush-and-discharge systems require large amounts of water for flushing, and for many municipalities couldn't afford investments in pipe networks and treatment plants. Over a year for each person some 400-500 liters of urine and 50 liters of faeces are flushed away with 15,000 liters of pure water. Water from bath, kitchen and laundry may add up to another 15,000-30,000 liters for each person.

The problems people normally face from the conventional sanitation system are:

- They are not working properly at all and do not ensure safe and healthy sanitation but increase health risks from severe water pollution due to On- Site Sanitation systems.
- No recycling of water and nutrients leading to Loss of valuable nutrients for agriculture are largely linear end-of-pipe technology systems where drinking water is misused to transport waste into the water cycle, causing environmental damage and hygienic hazards, and contributing to the water crisis.
- Unsatisfactory purification or uncontrolled discharge of more than 90 % of wastewater worldwide.
- Use of freshwater to transport human excreta in sewers results in high drinking water demand. In water-scarce regions, additional pressure is put on limited freshwater resources.

2. ECOLOGICAL (DRY COMPOSE) SANITATION SYSTEMS: ADVANTAGES -

Ecological sanitation systems render human excreta safe, preventing pollution rather than attempting to control it after pollution takes place and proposes to use the safe products of human excreta for agricultural Therefore it can be characterized as a "closed loop" sanitation system which treats human excreta as a resource. Human excreta are processed until they are completely free of disease organisms. Nutrients obtained in the form of compost and urine is recycled by using them in agriculture. As ecological sanitation systems adopt treatment processes that closely mimic the cycles of nature, it is sustainable and has no negative impact on the environment.

Some of the advantages in the use of ecological sanitation systems are:

- Ecological sanitation systems lead to enormous quantities of fresh water since urine diverting dry toilets and waterless urinals do not require water for flushing.
- Faeces and urine which require different treatment processes can be handled easily when separated at source. Studies show that the segregated treatment approach is both energy efficient and cost effective.
- Separation of faeces, which has high pathogen levels, from urine and absence water used for flushing, significantly reduces the volume of waste fraction to be treated.
- By using ecological sanitation approach pollution of water sources and the risks posed by diarrheal diseases due to unsafe disposal of human excreta can be mitigated.
- Ecological systems facilitate decentralized and sustainable treatment options for disposal of human excreta.
- Compost obtained from ecological sanitation toilets is a good soil conditioner and increases soil fertility.
- Urine, which is usually sterile, is rich in nitrogen, phosphorous and potassium can be directly applied to crops or further processed as crystal fertilizer.
- Recovery of nutrients from human excreta using ecological sanitation systems can effectively substitute mineral fertilizers which are non-renewable whose prices have treatment processes can be handled easily increased multifold due to depletion of oil that and phosphate rock reserves.
- Linking sanitation and agriculture using ecological sanitation approaches can play a major role in ensuring health security as well as food security of economically weaker sections of society.

3. COMPONENTS OF A DRY COMPOSE TOILET -

Chamber:

Single, double, multiple chambers or removable bins are used for collection and processing of faeces.

Toilet Seat:

Specially designed toilet seats are utilized for separation of faeces, urine and wash and water. Toilet seats with two-hole or three-hole separation arrangements are utilized for this purpose.

`

Design Parameters	Average Values
Ultimate desiccated volume of faeces and additives added	0.25 to 0.4 liters / per person per use

Volume of urine	0.25 to 0.3 liters / per person per use
Wash water	1 to 2 liters / per person per use
Storage period of faeces for inactivation of pathogens	9–12 months (after a vault fills-up and is sealed for decomposition)

[Table 8.7: Design Parameters and Their Average Values for Ecosan Toilet Design]

Vent pipe:
Vent pipes provided to the chambers facilitate aeration, moisture removal and increase in temperature.
Toilet Structure:
Covered super structure provided to the toilets offer privacy to the users and also protects the chambers from rain, cold weather and from insects and animals.
Urine Storage:
Collection of urine in a storage tank provided within or outside the toilet facilitates its application as liquid fertilizer for crops.
Wash Water Disposal:
Planted beds or soak pits provided outside the toilets facilitate safe disposal of wash water containing faecal matter.
Additives:
Wood ash, soil, saw dust and powdered leaves can be added as additives to the faeces to remove moisture, increase pH and achieve desired C: N ratio of the mixture.

4. DESIGN CONSIDERATIONS -
Capacity:
A household ecosan toilet is normally designed for use by 5 - 7 members. In special cases it is designed for use up to a maximum of 20 members in a residential scenario. In such situations, the faces collection chamber(s) should be designed to accommodate higher number of users.

Volume of Chambers:
For designing the storage volume of faeces collection chamber, an ultimate volume of desiccated faeces and additive mixture of 0.25 to 0.40 liters per person per day can be considered depending upon the local condition and usage pattern.

Type of Chambers:
A twin chamber ecosan toilet is most ideal which requires very minimal maintenance compared to others. However, if there is no space for a double chamber ecosan toilet and the members of the household are confident of managing the regular maintenance requirements, a single chamber ecosan toilet with removable bins can be chosen.

Retention Period:
A minimum retention period of 10 months for pathogen inactivation of faeces and additive mixture in the faeces collection chamber must be considered in the design. If bins or any other removal method of collection is proposed for use, the bins or the secondary composting process where faeces is processed must take the appropriate retention period required for pathogen inactivation. Urine can be collected in jerry cans of 10-15 liters size. These can be stored or directly transported for agricultural applications.

Floor Space and Level:

The minimum floor dimension of ecosan toilets with single chamber must be 1.00 m in width and 1.20 m in length, while it should be at least 1.50 m in width and 1.20 m in length for twin chamber. The lower level of the faeces collection chambers of ecosan toilets should be above the high flood level expected in low lying and flood prone areas.

Construction materials:

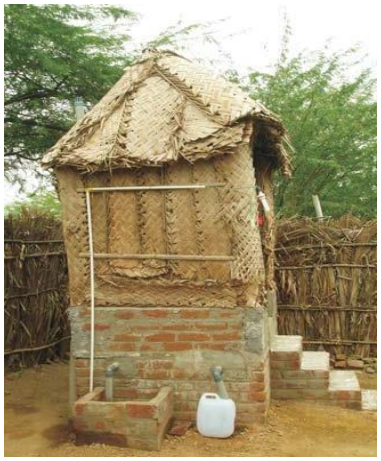
An ecosan toilet is designed with a leak proof faeces and urine collection chambers / tanks and super structure with pans / arrangements that help in source separation of faeces, urine and wash water. Ecosan toilets can be constructed using locally available materials like bricks, cement blocks, concrete, bamboo or other suitable materials can be used for construction of ecosan toilets. Cost of household ecosan toilets can be drastically reduced by using low cost materials like bamboo, thatch, gunny bags, etc., for the construction of superstructure. However, care should be taken to prevent entry of rainwater into the dry compose toilet.

Brick Walls

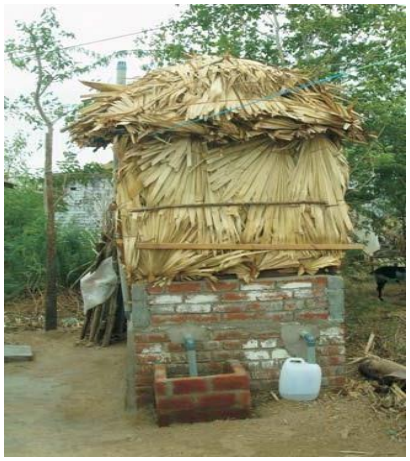
Mud Blocks

Hollow Blocks

Figure 8.5: Normal Options of Superstructure



Coconut Thatch



Palm Thatch

Waste Wood

Figure 8.6: Low Cost Options of Superstructure

5. DRY COMPOSE TOILET WITH REFERENCE TO RANGPAR (BELA) VILLAGE -
Following figure shows the dry compose public toilet designed by us for Rangpar (Bela) village for common use.

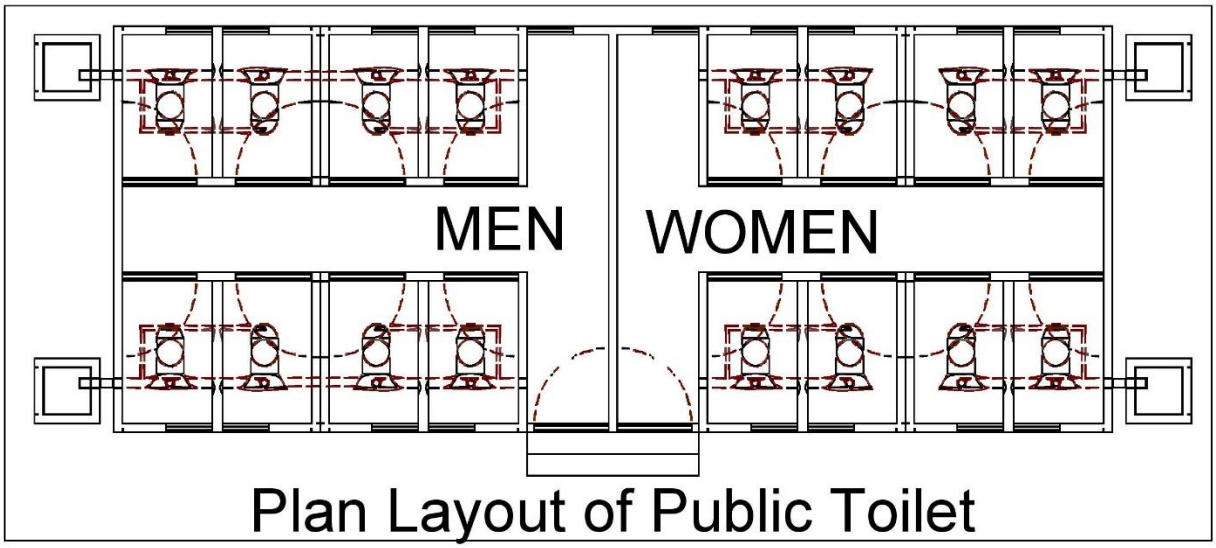


Figure 8.7: Plan of Public Toilet by Using AutoCAD

6. WORKING -
These dry compose toilet contains two special pans in which human excreta is separated from urine and wash water and it is stored in chamber provided below toilet. There are two pans and two chambers provided in toilet so when one chamber completely fills than toilet can be used with the help of another toilet chamber. After complete filling the one chamber ash and soil and saw dust. And after 5 to 6 months it will turn in to organic fertilizer.

And if we want to use these toilets as public toilet than as shown in following fig. a plastic bag (container) is used in chamber for storing of excreta. After filled of container, it will be replaced with another container and we can continually use the toilet.

7. ESTIMATION OF COST FOR DRY COMPOSE TOILET -

Design details	Specification
No. of users	5 members
Average volume of desiccated material	0.25 liters / person / day
Retention period	300 days
No. of chambers	2 nos.
Size of faces collection tanks Volume of tanks needed Size of one tank provided	= 5 nos. x 300 days x 0.25 l/p/d = 375 liters = 0.9 m x 1.4 m x 0.50 m x 1000 liters = 630 liters
Size of chamber access hole	750 mm wide x 400 mm high
Vent pipe	100 mm dia. connecting both tanks 500 mm above roof level Cowl on top

Toilet size (floor area)	1.4m width x 1.8 m length
Plant bed or Soak pit	0.50 m x 0.50 m size or 0.50 m x 0.50 m x 1.20 m size
Door	0.8 m x 2 m
Roof	1–2" thick Ferro-cement slab or AC/GI sheets
Super structure	Brick wall 200 mm thick

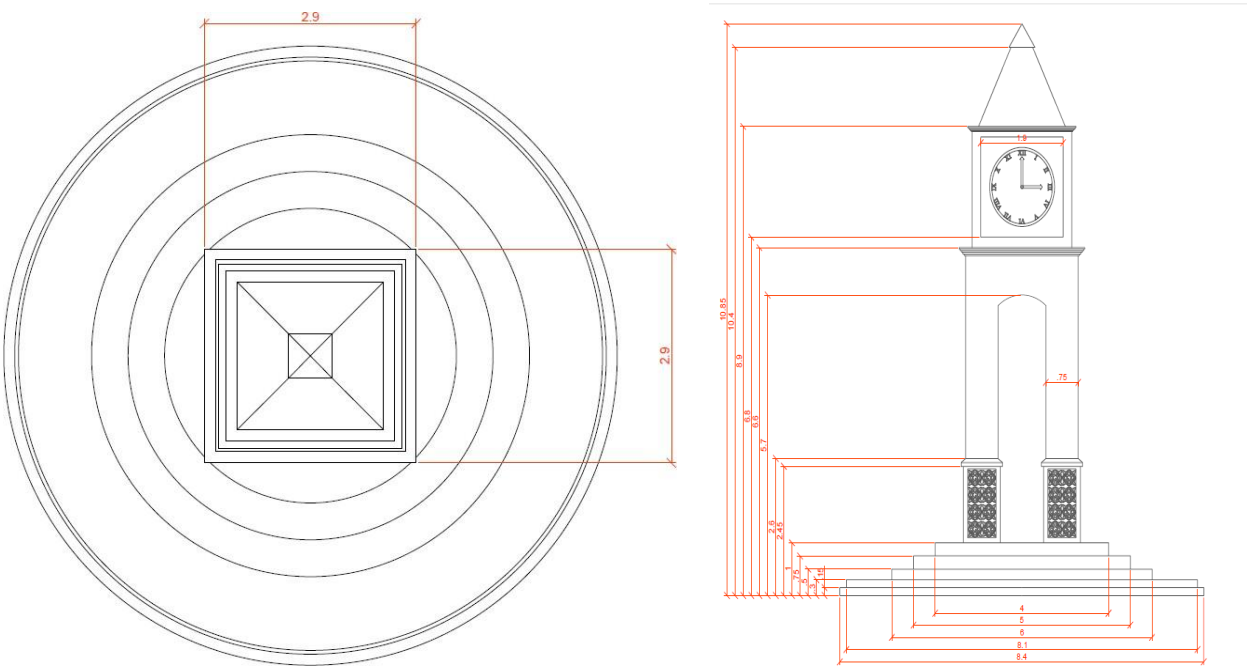
[Table 8.8: Drawing Detail of Toilet]

ITEM	***L***	***B***	***H/D***	***Q***	***RATE***	***MONEY***
EXCAVATION	8.7	0.4	0.25	0.87	201	174.8
BBLC	8.7	0.4	0.10	0.348	4000	1392
MASONARY UP TO PLINTH	8.7	0.3	0.65	1.696		
DEDUCTIONS OF DOORS (2)	0.75	0.3	0.4	0.18		
				1.516	2817	4270
MASONARY IN SUPER STRUCTURE	7.2	0.2	2.5	3.6		
DOOR	2	0.2	0.8	0.32		
VENTILATOR	0.5	0.2	0.5	0.05		
				3.23	2900	9367
SLAB AT PLINTH	2.2	1.8	0.1	0.396	3392	1343
ROOF OF ASBESTOS SHEET	1.8	1.4	-	2.5	1000	2500
BOTH SIDE PLASTER (2)	7.2	-	2.5	36		
DEDUCTION						
DOOR	2	-	0.8	1.6		
VENTILATOR	0.5	-	0.5	0.25		
				34.15	100	3415
COST OF PANS AND DOOR					2600	2600
For 2 Chambers TOTAL(Rs.) = **25,061**						
Here, Total No. of Chambers = 8						
So, TOTAL Cost of Public Toilet = 8*25061 = **2,00,488 Rs.**						

[Table 8.9: Cost Estimation of Toilet]

8.1.6 Heritage Village Design (Civil)

CLOCK TOWER-



(A.) PLAN **(B.) ELEVATION**

Figure 8.8: Design of Clock Tower by Using AutoCAD

Following table is showing the total estimate and their rates and the total amount of money required for construction of Clock Tower.

Measurement sheet:

Sr.no	Item Description	Nos.	L(m)	B(m)	H(m)	Quantity
1	Excavation in foundation	1	8.3	0.76	0.81	5.11m^3
2	P.C.C For Foundation	1	8.3	0.76	0.30	1.89 m^3
3	1 Step Brick Work	1	10.52	0.61	0.30	1.93 m^3
4	2 Step Brick Work	1	10.52	0.51	0.20	1.07 m^3
5	3 Step Brick Work	1	10.52	0.41	0.46	1.98 m^3
6	Column (right side)	2	5.7	0.76	1.52	13.16 m^3
7	Column (Left side)	2	5.7	0.76	1.52	13.16 m^3
8	Brick work In Wall		10.52	0.23	1.52	3.68 m^3
9	Plaster	1	18.04	-	1.52	27.42 m^2

Abstract sheet:

Sr.no.	Description of Item	Quantities	Rate	Unit	Amount
1	Excavation in foundation	5.11	90	m^3	500
2	P.C.C for Foundation	1.89	3200	m^3	6048
3	Brick Work in foundation	4.98	3500	m^3	17430
4	Brick Work in super structure	48.52	3500	m^3	169820
5	Plaster work in c.m.(1:3) for inside & outside	27.42	200	m^2	5484
6	Cement	101	400	Bag	40400
7	Sand	5.28	800	m^3	4224
8	Aggregate	10.56	1000	m^3	10560
9	Bricks	31320	4	Nos.	125280
10	Steel	525	50	Kg.	26250
11	Binding wire	5.25	20	Kg.	105
				Total (Rs.)	4,06,101
				Add 3% of contingencies	12,183
				Add 2% of water Charge	8,122
				Grand total (Rs.)	**4,26,406**

[Table 8.10: Quantity & Cost Calculation for Clock Tower]

8.2 Reason for Students Recommending this Design

The above mentioned all designs are real-time requirement cases. As we have studied and watched the situation of the above-mentioned village Ragnpar (Bela), We found that some facilities must be there in case of making Smart village and **"Aatmnirbhar Bharat".**

From our analysis and with help of Gram Panchayat, we finalize that the design of following is suitable for the village. So, we have to decide the design of Bio-gas plant, Children park, Rain harvesting system, Community Hall, Public Toilet and Clock Tower.

8.3 About designs Suggestions / Benefit of the villagers

Bio-gas plant for renewable energy source as well cheap energy source compare to LPG gas,

Children park for purpose to play children in a safe place and a dust free and clean environment,

Rain Harvesting system is used to store the rain water which might be helpful to villagers in form like, drinking water, Irrigation use, Agriculture purpose, etc.,

Community hall is a necessary facility in cases of any small events, annual meetings, get-together functions, family occasion etc.,

As your nation is going towards the **SWACHCH BHARAT MISSION**, it is necessary that there is at least one **Public Toilet** which is using for common people., Due to **Clock Tower (Heritage Place)** there are several particular benefits to the village & some of them are mention here:

1. Clock Towers are institutions created in the public interest. They engage their visitors, foster deeper understanding and promote the enjoyment and sharing of authentic cultural and natural heritage.

2. Travel's & Tourism business have some positive exposure.

3. Hotels & restaurant business have also benefit from the visitors.

4. Clock Towers acquire, preserve, research, interpret and exhibit the tangible and intangible evidence of society and nature.

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

After completion of visit & data collection the project carried out in the current semester by the group members which includes the design of a sustainable facilities for Rangpar (Bela) village in Morbi Taluka of Morbi District in Gujarat State.

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

- In next semester we will provide Social Infrastructure design for the village. It will include the design of Community Health Centre (CHC) and it is required to provide Child Welfare & Maternity Homes. We will also provide Septic Tank in Infrastructure design.
- Then we will design Green House Building as a Sustainable Design.
- Then we will also design Social-Cultural Infrastructure for the village. It will include recreational facilities like Public Library and Public Garden.
- Agricultural Storage building for the storage of the agricultural products.
- Milk Co-operative Society building for the purpose of storing and selling milk.
- We will also design Physical Infrastructure in the village. It will include the design of overhead water tank.

Chapter - 10.
Conclusion of the Entire Village Activities of the Project

Long-range planning must take place in a public forum, with opportunities for public participation, if it is to be representative. The support of the community can also faster improved implementation opportunities. An approach that will be used successfully when planning for the future of a community involves preceding the planning process with an exercise designed to develop vision of the future for the "Vishwakarma Yojana".

In this semester, we completed our Literature Review and our Ideal Village Visit. From there we got an idea about how the smart village should be. Then we visited our allotted village Rangpar (Bela) of Morbi district. There we completed our Techno-Economic Survey and Smart Village Survey.

Based on gap analysis done in this semester we developed and designed the bio gas plant, drainage system, dry compost public toilet, community hall & Children playground. So, we can say if all the missing amenities are provided than it may stop the migration of rural people towards the urban area. This can cause reduce the load on urban areas. And this amenity designed by us is helpful for better development of village as physically as well as socially, which improves the overall lifestyle of people.

It can be help to develop the other village as increase basic amenities and after that smart amenity on any country with the help Smart (Ideal) Village visit and solid and liquid waste water management system, survey and analysis. And it's also helps to increase GDP of state and also increase country image in front of world as good infrastructure, Good Economic Profile and good employment solution. Good & smart example of new infrastructure with use of renewable energy solution.

Chapter - 11.
References refereed for this project

http://www.vyojana.gtu.ac.in

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UDPFI Guideline 2014.

https://www.google.com/maps/place/Rangpar,+Gujarat+363641/@22.9087662,70.8695004,13z/data=!3m1!4b1!4m5!3m4!1s0x39598bd51c7582d9:0xf05ccac15130769b!8m2!3d22.9159649!4d70.9011786

https://www.censusindia.gov.in/2011-Common/CensusData2011.html

Chapter - 12.
Annexure attachment

12.1 Survey form of Ideal Village Scanned copy attachment

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

Name of Village:	Lilakha
Name of Taluka:	Gondal
Name of District:	Rajkot.
Name of Institute:	Government Enggi. Colloge, Rajkot
Nodal Officer Name & Contact Detail:	Mrs. Kamnali J. Savalia Contact No.- 9712916203
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Sarpanch : Shardaben Dhirubhai Dholariya.
Date of Survey:	30/10/2020.

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	712	372	340	157
ii)	2011	1098	544	534	262

2. **Geographical Detail:**

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	905.93 hectares.
	Forest Area (In hect.)	-
	Agricultural Land Area (In hect.)	620.00 hactares.
	Residential Area (In hect.)	285.93 hactares.
	Other Area (In hect.)	-
	Water bodies	Bhadar River
	Nearest Town with Distance:	Virpur, 7km away.

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3. Occupational Details:

Name of Three Major Occupation groups in Village	1. Farming (80%) 2. Bussiness (10%) 3. Govt. Service (10%)

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	Treated Tap water No 2 well 2 hand Pumps No Bhadar River	✓ ✓ ✓ ✓	✓ ✓	Require RO water
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:			
	Underground Sump	Capacity: Lit	1,00,000	✓	
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	Yes	✓		
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open	closed	✓		
	If Open than Pucca / Kutchcha	–			
	Whether drain water is discharged directly in to Water bodies/ Sewer plants	water bodies		✓	
Suggestions if any:					

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Techno Economic Survey

E.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Bituminous	✓		
	Main road	C.C.	✓		
	Internal streets	C.C.	✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH-27 7.1 kms.	✓		SH 31
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No. Gomta 5 km.	✓		
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	No. Gomta 5 km.	✓		
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	✓		Auto, P.V.
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	yes	✓		Govt. 24 hrs.
	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	✓		12 hrs.

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K.	**Health Facilities:**				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	PHC 4 beds Good	✓		
	Private Clinic/Private Hospital/ Nursing Home	No.		✓	
	If any of the above Facility is not available in village than approx. distance from village: ..22..kms.				
Suggestions if any: Required CHC, child welfare & maternity homes.					
L.	**Education Facilities:**				
	Aaganwadi/ Play group	yes	✓		01
	Primary School	yes	✓		01
	Secondary school	yes	✓		01
	Higher sec. School	yes	✓		01
	ITI college/ vocational Training Center	No		✓	
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	No		✓	
	If any of the above Facility is not available in village than approx. distance from village: ..22..kms.				
Suggestions if any:					
M.	**Socio- Culture Facilities**				
	Community Hall (With or without TV) Location:	Yes	Near B.S.	✓	without TV

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	Electrification in Government Buildings/ Schools/ Hospitals	Yes	✓		24 hrs.
	Renewable Energy Source Facilities (Y/ N)	No		✓	-
	LED Facilities	No		✓	-
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes	✓		
	Location Condition	Near bus stand Good			
	Community Toilet (With bath/ without bath facilities)	No.		✓	
	Solid & liquid waste Disposal system available	Yes	✓		
	Any facility for Waste collection from road	Yes	✓		Door to Door
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Bhadar Dam	✓		
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	262	✓		

5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks

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Techno Economic Survey

	Condition:	Good			
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	No		✓	
	Public Garden Location: Condition:	No		✓	
	Village Pond Location: Condition:	No		✓	
	Recreation Center Location: Condition:	No		✓	
	Cinema/ Video Hall Location: Condition:	No		✓	
	Assembly Polling Station Location Condition	Yes Primary School	✓		01
	Birth & Death Registration Office Location Condition	Yes Gram panchayat	✓		01
If any of the above Facility is not available in village than approx. distance from village: ..22.. kms.					
Suggestions if any					
N.	**Other Facilities**				
	Post-office	No		✓	
	Telecommunication Network STD booth	No		✓	

	General Market	No		✓	
	Shops (Public Distribution System)	Yes		✓	01
	Panchayat Building	Yes	✓		01
	Pharmacy/Medical Shop	No		✓	
	Bank & ATM Facility	No		✓	
	Agriculture Co-operative Society	No		✓	
	Milk Co-operative Soc.	Yes	✓		01
	Small Scale Industries	No		✓	
	Internet Cafes/ Common Service Center/Wi Fi	No		✓	
	Other Facility				
Suggestions if any:	ATM & General market.				

6. Sustainable /Green Infrastructure Facilities:

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
O.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	No		✓	Need to create
P.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	No		✓	Need to create
Q.	Any Other				

7. Data Collection From Village

Village Base Map Available: Hard Copy/Soft Copy	Yes Hard 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)	No.	All are Need & good Condition
2.	Additional Information/ Requirement	Yes	Public Toilets

9. **Smart Village Proposal Design**

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Is their any thing for the village enhancement possible ?	Yes	Land

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

12.2 Survey form of Smart Village Scanned copy attachment

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

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

Name of District:	Rajkot.
Name of Taluka:	Gondal.
Name of Village:	Lilakha
Name of Institute:	Government Enggi. College, Rajkot.
Nodal Officer Name & Contact Detail:	Mrs. Kaumali J. Savalia Contact No.- 9712916203
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Sarpanch : Shardaben Dhirubhai Dholariya
Date of Survey:	

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	712	372	340	157
2.	2011	1098	549	549	265

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	905.93 hactors.
2.	Forest Area (In hect.)	–
3.	Agricultural Land Area (In hect.)	620 hactors.
4.	Residential Area (In hect.)	285.93 hactors.
5.	Other Area (In hect.)	–
6.	Distance to the nearest railway station (in kilometers):	5 kms at Gomta.

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7.	Name of Nearest Town with Distance:	Gromta (4 Kms)
8.	Distance to the nearest bus station (in kilometers):	0.25 Kms.
9.	Whether village is connected to all road for the any facility or town or City?	Yes, all roads are connected to each-others.

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1. Animal Husbandry 2. Farming 3. Labour work
Major crops grown in the village:	1. Cottons 2. Peanuts 3.

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	Yes Good	✓		Piped Into Dwelling
2.	**DUG WELL** Protected Well Un Protected Well	Yes Good	✓		Protected well
3.	**WATER FROM SPRING** Protected Spring Unprotected Spring Rainwater Tanker Truck Cart With Small Tank	Good	✓		Rainwater
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/** Irrigation Channel Bottled Water Hand Pump Other(Specify)**Lake/ Pond**	Yes Good	✓		Bhadar Dam

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Techno Economic Survey

Suggestions if any:						
B.	**Water Tank Facility**					
	Overhead Tank	Capacity: Lit.	1,00,000			
	Underground Sump	Capacity:				
Suggestions if any:						
C.	**The Type of Drainage Facility**					
	A. UNDERGROUND DRAINAGE 1 2 B. OPEN WITH OUTLET C. OPEN WITHOUT OUTLET	Good	✓		Underground Drainage system	
Suggestions if any:						
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**					
	Village approach road	Good	✓			
	Main road	V.Good	✓			
	Internal streets	Good	✓			
	Nearest NH/SH/MDR/ODR Dist. in kms.	N.H 9.1 Kms	✓		N.H. 27	
Suggestions if any:						
E.	**Transport Facility**					
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No. 5 kms.		✓	Nearest R.S. is in Gromta.	
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	No. 5 kms.		✓	Nearest B.S. is in Gromta.	
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes,	✓		Auto, Private vehicles.	
Suggestions if any:						
F.	**Electricity Distribution**					
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes,	✓		Govt + More than 6 hrs.	

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Techno Economic Survey

	Power supply for Domestic Use	Yes	✓		24 hrs.
	Power supply for Agricultural Use	Yes	✓		24 hrs.
	Power supply for Commercial Use	Yes	✓		24 hrs.
	Road/ Street Lights	Yes	✓		24 hrs.
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	✓		24 hrs.
	Renewable Energy Source Facilities (Y/ N)	No		✓	–
	LED Facilities	Yes	✓		–
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes 01.	✓		
	Location Condition	Good			
	Community Toilet (With bath/ without bath facilities)	No		✓	
	Solid & liquid waste Disposal system available	Yes.	✓		
	Any facility for Waste collection from road	No.		✓	
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL. OTHER (SPECIFY) ✓	Yes.	✓		Bhadar Dam
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	265	✓		Ratio (1:2)

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Techno Economic Survey

V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	Yes	✓		1
	Sub-Centre	Yes	✓		1
	PHC	NO			
	BLOCK PHC	—			
	CHC/RH	—			
	District/ Govt. Hospital	Yes	✓		2
	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: ..22..kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes	✓		1
	Primary School	Yes	✓		1
	Secondary school	Yes	✓		1
	Higher sec. School	Yes	✓		1
	ITI college/ vocational Training Center	—			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	—			
	If any of the above Facility is not available in village than approx. distance from village: ..22..kms.				

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Suggestions if any:

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

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

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

Suggestions if any:

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

VII. DATA COLLECTION FROM VILLAGE

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

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks

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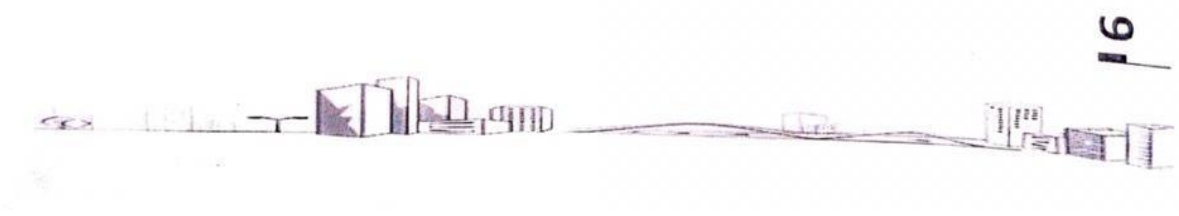
1.	Repair & Maintenance of Existing Public Infrastructure facilities, School Building Health Center Panchayat Building Public Toilets & any other	No	All are Need of Used condition.
2.	Additional Information/ Requirement	Yes,	Public Toilets
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?	Yes.	2 times Both

IX. Smart Village / Heritage Details

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

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



12.3 Survey form of Allocated Village Scanned copy attachment

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

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

Name of District:	Morbi
Name of Taluka:	Morbi
Name of Village:	Rangpar (Bela)
Name of Institute:	Government Engg. College, Rajkot.
Nodal Officer Name & Contact Detail:	Mrs. Kaunali J. Savalia. Contact No.- 9712916203
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Sarpanch : Kusumba Mahendrasinh Zala. કુસુમબા મહેન્દ્રસિંહ ઝાલા. સરપંચ. રંગપર ગ્રામ પંચાયત
Date of Survey:	9/11/2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	1719	892	827	349
2.	2011	2123	1092	1031	403

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	2747.6973 / 21.42° N 70.17° E
2.	Forest Area (In hect.)	69.48
3.	Agricultural Land Area (In hect.)	2441.25
4.	Residential Area (In hect.)	210.17
5.	Other Area (In hect.)	26.79
6.	Distance to the nearest railway station (in kilometers):	13.7 kms at Morbi.

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7.	Name of Nearest Town with Distance:	Kerala (5.9 Kms)
8.	Distance to the nearest bus station (in kilometers):	0.950 kms
9.	Whether village is connected to all road for the any facility or town or City?	Yes.

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1.	Farming
	2.	Factory's Labour work
	3.	Bussiness (shop)

Major crops grown in the village:	1.	Cottons
	2.	Peanuts
	3.	Castor

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				
2.	**DUG WELL** Protected Well Un Protected Well	Good	Yes		protected well
3.	**WATER FROM SPRING** Protected Spring Unprotected Spring				
	Rainwater Tanker Truck Cart With Small Tank				
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/** Irrigation Channel				
	Bottled Water Hand Pump				

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	Other(Specify)Lake/ Pond water supply	Good	Yes		2 water supplys.
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: lits	200000		Not in working
	Underground Sump	Capacity:			
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1	Good	Yes.		All drainage are underground
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	R.C.C.	Good		
	Main road	Asphalt	intermediate		
	Internal streets	R.C.C.	Good		
	Nearest NH/SH/MDR/ODR Dist. in kms.	SH 1 km.	Yes		SH 321.
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No. 13.7 km		No.	Newest R.S. is in Morbi.
	Bus station (Y/N) Condition: (if No than Nearest Bus Station---Kms)	Yes. 0.95 km		No.	Need to Renewal
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes.	Yes		Auto, Jeep, Private vehicles
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes.	Yes.		Govt. More than 6 hours.

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	Power supply for Domestic Use	Yes	Yes		24 hrs
	Power supply for Agricultural Use	Yes	Yes		24 hrs
	Power supply for Commercial Use	Yes	Yes		24 hrs
	Road/ Street Lights	Yes		No	12 hrs
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	Yes		24 hrs
	Renewable Energy Source Facilities (Y/ N)	No		No	-
	LED Facilities	Yes		No	-
Suggestions if any:					

G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes 01	✓		Need to create New
	Location Condition	Very Bad			
	Community Toilet (With bath/ without bath facilities)	No.		✓	
	Solid & liquid waste Disposal system available	Yes	✓		
	Any facility for Waste collection from road	No.		✓	
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND				
	STREAM/RIVER				
	CANAL ✓	Yes		✓	
	WELL ✓	Yes		✓	
	TUBE WELL				
	OTHER (SPECIFY) ✓	Rainwater	✓		
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	403	Yes.		Ratio (1:4)

V. SOCIAL INFRASTRUCTURAL FACILITIES:

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

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

Suggestions if any:

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

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

Suggestions if any:

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

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

Suggestions if any:

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

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VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

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

VII. DATA COLLECTION FROM VILLAGE

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

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VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

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

IX. Smart Village / Heritage Details

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

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

કુલદીપસિંહ ગંડુભા ઝાલા
સરપંચ
રંગપર ગ્રામ પંચાયત

12.4 Gap Analysis of the Allocated Village

VILLAGE GAP Analysis					
Village Facilities	**Planning Commission/UDPFI Norms**	**Village Name:**	Rangpar (Bela)		
		Population:			2123
		Existing	**Required as per Norms**	**Smart Village / Cities / Heritage / Future Projection Design**	**Gap**
	Social Infrastructure Facilities				
Education					
Anganwadi	Each or Per 2500 population	1	2		1
Primary School	Each Per 2500 population	1	2		1
Secondary School	Per 7,500 population	1	1		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
Skill Development Center	Per 100000 Population	0	0		0
Health Facility					
Govt/Panchyat Dispensary or Sub PHC or Health Centre	Each Village	1	1		0
Primary Health & Child Health Center	Per 20,000 population	1	0		0
Child Welfare and Maternity Home	Per 10,000 population	0	0	1	0
Multispeciality Hospital	Per 100000 Population	0	0		0
Public Latrines	1 for 50 families (if toilet is not there in home, especially for slum pockets & kutcha house)	0	1	1	1
	Physical Infrastructure Facilities				
Transportation		Adequate			
Pucca Village Approach Road	Each village	Adequate			
Bus/Auto Stand provision	All Villages connected by PT (ST Bus or Auto)	Adequate			
Drinking Water (Minimum 70 lpcd)		Adequate			
Over Head Tank	1/3 of Total Demand	Adequate			
U/G Sump	2/3 of Total Demand	Inadequate			
Drainage Network - Open		Inadequate			
Drainage Network - Cover		Adequate			
Waste Management System		Inadequate			
	Socio- Cultural Infrastructure Facilities				
Community Hall	Per 10000 Population	0	1	1	1
community hall and Public Library	Per 15000 Population	0	1	1	1
Cremation Ground	Per 20,000 population	0	0	0	0
Post Office	Per 10,000 population	1	1	0	0
Gram Panchayat Building	Each individual/group panchayat	1	1	0	0
APMC	Per 100000 Population	0	0	0	0

Fire Station	Per 100000 Population	0	0	0	0
Public Garden	Per village	0	1	1	1
Police post	Per 40,000 Population	0	0	0	0
Shopping Mall	0				
	Electrical Design				
Electricity Network		Adequate			
For Domestic use	24 hrs. per day	Adequate			
For Agricultural use	8 hrs. per day	Adequate			
For commercial use	24 hrs. per day	Adequate			
	Any Smart Village Facility				
Technology					
		ESR cap	0		
		Sump cap	0		
		Lat	0		

[Table 12.1: Gap Analysis of the Allocated Village]

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

Sr. No.	Village	Discipline	Part-I	Part-II
1.	**Rangpar (Bela)**	**Civil**	**Bio-Gas Plant**	**Green House**
			Children Park	**Septic Tank**
			Rain Water Harvesting System	**Public Bank**
			Community Hall	**Post-Office**
			Dry Composite Public Toilet	**Public Library**
			Clock Tower	**Museum**
2.	Agatrai	Civil	Play Ground	Agricultural Storage Yard
			Public Library	Skill Development Centre
			Septic Tank	Bus Stop
			Solid Waste Management	Rainwater Recharge System
			Community Hall	Milk Cooperative Society
			Dry Composite Toilet	Farmer Help Centre
3.	Khoja Beraja	Civil	Vertical farming	Bus Stop
			Bio gas Plant	Artificial Pond
			Step Museum	ATM Machine
			Library	Public Health Centre
			Swimming pool	Community Toilet
			Children Playground	Open party Plot

[Table 12.2: Summary Details of all the Village Designs]

12.6 Drawings

All the drawings and images are attached in their respective chapters along with designs and their listing are mentioned in the list of figures along with their page numbers. And we have added A3 sheets of proposed designs at the end of the **Vishwakarma Yojana Phase VIII Part-I and Part-II Report.**

12.7 Summary of Good Photographs in Table Format (village visits, Ideal, Smart Village or any other)

Photographs of Allocated Village visit

Photographs of Ideal & Smart Village visit


SHREE RAJENJAYMAL RUPARELL (CANADA) PRIMARY SCHOOL


આંગણવાડી. કેન્દ્ર નં.૧

12.8 Village Interaction with Sarpanch Report with the photograph

Date: 09/11/2020

Subject: Village Interaction with Sarpanch

As per the circular of GTU guidelines, GTU had informed all the team members of Vishwakarma Yojana to present their work in the allocated village for the successful and effective implementation of Vishwakarma Yojana Phase-VIII. Under their guidelines the members of the team of Rangpar (Bela) village presented the plan for the development of the village at Rangpar (Bela) Gram panchayat office.

Sarpanch, Talati-mantry, and all the other member of the panchayat, village dwellers were present were present to know how the development of the village can be done. Some of them also gave their own ideas and the facilities which are required in the village.

We presented our work under the guidelines of VY Phase-VIII. We also made them understand about the main objective of the project, its benefits for the development of village and other issues and concerns prevailing in the village.

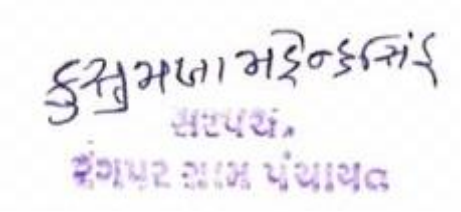
We explained them about the various designs we are going to proposed in the village for its development. The designs which we are going to proposed were designated as Physical infrastructure, Social infrastructure, Social and Cultural facilities, Repair and Maintenance of Existing structures and the most important facility of Sustainable/ Renewable Energy Source of planning.

Figure 12.8: Village Interaction with Sarpanch

12.9 Sarpanch Letter giving information about the village Development

Additional Information / Requirements / Suggestions:

Sr. No.	Additional Requirements	Information/Details	Remarks
1.	Water for Drinking	Drinking water pipelines from Narmada Canal	Required
2.	Water Tank	Renovation Required	Required
3.	Road Network's	Improve SH to reach the village easily & quickly	Required
4.	Community Hall	For better Communication each other to villagers	Required
5.	Public Toilets	To defecate people	Required



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

13.1 Design Proposals

In Tachometric survey done by us, we observed that the basic facilities required in a village are Physical infrastructure, Social infrastructure, Socio-cultural infrastructure. Physical infrastructure includes sources of drinking water, Water Tanks, Drainage systems, Road networks, Electricity distribution, Sanitation facilities and irrigation system. Social infrastructure includes Schools, colleges, Anganwadi, Hospitals, sub centers, Clinics. Socio- cultural facilities include Community halls, public library, public garden, pond, recreation center, cinema hall, Assembly polling station, Birth and death registration office, etc.

13.1.1 Sustainable design

In this part we have decide to design a greenhouse as sustainable design.

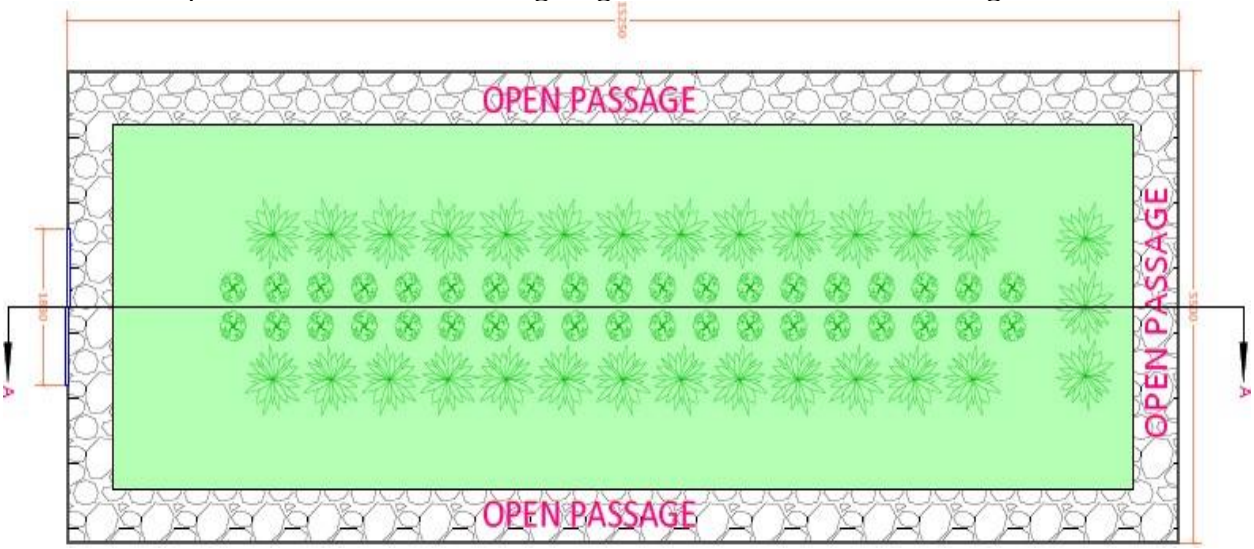


Figure 13.1: Plan of Green House

- A greenhouse is a structure with walls and roof made chiefly of transparent material, such asglass, in which plants requiring regulated climatic conditions are grown.
- These structures range in size from small sheds to industrial-sized buildings.
- A miniature greenhouse is known as a cold frame.
- The interior of a greenhouse exposed to sunlight becomes significantly warmer than the external temperature, protecting its contents in cold weather.
- Many commercial glass greenhouses or hothouses are high tech production facilities for vegetables, flowers or fruits.

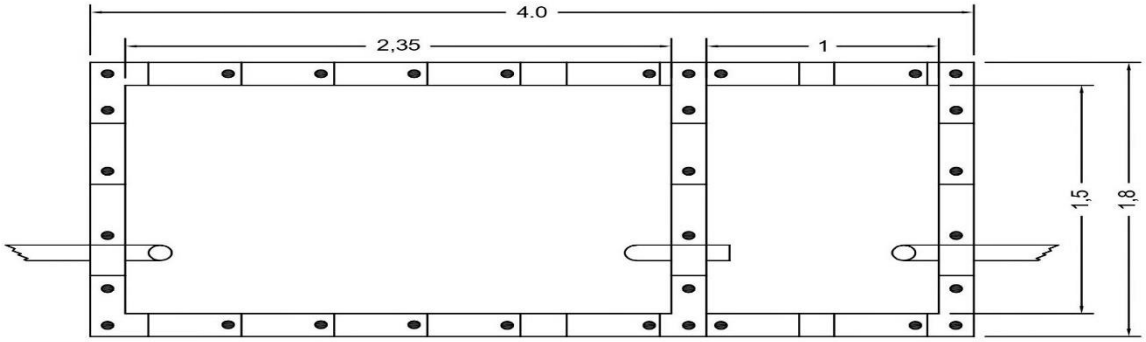
- The glass greenhouses are filled with equipment including screening installations, heating, cooling, lighting, and may be controlled by a computer to optimize conditions for plant growth.
- Different techniques are then used to evaluate optimality degrees and comfort ratio of greenhouses, such as air temperature, relative humidity and vapour-pressure deficit, in orderto reduce production risk prior to cultivation of a specific crop.

Sr. No.	Description of Item	Quantity	Rate/Unit	Total
1.	G.I. Pipe of 25 mm. φ for foundation	50 x 1.20 =60m	65	3900
2.	G.I. Pipe of 15 mm. φ for arches and top M.S Flates 19x8 m	25 x 6 = 150m 25 x 1 = 25m Total = 175m	25	4375
3.	For sides for holding mesh and UV film and front & backside for purlins.	120.00m run 80Kg.	16.50	1320
4.	M.S. L'angle 19x19x3 m for front and end frames and door	28m run 20Kg.	17.50	350
5.	Plastic beading 25 mm width	150 m	4	600
6.	UV stabilised film (200 micron)	175 m^2	20	3500
7.	Mesh 40-60 size all round (1.15 m width)	65 m^2	22	1430
8.	Door frame and fitting			425
9.	Hardware like Bolts and nuts, welding rods, Aluminium oxide, Painting etc.			650
10.	Earth work and concreting of foundation with 1:3:6			400
11.	Labour cost			550
		Total (In Rs.)		17500
		Contractor'sProfit (10%)		1750
		Water Charges (5%)		875
		Total Amount (In Rs.)		**20,125**

[Table 13.1: Measurement and Abstract Sheet of Green House]

13.1.2 Physical Design

As a physical design we have decided to design septic tank.



PLAN

Figure 13.2: Plan of Septic Tank

Sr. no.	Description of Item	Nos.	L(m)	B(m)	H(m)	Quantity
1.	Excavation work upto depth 1.5m	1	3.9	1.5	1.5	8.78
	L = (3*1) + (4*0.2)) + (2*0.05) = 3.9m					
	B = 1+(2*0.2) + (2*0.05) = 1 .5m					
	D = 0.1+0.15+0.3+0.55+0.3+0.1 = 1.5m					
					Total	**8.78 m^3**
2.	P.C.C. (1:3:6) flooring	1	3.9	1.5	0.1	0.59
					Total	**0.59 m^3**
3.	First class brick masonry in C.M. (1:6)					
	Long walls, L=3.9-(2*.05) =3.8m D=1.5-.2=1.3m	2	3.8	0.2	1.3	1.98
	Short walls,	2	1	0.2	1.3	0.52
	Middle walls, D = 1.5-0.1-0.1-0.15=1.15m	2	1	0.2	1.15	0.46
					Total	**2.96 m^3**
4.	R.C.C. slab in proportion (1:2:4)					
	B=1+(2*0.2) = 1.4m	1	3.8	1.4	-	5.32
					Total	**5.32 m^2**
5.	Weight of steel reinforcement in slab					
	volume of concrete of 10cm. slab = 0.532					
	volume of steel 1% of concrete volume = 0.00532					
	weight of steel = volume of steel* density of steel = 41.762 Kg.					
	1% steel is provided				**Total**	**41.76 Kg**

[Table 13.2: Measurement sheet of Septic Tank]

Sr. no.	Description of Item	Quantity	Cost	Per	Amount
1.	Earthwork in foundation up to depth 1.5 m for 8.78 m^2				
	Labor				
	Male coolie	2	400	Day	800
	Female coolie	2	350	Day	700
	Sundries				50
				Total	**1550**
2.	P.C.C. (1:3:6) flooring 0.59 m^3				
	Materials				
	Cement	2	300	Bag	600
	Sand	0.22	800	M^3	176
	Aggregate	0.44	1000	M^3	440
	Sundries				50
				Total	**1266**
	Labor				
	Main mason	1	700	Day	700

	Male coolie	2	400	Day	800
	Female coolie	2	350	Day	700
	Bhistie	1	300	Day	300
				Total	**2500**
3.	First class brick work in CM 1:6 in superstructure 33.849 m^3				
	Materials				
	Brick	1480			
	Add 5% wastage	74			
	Total Brick	1554	4000	1000 Nos.	6216
	Cement	4	300	Bag	1200
	Sand	0.83	800	M^3	670
	Sundries				50
				Total	**8136**
	Labor, Main Mason	1	700	Day	700
	Mason	2	550	Day	1100
	Male coolie	3	400	Day	1200
	Female coolie	3	350	Day	1050
	Bhistie	1	300	Day	300
	Sundries				50
				Total	**4400**
4.	P.C.C. 1:2:4 for 0.53m3				
	Materials				
	Cement	3	300	Bag	900
	Sand	0.189	800	M3	151
	Aggregate	0.379	1000	M3	379
	Sundries				50
				Total	**1480**
	Labor, Main Mason	1	700	Day	700
	Male coolie	2	400	Day	800
	Female coolie	2	350	Day	700
	Bhistie	1	300	Day	300
	Sundries				50
				Total	**2550**
5.	Steel reinforcement in slab				
	20% mild steel	8.35	46	Kg	384
	80% HYSD steel	33.11	50	Kg	1656
				Total	**2040**
		Total (In Rs.)			**25850**
		Add 5% Contingencies			**1292.5**
		Grand Total (In Rs.)			**27142**

[Table 13.3: Abstract Sheet of Septic Tank]

13.1.3 Social Design

As a Social design we have decided to design a bank.

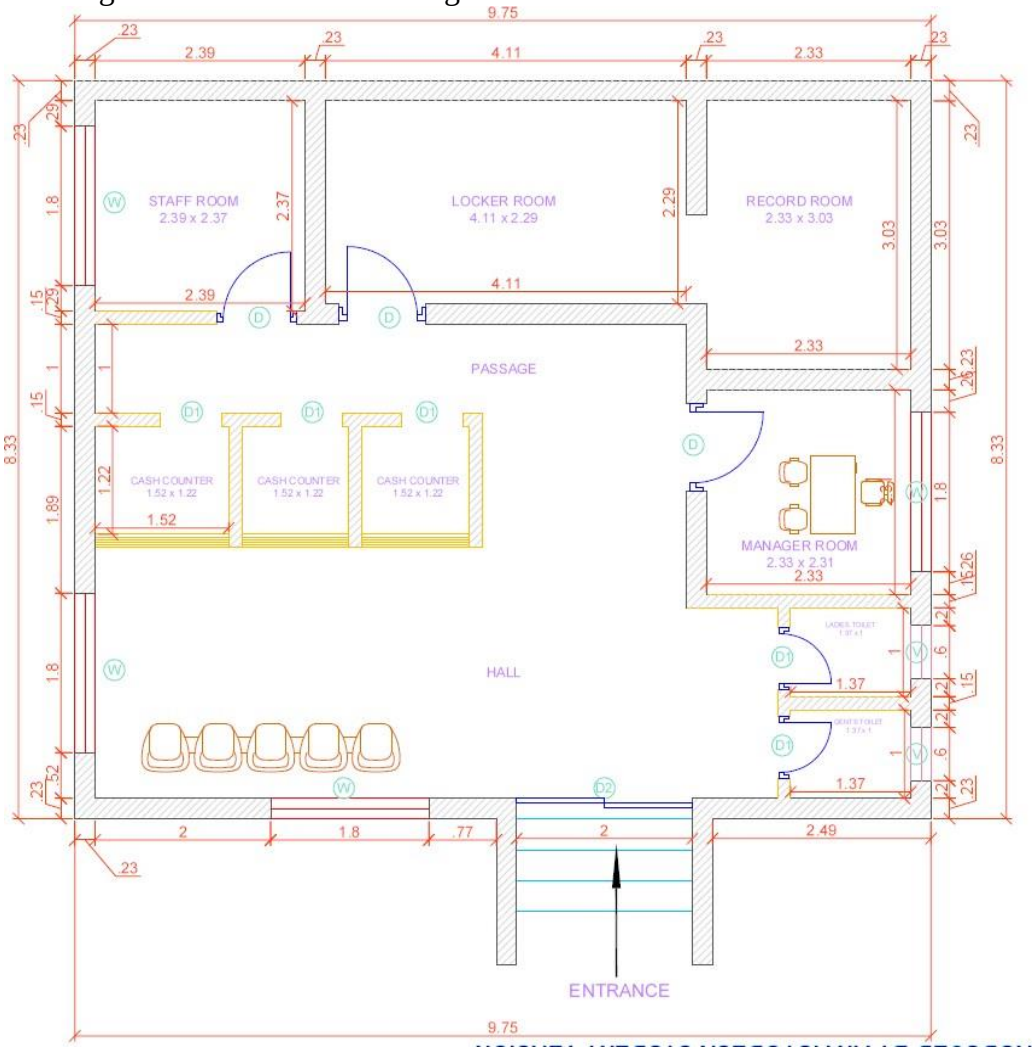


Figure 13.3: Bank

Sr. no.	Description of Item	Nos.	L(m)	B(m)	H(m)	Quantity
1.	Excavation for foundation	-	44.64	0.91	0.84	32.90
					Total	**32.90 m^3**
2.	P.C.C in foundation	-	44.64	0.91	0.30	12.19
					Total	**12.19 m^3**
3.	Brick work in foundation					
	1st step	-	45.84	0.61	0.30	8.39
	2nd steps	-	46.24	0.51	0.20	4.72
	3rd steps	-	46.64	0.41	0.46	8.81
					Total	**21.82 m^3**
4.	Brick work					
	Brick work (9Ⅱ)	-	47.36	0.23	3.50	38.12
	Brick work (4Ⅱ)	-	20.83	0.10	3.50	7.29

					Total	**45.41 m^3**
5.	Deduction from wall					
	D	1	2.13	0.23	2.29	1.12
	D1	3	0.9144	0.23	2.13	1.34
	D2	6	0.76	0.10	1.98	0.90
	W	4	1.52	0.23	1.37	1.92
	W	1	1.52	0.10	1.37	0.21
	W1	2	1.21	0.10	1.37	0.33
	W2	2	0.91	0.10	1.37	0.25
					Total	**12.14 m^3**
6.	R.C.C lintel & chajja					
	Door	1	2.43	0.23	0.15	0.084
	Door1	3	1.21	0.23	0.15	0.125
	Door2	6	1.06	0.23	0.15	0.095
	Window for 9‖	4	1.82	0.23	0.15	0.251
	Window for 4‖	1	1.82	0.10	0.15	0.024
	Window 1	2	0.10	0.23	0.15	0.045
	Window 2	2	0.10	0.23	0.15	0.036
	Ventilation	2	0.76	0.23	0.15	0.052
	Window chajja	4	1.82	0.30	0.15	0.33
	Door chajja	1	2.44	1.52	0.15	0.556
					Total	**1.59 m^3**
7.	Parapet wall					
		1	33.81	0.23	0.91	7.08
					Total	**7.08 m^3**
8.	Plaster					
	Outside plaster	-	34.75	-	4.572	158.86
					Total	**158.86 m^2**
9.	Deduction from outside plaster					
	Door	1	2.13	-	2.29	4.88
	Window	4	1.52	-	1.37	8.33
					Total	**13.21 m^2**
10.	Inner side plaster					
	Staff room	2	2.29	-	3.5	16.03
		2	1.98	-	3.5	13.86
	Locker room	2	4.11	-	3.5	28.77
		2	2.16	-	3.5	15.12
	Record room	2	2.34	-	3.5	16.38
		2	2.57	-	3.5	17.99
	Cash counter	2	1.52	-	3.5	10.64
		2	1.22	-	3.5	8.54
	Office (1)	4	1.22	-	3.5	17.03
	Office (2)	2	1.22	-	3.5	8.54

		2	0.91	-	3.5	6.37
	Manager office	2	2.34	-	3.5	16.38
		2	2.13	-	3.5	14.91
	Gents' toilet	2	1.37	-	3.5	9.59
		2	0.96	-	3.5	6.72
	Ladies' toilet	2	1.37	-	3.5	9.59
		2	1.066	-	3.5	7.46
	Bank hall	2	6.86	-	3.5	48.02
		2	2.44	-	3.5	17.08
	Front of staff room	2	4.27	-	3.5	29.89
		2	2.64	-	3.5	18.48
	Parapet	2	9.52	-	0.91	17.33
		2	7.39	-	0.91	13.45
					Total	**368.22 m^2**
11.	Ceiling plaster					
	Staff room		2.29	1.98		4.53
	Locker room		4.11	2.16		8.86
	Record room		2.34	2.57		6.01
	Cash counter		1.52	1.22		1.85
	Office (1)		1.22	1.22		1.49
	Office (2)		1.22	0.91		1.11
	Manager office		2.34	2.13		4.98
	Gents' toilet		1.37	0.96		1.32
	Ladies' toilet		1.37	1.066		1.46
	Bank hall		6.86	2.44		16.73
					Total	**48.34 m^2**

[Table 13.4: Measurement sheet of bank]

Sr.no.	Description of Item	Quantity	Rate	Unit	Amount
1.	Excavation	32.90	85	M^3	2796
2.	PCC	12.92	3200	M^3	39008
3.	Brick work in foundation	21.82	3200	M^3	69824
4.	Brick work in super structure	43.55	3500	M^3	141225
5.	RCC work in slab, lintel & chajja	12.74	8800	M^3	112112
6.	Plaster work in c.m. (1:3) for inside & outside & celling	562.21	150	M^2	84331
7.	Wood work for door and window	35.94	7800	M^2	280332
8.	Marble flooring	49.91	500	M^2	24955
9.	Cement	101	350	Bag	35350
10.	Sand	5.28	800	M^3	4224
11.	Aggregate	10.56	1000	M^3	10560
12.	Bricks	31320	4	Nos.	125280
13.	Steel (HYSD)	525	50	Kg.	26250

14.	Binding wire	5.25	20	Kg.	105
		Add 3% of contingencies			14,345.30
		Add 2% of water charge			28,690.59
		Add 5% of plumbing charge			47,817.65
		Add 10% of electric charge			95,635
		Grand Total (In Rs.)			**9,56,353/-**

[Table 13.5: Abstract sheet of bank]

13.1.4 Socio-cultural design

As a socio-cultural design we have decided to design post office.

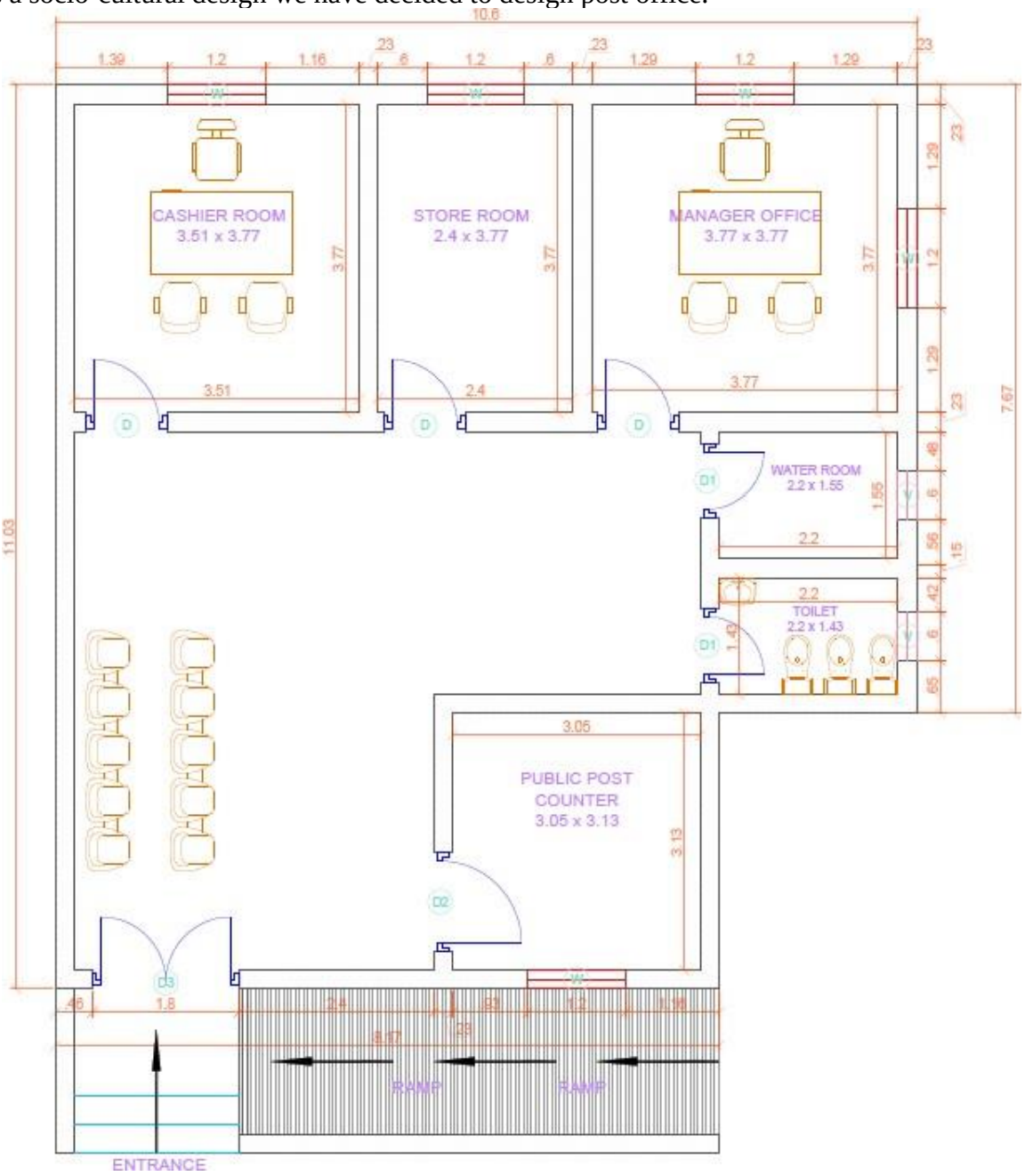


Figure 13.4: Post office

Sr.no.	Description of Item	Nos.	L(m)	B(m)	H(m)	Quantity
1.	Excavation Hor. o/o 2*11.2 = 22.4 Ver. i/i 2*9.90 = 19.8 Total = 42.2 m	1	42.2	0.9	1.2	45.8
					Total	**45.58 m^3**
2.	B.B.C.C (1:6:12) in Foundation	1	42.2	0.9	0.3	11.47
					Total	**11.47 m^3**
3.	First class brick masonry up to plinth in C.M. (1:6)					
	Step-1	1	42.2	0.6	0.2	5.06
	Step-2	1	42.2	0.5	0.2	4.22
	Step-3	1	42.2	0.4	0.2	3.38
	Upto plinth	1	42.2	0.23	0.7	6.79
					Total	**19.45 m^3**
4.	Sand filling in plinth					
	Cashier room	1	3.4	3.6	0.6	7.34
	Store room	1	2.3	3.6	0.6	4.97
	Manager office	1	3.5	3.6	0.6	7.56
	Water room	1	2.1	1.45	0.6	1.83
	Toilet	1	2.1	1.33	0.6	1.68
	Public post	1	3.1	3.1	0.6	5.77
	Other area					21.87
					Total	**51.023 m^3**
5.	First class brick masonry in super structure in C.M. (1:6)					
	Hor. o/o 2*11.2 = 22.4 Ver. i/i 2*9.90 = 19.8 Total = 42.2 m	1	42.2	0.23	3.95	38.34
	Internal walls	1	31.68	0.23	3.95	28.78
	Deduction					
	Door	1	2.14	0.23	2.14	1.05
	Door 1	1	1	0.23	2.14	0.49
	Door 2	5	0.91	0.23	2.14	2.24
	Window	3	0.91	0.23	1.4	0.29
	Window 1	4	1.22	0.23	1.4	0.39
	Ventilator	1	0.7	0.23	1.4	0.23
					Total	**62.43 m^3**
6.	10 cm brick partition wall	1	42.66	-	0.9	38.39
					Total	**38.39 m^2**
7.	Wooden doors with oxide copper fastening & fixtures					
	Door	1	2.14	-	2.14	4.58
	Door 1	1	1	-	2.14	2.14
	Door 2	5	0.91	-	2.14	9.74

	Window	3	0.91	-	1.4	1.27
	Window 1	4	1.22	-	1.4	1.71
					Total	**20.35 m^2**
8.	C.C. Jali	1	0.7		1.4	0.98
					Total	**0.98 m^2**
9.	10 cm R.C.C slab portion (1:1.5:3)	1	10.53	7.6		80.03
		1	8.09	3.43		27.75
					Total	**107.78 m^2**
10.	12 mm thick single coat cement plaster in c.m. (1:4)					
	Cashier room	2	3.74	3.6	-	13.46
		2	3.7	3.6	-	13.32
	Store room	2	2.4	3.6	-	8.64
		2	3.7	3.6	-	13.32
	Manager office	2	3.6	3.6	-	12.96
		2	3.7	3.6	-	13.32
	Water room	2	2.2	1.45	-	3.19
		2	1.15	1.45	-	1.66
	Toilet	2	2.2	1.33	-	2.92
		2	1.43	1.33	-	1.90
	Public post	2	3.2	3.1	-	9.92
		2	3.2	3.1	-	9.92
	Other area	1				10.84
					Total	**241.80 m^2**
	Deduction:					
	Door	1	2.14	2.14	-	2.29
	Door 1	1	1	2.14	-	2.14
	Door 2	5	0.91	2.14	-	1.95
	Window	3	0.91	1.4	-	1.27
	Window 1	4	1.22	1.4	-	1.71
	Ventilator	1	0.7	1.4	-	0.98
					Total	**231.46 m^2**
11.	Double coat sand faced plaster to external walls					
	Horizontal walls	2	10.76	-	3.05	65.63
	Vertical walls	2	8.09	-	3.05	49.35
					Total	**114.98 m^2**
	Deduction:					
	Door	1*0.5	2.14	-	2.14	2.29
	Window	3*0.5	0.91	-	1.4	0.64
	Window 1	4*0.5	1.22	-	1.4	0.9
	Ventilator	1*0.5	0.7	-	1.4	0.49
					Total	**110.66 m^2**

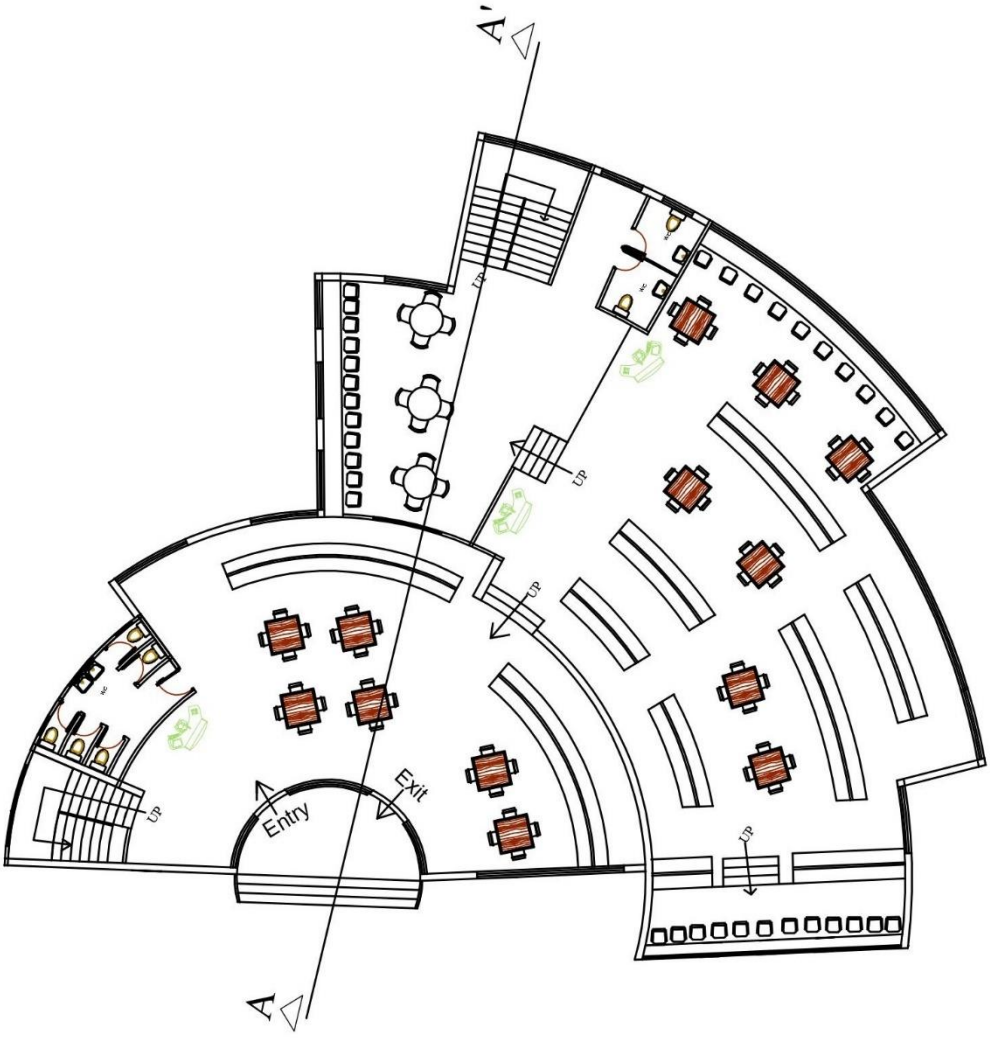
[Table 13.6: Measurement sheet of post office]

Sr. no.	Description of Item	Quantity	Per	Rate	Amount
1.	Excavation	45.58	M^3	220	10027.60
2.	B.B.C.C (1:6:12) in Foundation	11.39	M^3	2620	29841.80
3.	First class brick masonry up to plinth in C.M. (1:6)	19.45	M^3	3850	74882.50
4.	Sand filling in plinth	51.023	M^3	1930	98474.20
5.	First class brick masonry in super structure in C.M. (1:6)	62.43	M^3	3950	2,46,598.5
6.	10 cm brick partition wall in C.M. (1:4)	38.39	M^3	465	17,851.0
7.	Wooden doors with oxide copper fastening & fixtures	20.35	M^3	7400	1,50,590
8.	C.C. Jali	0.98	M^2	550	539
9.	10 mm R.C.C slab portion (1:1.5:3)	107.78	M^2	1630	1,75,681.4
10.	12 mm thick single coat cement plaster in C.M. (1:4)	241.8	M^2	185	44,733
11.	Double coat sand faced plaster to external walls	110.66	M^2	400	44,264
12.	Indian W.C. Pans with a pair of footrests	1	Nos.	3350	335
13.	Foot rests	1	Pair	450	450
14.	P.V.C. flushing cistern for W.C.	1	Nos.	2800	2800
15.	P.V.C. automatic flushing tank for Urinals	1	Nos.	2000	2000
16.	Nanny traps	1	Nos.	300	300
				Total (In Rs.)	**8,98,802.7**
				Add 5% Contingencies	44,940.13
				Grand Total (In Rs.)	**9,43,743.00**

[Table 13.7: Abstract sheet of post office]

13.1.5 Smart Design

As a Smart design we have decided to design Library.



GROUND FLOOR PLAN

Figure 13.5: Plan of Public Library

Sr. No.	Description of Item	No.	Length (m)	Width (m)	Height (m)	Quantity (m^3)
1	Earthwork in Excavation in Foundation:					
	Footing, Depth from GL = 0.6 + 1 + 0.6	16	2.20	2.20	1.00	77.44
	0.6 = Extra For working space					
		Total Qty. of Excavation =				**77.44**
2	Footing PCC with 1:3:6 Ratio					
	Footing, Thickness = 0.075	16	1.300	1.300	0.075	2.03
	D = 0.150 + 1.0 + 0.150					
		Total Qty. of Footing PCC =				**2.03**

3	Footing RCC with 1:1.5:3 Ratio					
	Footing, Thickness=0.6m	16	1.000	1.000	0.600	9.60
		Total Qty. of Footing RCC =				**9.60**
4	Column up to Plinth Level RCC					
	Column 1:1.5:3 Mix Ratio	16	0.230	0.460	0.330	0.56
		Total Qty. of Footing Column =				**0.56**
5	Plinth Beam RCC with 1:1.5:3 Ratio					
		1	59.440	0.230	0.450	6.15
		Total Qty. of Plinth Beam =				**6.15**
6	Back-filling					
6a	Back-filling In Footing					
	Excavation Area	16	2.200	2.200	1.000	77.44
	Deduction					
	Footing P.C.C	-16	1.300	1.300	0.075	-2.03
	Footing RCC	-16	1.000	1.000	0.600	-9.60
	Footing Column	-16	0.230	0.460	0.330	-0.56
		6a Total Qty. =				65.81
6b	Back Filling from Ground Level to L.C. Bed below Level					
	Plinth area in to in	1	14.740	11.840	0.200	34.90
		-1	7.120	1.300	0.200	-1.85
		-1	1.610	1.380	0.200	-0.44
		6b Total Qty. =				32.61
		Total Qty. of Back Filling of 6a + 6b =				**98.42**
7	L.C. Bed RCC with 1:1.5:3 Ratio					
		1	14.740	11.840	0.200	34.90
		-1	7.120	1.300	0.200	-1.85
		-1	1.610	1.380	0.200	-0.44
		Total Qty. of L.C. Bed =				**32.61**
8	Brick Masonry with 1:4 Ratio					
8a	0.23m thick wall Brick Masonry	1	79.330	0.230	3.200	58.39
	Deduction					
	Window W	-1	5.190	0.230	1.520	-1.81
	Window W1	-3	1.830	0.230	1.200	-1.52
	Window W2	-5	1.200	0.230	1.200	-1.66
	Window W3	-2	0.600	0.230	1.200	-0.33

	Vent V	-2	0.600	0.230	0.600	-0.17
	M.D.	-1	1.200	0.230	2.100	-0.58
	Door D1	-4	0.900	0.230	2.100	-1.74
	Door D2	-2	0.750	0.230	2.100	-0.72
		8a Total Qty. =				49.86
8b	0.1m thick wall Brick Masonry	1	9.820	0.100	3.200	3.14
	Deduction					
	Door D2	-6	0.750	0.100	2.100	-0.95
		8b Total Qty. =				2.20
		Total Qty. of 8a + 8b Walls =				**52.06**
9	Chhajja with 1:1.5:3 RCC Ratio					
		2.00	2.140	0.540	0.150	0.35
		2.00	4.270	0.540	0.150	0.69
		Total Qty. of Chajjas =				**1.04**
10	Slab with 1:1:2 RCC Ratio					
	0.15m Thick Slab	1	15.200	12.300	0.150	28.04
		-1	6.660	1.070	0.150	-1.07
		-1	1.380	0.920	0.150	-0.19
		Total Qty. of Slab =				**26.78**
11	Parapet Wall					
		1	58.890	0.230	1.000	13.54
		Total Qty. of Parapet Wall =				**13.54**
12	Internal Plaster with 1:4 Ratio					
	15mm thick	1	114.990	0.015	3.100	5.35
	Deduction					
	Window W	-2	1.800	0.015	1.520	-0.08
	Window W1	-3	1.520	0.015	1.200	-0.08
	Window W2	-5	1.200	0.015	1.200	-0.11
	Window W3	-2	0.900	0.015	1.200	-0.03
	Vent V	-2	1.200	0.015	0.600	-0.02
	M.D.	-1	0.910	0.015	2.100	-0.03
	Door D1	-8	0.750	0.015	2.100	-0.19
	Door D2	-16	0.600	0.015	2.100	-0.30
		Total Qty. of Internal Plaster =				**4.50**
13	External Plaster with 1:4 Ratio					
	25mm Thick	1	60.040	0.025	4.800	7.20

	Deduction					
	Window W1	-3	1.830	0.025	1.200	-0.16
	Window W2	-5	1.200	0.025	1.200	-0.18
	Window W3	-2	0.600	0.025	1.200	-0.04
	Vent V	-2	0.600	0.025	0.600	-0.02
	M.D.	-1	1.200	0.025	2.100	-0.06
		Total Qty. of External Plaster =				**6.74**

[Table 8.8: Quantity Sheet for Public Library]

(Rate as per SOR 2015-16 R &B)

Sr. no.	Description of Item	Qty.	Rate/Per	Amount
1.	Earthwork in Excavation in Foundation: 1.0 x 1.0 x 1.0 M^3	77.44	280 m^3	21,683.00
2.	Footing P.C.C. with 1:3:6 Ratio	2.03	2507 m^3	5090.00
3.	Footing R.C.C. with 1:1.5:3 Ratio	9.60	1500 m^3	14,400.00
4.	Column up to Plinth Level R.C.C.	0.56	5000 m^3	2800.00
5.	Plinth Beam RCC with 1:1.5:3 Ratio	6.15	2000 m^3	12,300.00
6.	Back-filling 6(A) & 6(B)	98.42	125 m^3	12,303.00
7.	L.C. Bed RCC with 1:1.5:3 Ratio	32.61	150 m^3	4892.00
8.	Brick Masonry with 1:4 Ratio 0.23 MT. Thick Wall	49.86	2443 m^3	1,21,808.00
9.	Brick Masonry with 1:4 Ratio 0.10 MT. Thick Wall	2.20	2443 m^3	5375.00
10.	Chhajja with 1:1.5:3 R.C.C. Ratio	1.04	2000 m^2	2080.00
11.	Slab with 1:1:2 R.C.C. Ratio	26.78	3236 m^2	86,660.00
12.	Parapet Wall	13.54	2443 m^3	33,078.00
13.	Internal Plaster with 1:4 Ratio	355.63	118 m^2	41,965.00
14.	External Plaster with 1:4 Ratio	287.73	230 m^2	66,178.00
15.	Providing and Fixing white vitrified flooring policing etc. comp.	160.27	720 m^2	1,15,395.00
16.	W/S and sanitation work	6 nos. W.C.	550/pc	3300.00
		2 nos. Wash Basin	1050/pc	2100.00
			Total (In Rs.) =	**5,51,407.00**

[Table 8.9: Abstract Sheet for Public Library]

13.1.6 Heritage design

As a Heritage design we have decided to design Museum.

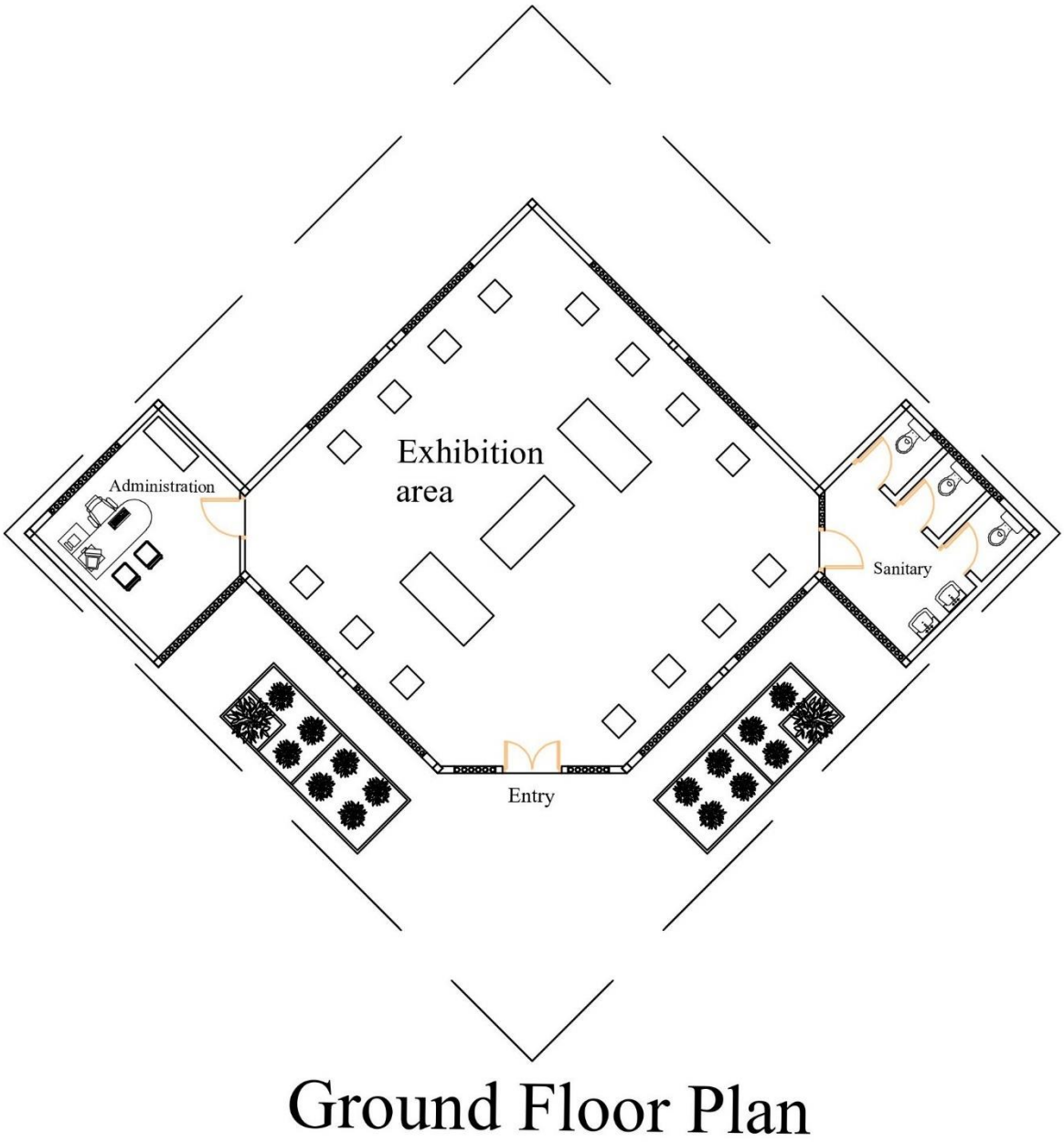


Figure 13.6: Plan of Museum

Sr. No.	Description of Item	Nos.	Length (m)	Width (m)	Height (m)	Quantity (m^3)
1.	Excavation in Foundation Net Centre line length = 48.92 - (0.5*0.9*2) = 48.02m	1	48.02	0.9	1.1	**47.54**
2.	P.C.C. in foundation (1:4:8)	1	48.02	0.9	0.2	**8.64**
3.	Brickwork in foundation up to plinth					

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

[Table 8.10: Quantity Sheet for Museum]

Sr. No.	Description of Item	Qty.	Rate	Per	Amount
1.	Excavation in foundation	47.54	85	m^3	4040.9
2.	Brick bat cement concrete in foundation	8.64	3200	m^3	27648
3.	First class brickwork up to plinth in C.M. 1:6	29.5	3200	m^3	67584
4.	Brickwork in super structure	43.76	3500	m^3	153160
5.	Brickwork for parapet wall	31.78	3500	m^3	95515
6.	RCC work for slab	16.05	8800	m^3	141240
7.	Smooth plaster on inside walls and ceiling in C.M. 1:3	192.90	150	m^2	28935
				Total (In Rs.)	527432.9
				Add 5% contingencies	26371.64
				Grand total (In Rs.)	**5,53,805**

[Table 8.11: Abstract Sheet for Museum]

13.2 Reason for Students Recommending this Design

The above mentioned all designs are real-time requirement cases. As we have studied and watched the situation of the above-mentioned village Ragnpar (Bela), We found that some facilities must be there in case of making Smart village and **"Aatmnirbhar Bharat".**

From our analysis and with help of Gram Panchayat, we finalize that the design of following is suitable for the village. So, we have to decide the design of Green House, Septic Tank, Public Bank, Post-Office, Public Library and Museum.

13.3 About designs Suggestions / Benefit of the villagers

Green House is building designed for the protection of tender or out-of-season plants against excessive cold or heat,

Septic Tank for purpose to Store the water. Sewer lines can occasionally leak raw sewage and contaminate groundwater. Because a septic system doesn't run through a sewer system, there's less of a risk for leakage. Plus, it uses a natural filtration system that minimizes pollution,

Public Bank is used to save the Rs. of the people & people can easily withdrawal or deposit money in bank, etc.,

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. 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). etc.,

Due to **Museum (Heritage Place)** there are several particular benefits to the village & some of them are mention here:

1. Museums are institutions created in the public interest. They engage their visitors, foster deeper understanding and promote the enjoyment and sharing of authentic cultural and natural heritage.

2. Travel's & Tourism business have some positive exposure.

3. Hotels & restaurant business have also benefit from the visitors.

4. Museums acquire, preserve, research, interpret and exhibit the tangible and intangible evidence of society and nature.

Chapter :14
Technical options with case studies

14.1 Civil Engineering

14.1.1 Advanced Earthquake Resistant

- Earthquake-resistant structures are structures designed to protect buildings from earthquakes.
- The goal of earthquake-resistant construction is to erect structures that fare better during seismic activity than their conventional counterparts.
- According to building codes, earthquake-resistant structures are intended to withstand the largest earthquake of a certain probability that is likely to occur at their location.
- Currently, there are several design philosophies in earthquake engineering, making use of experimental results, computer simulations and observations from past earthquakes to offer the required performance for the seismic threat at the site of interest.
- Among the most important advanced techniques of earthquake resistant design and construction are:
- Base Isolation
- Energy Dissipation Devices

➢ **Base Isolation**

- The simplest form of base isolation uses flexible pads between the base of the building and the ground.
- When the ground shakes, inertia holds the building nearly stationary while the ground below oscillates in large vibrations.
- Thus, no force is transferred to the building due to the shaking of the ground. The flexible pads are called base-isolators and structures using these devices are called base-isolated buildings.

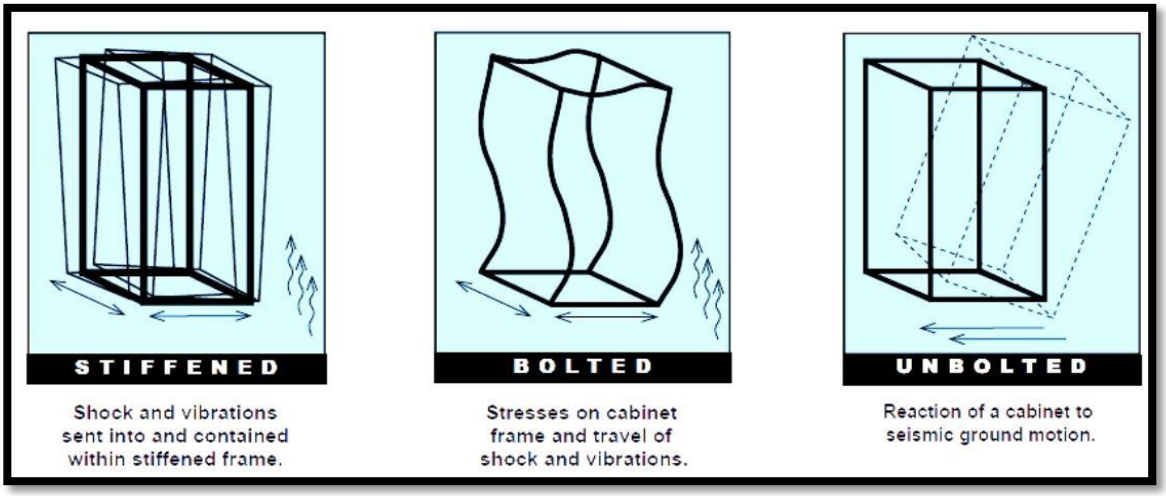


Figure 14.1: Base Isolation method

- **Working Principle**
  - When an earthquake vibrates a building with a fixed foundation, the ground vibration istransmitted to the building.
  - The buildings displacement in the direction opposite the ground motion is actually due toinertia.
  - In addition to displacing in a direction opposite to ground motion, the un-isolated building isdeformed.
  - If the deformation exceeds the constraints of the building design, the structure of the buildingwill fail.
  - This failure often occurs in the ground floor because most of the building ‘s mass is above that level. Also, many buildings have ‒soft‖ ground floors with many windows or unreinforced spaces for parking or lobbies.

- **Types of Bearings**
  - Lead-rubber bearings are frequently used for base isolation. A lead rubber bearing is made from layers of rubber sandwiched together with layers of steel. The bearing is very stiff and strong in the vertical direction, but flexible in the horizontal direction.
  - Spherical sliding isolation uses bearing pads that have a curved surface and low-friction materials similar to Teflon. During an earthquake the building is free to slide both horizontally and vertically on the curved surfaces and will return to its original position after the ground shaking stops. The forces needed to move the building upwards limit the horizontal or lateral forces that would otherwise cause building deformations.

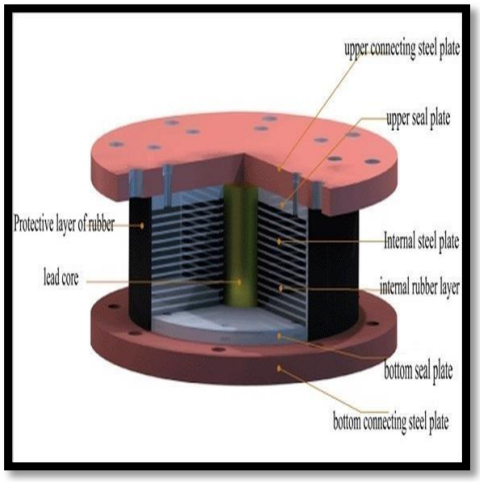


Figure 14.2: Lead rubber bearing

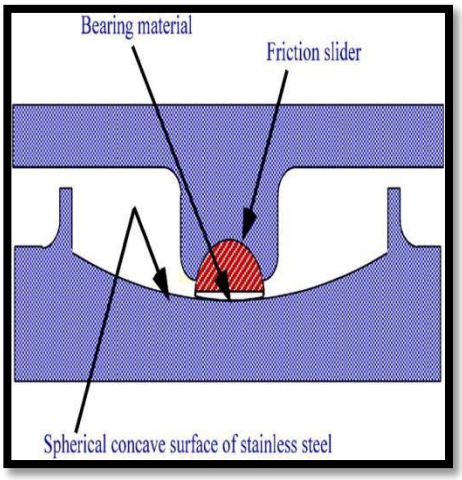


Figure 14.3: Spherical sliding bearing

- **Energy Dissipation Devices**
  - Another approach for controlling seismic damage in buildings is to install Seismic Dampers in place of some structural elements, such as diagonal braces.

- These dampers act like the hydraulic shock absorbers in cars that absorb sudden jerks. Whenseismic energy is transmitted through them, dampers absorb part of the energy, thus dampingthe vibration of the building.
- By equipping a building with devices that have high damping capacity, the seismic energy entering the building is greatly decreased.

➢ **Commonly used Energy Dissipation Devices**

- Viscous Dampers (energy is absorbed by silicone-based fluid passing between piston cylinder arrangement).
- Friction Dampers (energy is absorbed by surfaces with friction between them rubbingagainst each other).
- Yielding Dampers (energy is absorbed by metallic components that yield).
- Viscoelastic dampers (energy is absorbed by utilizing the controlled shearing of solids).

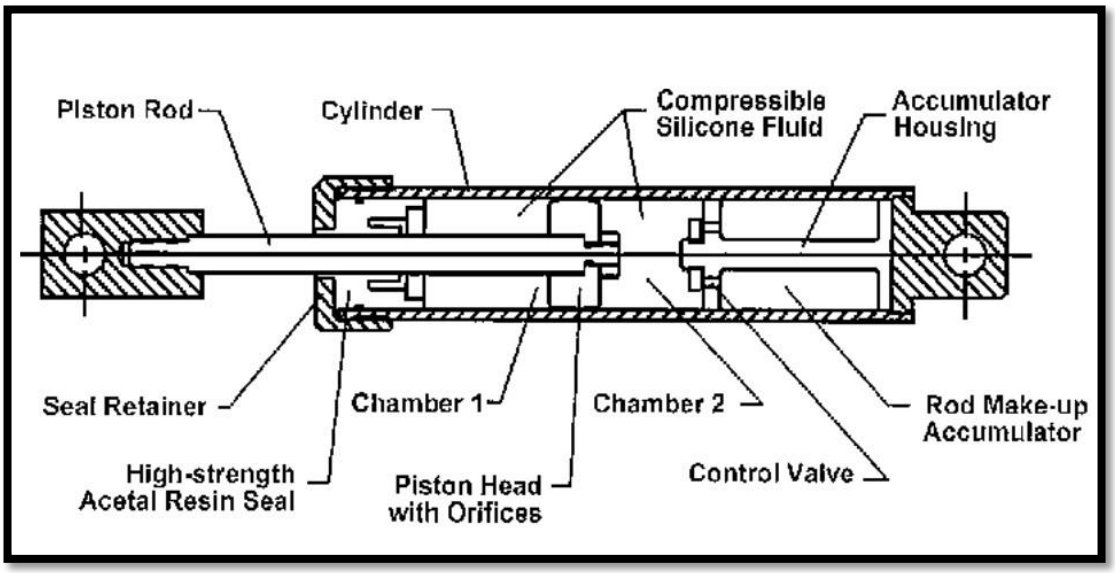


Figure 14.4: Cross section of a viscous fluid damper

14.1.2 Seismic Retrofitting of Buildings

➢ **Seismic Retrofitting of Buildings -**

- It is the modification of existing structures to make them more resistant to seismic activity,ground motion or soil failure due to earthquake.
- The retrofit techniques are also applicable to other hazardous conditions such as tropicalcyclones, tornadoes and severe winds from thunderstorms.

➢ **When seismic retrofitting is needed -**

- Earthquake damaged buildings
- Earthquake-vulnerable buildings (with no exposure to severe earthquakes)

- **Retrofit Performance Objectives -**
  - Public safety only: The goal is to protect human life, ensuring that the structure will not collapse upon its occupants or passersby, and that the structure can be safely exited. Under severe seismic conditions the structure may be a total economic write-off, requiring tear- down and replacement**.**
  - Structure survivability: The goal is that the structure, while remaining safe for exit, may require extensive repair (but not replacement) before it is generally useful or considered safe for occupation. This is typically the lowest level of retrofit applied to bridges.
  - Structure functionality: Primary structure undamaged and the structure is undiminished in utility for its primary application.
  - Structure unaffected: This level of retrofit is preferred for historic structures of high cultural significance.

- **Retrofitting techniques -**

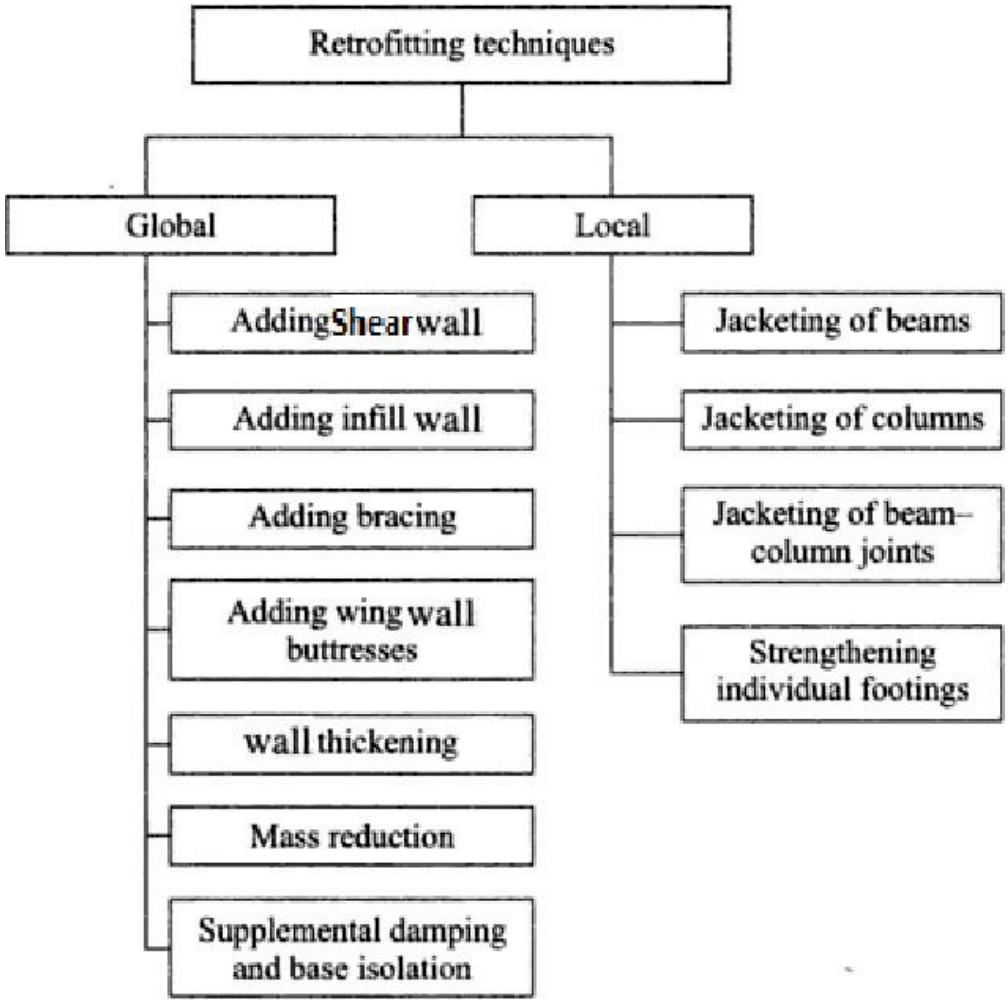


Table 14.1: Retrofitting Techniques

- **Adding new shear wall -**
  - Frequently used for retrofitting of non-ductile RC frame buildings.
  - The added elements can be either cast in place or pre cast concrete elements.
  - New elements preferably be placed at the exterior of the buildings.
  - Not preferred in the interior of the structure to avoid interior mouldings.
- **Adding steel bracing -**
  - An effective solution when large openings are required.
  - Potential advantages for the following reasons:
  - higher strength and stiffness
  - opening for natural light
  - amount of work is less since foundation cost may be minimized
  - adds much less weight to the existing structure.

Figure 14.5: Additional shear wall

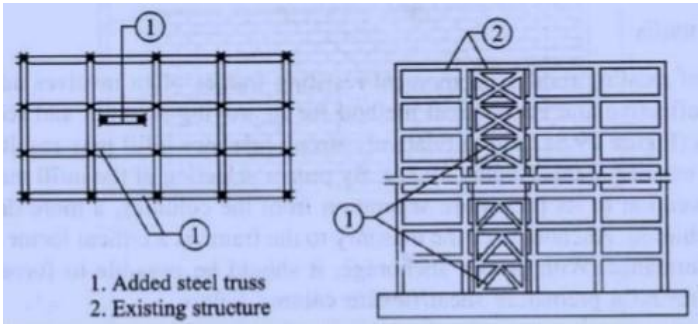


Figure 14.6: Additional steel bracing

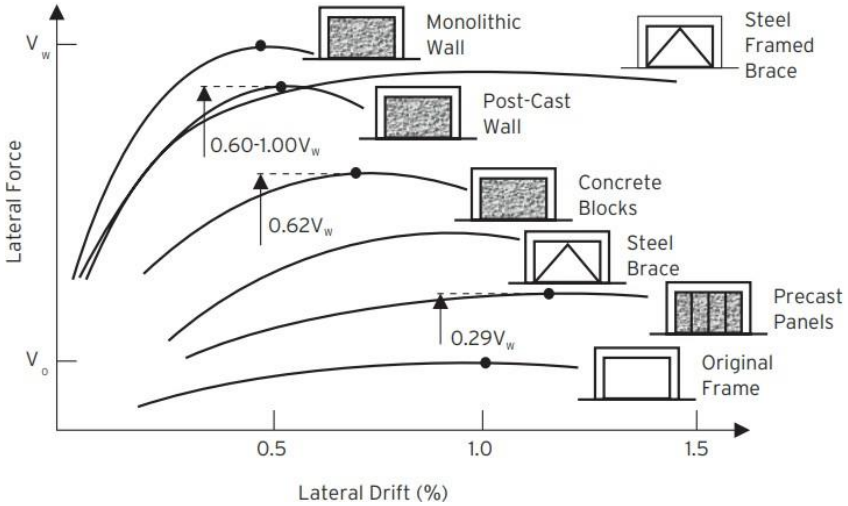


Figure 14.7: Effect of adding shear wall and bracing

- **Jacketing -**
  - Most popular method for strengthening of building columns
  - Steel jacket,

- Reinforced Concrete jacket,
- Fiber Reinforced Polymer Composite (FRPC) jacket
- Purpose for jacketing:
- To increase concrete confinement
- To increase shear strength
- To increase flexural strength

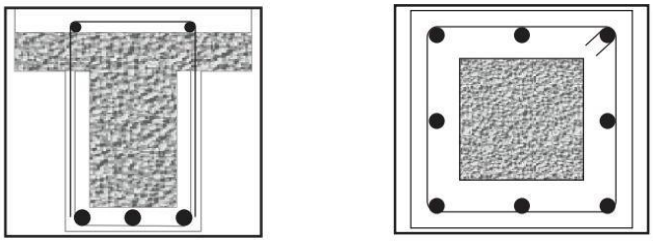


Figure 14.8: beam and column jacketing

- **Retrofit of Structures using Innovative Materials -**
  - Current research on advanced materials has mainly concentrated on FRP composites.
  - Studies have shown that externally bonded FRP composites can be applied to various structural members including columns, beams, slabs, and walls to improve their structuralperformance such as stiffness, load carrying capacity, and ductility.

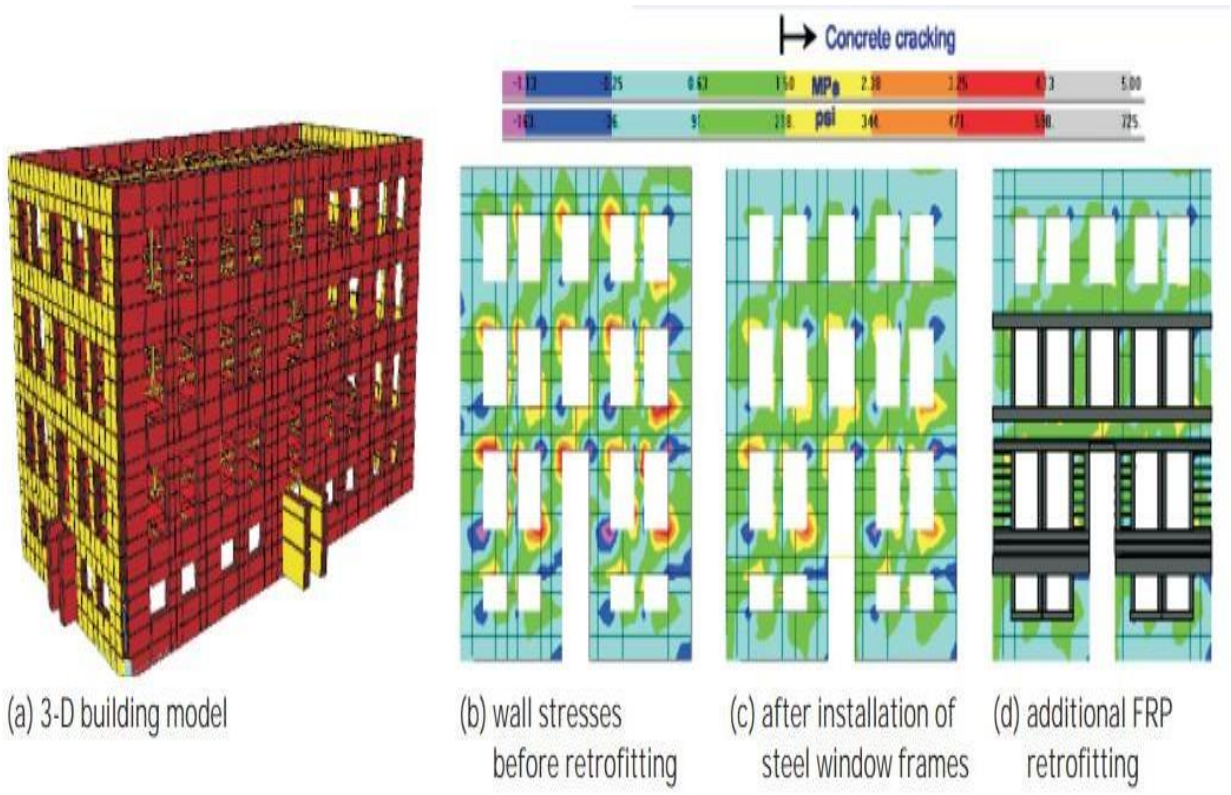


Figure 14.9: A Retrofit Application combining Conventional and Composites Retrofitting

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

- **Modern construction materials:**

1. **Prefabricated Laminated Timber -**
   - Considered the wood of the future, this type ofwood is more resistant to water and is stronger than conventional timber from trees. The prefabricated wood is used to support skyscrapers, and help reduce carbon emissions with every story raised.
   - Many of the top construction companies in the world are using this and other prefabricationmethods to increase sustainability and reduce costs.

Figure 14.10: Prefabricated laminated Timber

2. **Self-Healing Concrete -**
   - Self-healing concrete is saving contractors a lot of time and labor. The concrete is engineered with water-activated bacteria which heal cracks by producing calcite. By using this type of concrete, you reduce infrastructure maintenance, and you reduce theproduction of greenhouse gases. Simply put, you can build faster, and the structures will last for about 200 years.

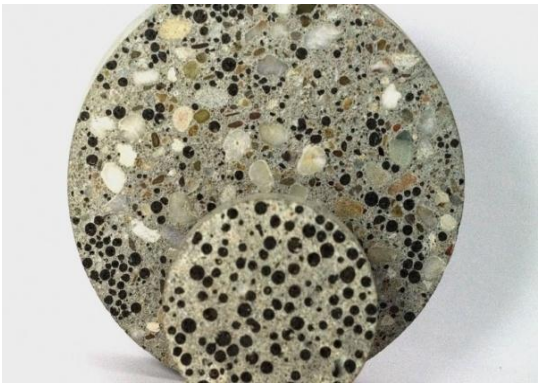


Figure 14.11: Self-healing concrete

3. **3D Graphene -**
   - 3D graphene is coming to replace steel. Steel is not only heavy but also expensive to buy. 3D graphene is only 5 percent of the weight of steel but offers up to200 times the strength of steel. With the added strength, contractors can build skyscrapers more than 98k feet high. Again, the material can be used in the manufacture of lighter and more fuel-efficient vehicles.

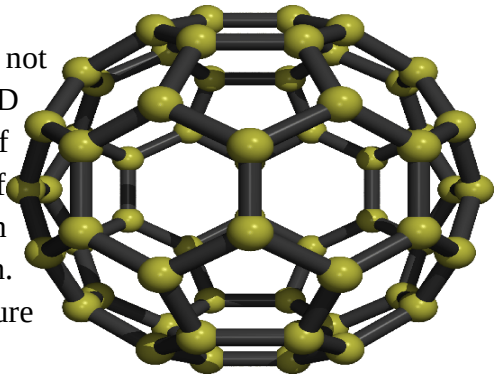


Figure 14.12: 3D Grapheme

4. **Transparent Aluminum -**
   - One of the new building materials for homes is a ceramic alloy that is almost 2x harder than sapphire. Thematerial does not corrode and is resistant to radiationand oxidation. You can use it in the creation of stronger windows for homes, and domes for space and undersea vehicles.

Figure 14.13: Transparent Aluminum

5. **Bioreactors -**
   - As the world moves towards renewable sources of energy, new building materials for houses are all geared towards sustainability. These bioreactors are algae-infused wall panels that undergo synthesis to create energy. The new sustainable building materials are ideal when you need to create buildings with great thermal regulation and which are more self-reliant.

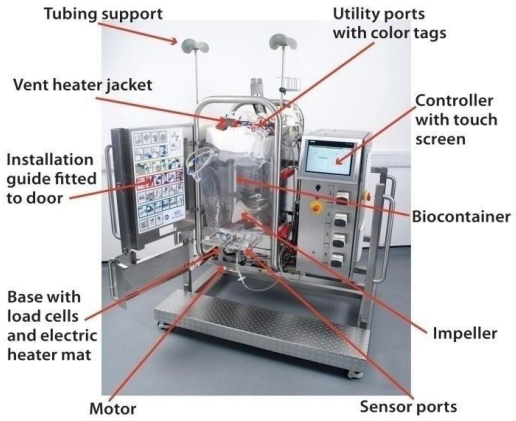


Figure 14.14: Bio-reactor

6. **Invisible Solar Cells -**
   - You can generate energy at home without having huge solar panels. Invisible solar cells produce power bypushing wavelengths of light to cells at the edges. You can use these new home building materials to generate energy from any component of a building, including doors and windows. It is one of the new building materials in architecture that will save you money on electricity bills.

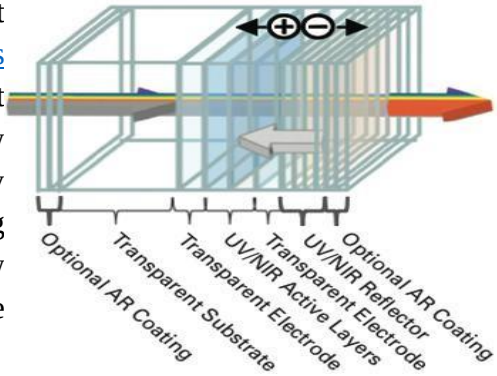


Figure 14.15: Invisible solar cells

7. **Synthetic Spider Silk -**
   - The synthetic spider silk is up to 340x longer lastingcompared to steel. Again, it contains resonance propertiesmaking it ideal for use in most buildings. Variants of this material can be used in acoustic building tiles and laboratories.

Figure 14.16: Synthetic spider silk

8. Aluminum Foam -

- This is one of the new sustainable building materials that are 100 percent recyclable. The material is developed when air is injected with molten metal to create a porous material. The aluminum foam is strong and lightweight and can be used to create durable building cladding and decorative features on buildings.

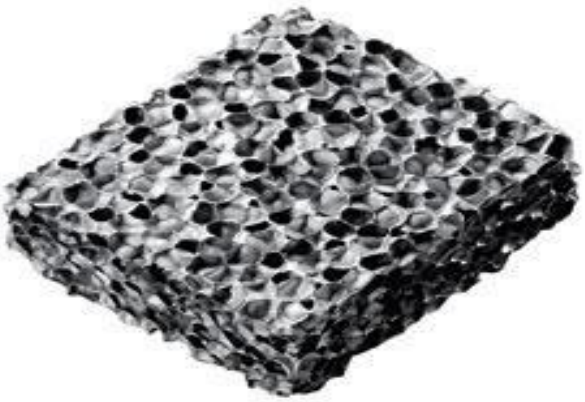


Figure 14.17: Aluminum Foam

9. Nanocrystal -

- Nanocrystal comes to make smart windows even smarter. The new home building materials are made with crystalline nanoparticles, which allow in natural light while blocking heat. The materials are ideal when you need to have more light into your home but reduceHVAC costs.

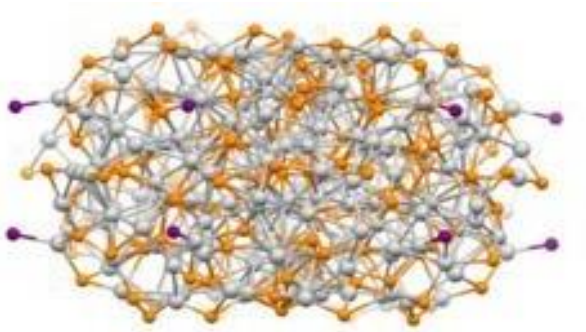


Figure 14.18: Nano crystal

10. Translucent Wood -

- This wood can also be termed as the ―future of wood‖ as it will be used for different applications. When used on structures, it offers better insulation, it is stronger than conventional wood, and it is biodegradable.
- You can use the wood in solar panels, on windows as replacements for glass, for natural indoor lighting, and contemporary structures. The wood is 90 percent transparent.

Figure 14.19: Translucent wood

11. Illuminating Concrete -

- When used on buildings, illuminating concrete will glow at night, making your building look aesthetically pleasing. The non-flammable concrete is engineered with minuscule glass balls that glow when they reflect light. You can use the concrete to create signage systems, lighting underground spaces, marking dangerous areas, and on artistic buildings.

Figure 14.20: Illuminating concrete

12. Wool Brick -

- Instead of using conventional earth bricks, you can use wool bricks, which are 37x stronger but lighter. The bricks are a fusion of wool and seaweed polymer. Whenused in buildings, the bricks reduce the emission of greenhouse gases as they do not need firing as is required with traditional bricks.

Figure 14.21: Wool bricks

➢ **Advanced construction Equipment's:**

1 Excavators -

- 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 theend 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 360^{o} which eases the operation. Excavators are available in both wheeled and tracked forms of vehicles.

Figure 14.22: Excavators

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 belowthe machine level and using front bucket loading, unloading and lifting of materials can be done.

Figure 14.23: Back hoe

3 Dragline Excavator -

- Dragline excavator is another heavy equipment used in construction which is generally used for larger depth excavations. It consists a long length boom and digging bucket is suspended from the top of the boom using cable.
- For the construction of ports, for excavations under water, sediment removal in water bodies etc. can be done by dragline excavator.

Figure 14.24: Dragline Excavator

4 Bulldozers -

- 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.

Figure 14.25: Bulldozers

5 Graders -

- Graders also called as motor graders are another type of equipment used in construction especially for the construction of roads. It is mainly used to level the soil surface. It contains a horizontal blade in between front and rear wheels and this blade is lowered in to the ground while working. Operating cabin is provided on the top of rear axle arrangement.

Figure 14.26: Graders

6 Wheel Tractor Scrapers -

- Wheel Tractor Scrapers are earth moving equipment used to provide flatten soil surface through scrapping. Front part contains wheeled tractor vehicle and rear part contain a scrapping arrangement such as horizontal front blade,conveyor belt and soil collecting hopper.
- When the front blade is lowered onto the ground and vehicle is moved, the blade starts digging the soil above the blade level and the soil excavatedis collected in hopper through conveyor belt.

Figure 14.27: Wheel Tractor scraper

7 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 areavailable 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 diggingtooth around it.

Figure 14.28: Trenchers

➢ **Advance construction Methods:**

1. **Precast Flat Panel System -**
   - 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.

Figure 14.29: Precast Flat Panel System

2. **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. At the time of installation, they are brought to the site and assembled module by module.
   - Each modular unit manufactured are 3D units, hence thisconstruction is called as 3D volumetric construction or modular construction.

Figure 14.30: 3D Volumetric Construction

3. **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.

Figure 14.31: Flat Slab Constructions

4. Precast Concrete Foundations -

- 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 asspecified by the designer.

Figure 14.32: Precast Concrete Foundation

5. Twin Wall Technology -

- The twin wall technology is a hybrid solution of wall system that combines the qualities of erection speed and precast concrete with the structural integrity of in-situ concrete. This type of wall system guarantees structural integrity and waterproof reliability for the structure. The twin wall system has the two slabs are separated by a cast in lattice girders.
- The procedure involves:
- The wall units are placed in the site.
- The twin units are propped temporarily.
- The wall units are later joined by means of reinforcing.
- The gap between the wall units is filled by means of concrete.

Figure 14.33: Twin wall technology

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 goodrobustness and better sound insulation.

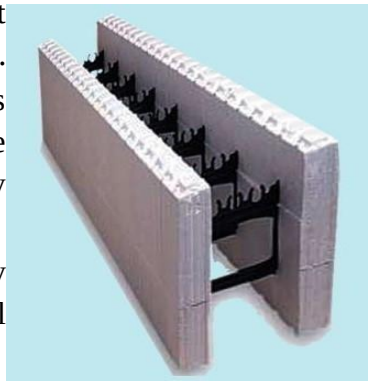


Figure 14.34: Insulating Concrete Formwork

14.1.4 Engineering Aspects of Soil mechanics - Environmental Impact Assessment

- **Engineering aspects of Soil Mechanics**
  - Soil mechanics is a branch of soil physics and applied mechanics that describes the behavior of soils.
  - It differs from fluid mechanics and solid mechanics in the sense that soils consist of a heterogeneous mixture of fluids (usually air and water) and particles (usually clay, silt, sand, and gravel) but soil may also contain organic solids and other matter.
  - Along with rock mechanics, soil mechanics provides the theoretical basis for analysis in geotechnical engineering, a sub discipline of civil engineering, and engineering geology, a sub discipline of geology.
  - Soil mechanics is used to analyze the deformations of and flow of fluids within natural and man-made structures that are supported on or made of soil, or structures that are buried in soils. Example applications are building and bridge foundations, retaining walls, dams, and buried pipeline systems.

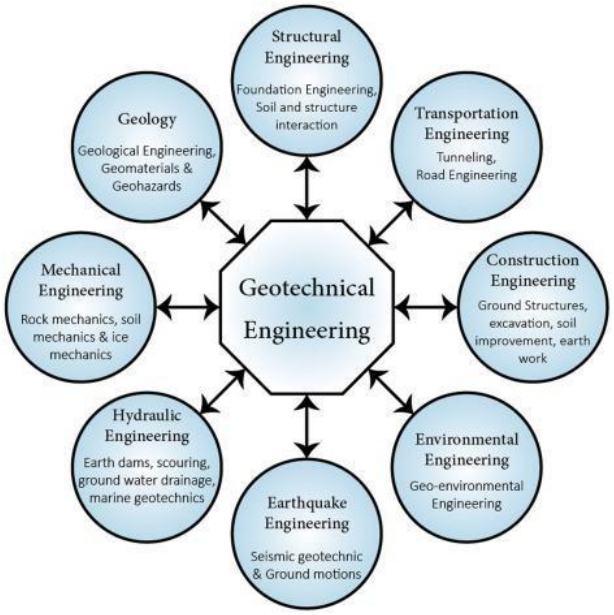


Figure 14.35: Engineering aspects of soil

- Principles of soil mechanics are also used in related disciplines such as geophysical engineering, coastal engineering, agricultural engineering, hydrology and soil physics.
- This article describes the genesis and composition of soil, the distinction between pore water pressure and inter-granular effective stress, capillary action of fluids in the soilpore spaces, soil classification, seepage and permeability, time dependent change of volume due to squeezing water out of tiny pore spaces, also known as consolidation, shear strength and stiffness of soils.
- The shear strength of soils is primarily derived from friction between the particles and interlocking, which are very sensitive to the effective stress.

- The article concludes with some examples of applications of the principles of soil mechanicssuch as slope stability, lateral earth pressure on retaining walls, and bearing capacity of foundations.

➢ **Environmental Impact Assessment**

1. Introduction -

- Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter- related socio-economic, cultural and human-health impacts, both beneficial and adverse.
- UNEP defines Environmental Impact Assessment (EIA) as a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. It aims to predict environmental impacts at an early stage in project planning and design, find waysand means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers.
- Environment Impact Assessment in India is statutorily backed by the Environment Protection Act, 1986 which contains various provisions on EIA methodology and process.

2. History of EIA in India -

- The Indian experience with Environmental Impact Assessment began over 20 years back. Itstarted in 1976-77 when the Planning Commission asked the Department of Science and Technology to examine the river-valley projects from an environmental angle.
- Till 1994, environmental clearance from the Central Government was an administrative decision and lacked legislative support.
- On 27 January 1994, the then Union Ministry of Environment and Forests, under the Environmental (Protection) Act 1986, promulgated an EIA notification making Environmental Clearance (EC) mandatory for expansion or modernization of any activity orfor setting up new projects listed in Schedule 1 of the notification.
- The Ministry of Environment, Forests and Climate Change (MoEFCC) notified new EIA legislation in September 2006.
- The notification makes it mandatory for various projects such as mining, thermal power plants, river valley, infrastructure (road, highway, ports, harbors and airports) and industries including very small electroplating or foundry units to get environment clearance.
- However, unlike the EIA Notification of 1994, the new legislation has put the onus of clearing projects on the state government depending on the size/capacity of the project.

3. The EIA Process -

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

4. Stakeholders in the EIA Process -

- Those who propose the project
- The environmental consultant who prepares EIA on behalf of project proponent
- Pollution Control Board (State or National)
- Public has the right to express their opinion
- The Impact Assessment Agency
- Regional centre of the MoEFCC

5. **Importance of EIA -**
   - EIA links environment with development for environmentally safe and sustainabledevelopment.
   - EIA provides a cost-effective method to eliminate or minimize the adverse impact ofdevelopmental projects.
   - EIA enables the decision makers to analyze the effect of developmental activities on theenvironment well before the developmental project is implemented.
   - EIA encourages the adaptation of mitigation strategies in the developmental plan.
   - EIA makes sure that the developmental plan is environmentally sound and within the limitsof the capacity of assimilation and regeneration of the ecosystem.

6. **Salient Features of 2006 Amendments to EIA Notification -**
   - Environment Impact Assessment Notification of 2006 has decentralized the environmental clearance projects by categorizing the developmental projects in two categories, i.e., Category A (national level appraisal) and Category B (state level appraisal).
   - Category A projects are appraised at national level by Impact Assessment Agency (IAA) and the Expert Appraisal Committee (EAC) and Category B projects are apprised at state level.
   - State Level Environment Impact Assessment Authority (SEIAA) and State Level Expert Appraisal Committee (SEAC) are constituted to provide clearance to Category B process.
   - After 2006 Amendment the EIA cycle comprises of four stages:
   - Screening
   - Scoping
   - Public hearing
   - Appraisal
   - Category A projects requires mandatory environmental clearance and thus they do notundergo the screening process.
   - Category B projects undergoes screening process and they are classified into two types.
   - Category B1 projects (Mandatorily requires EIA).
   - Category B2 projects (Do not require EIA).
   - Thus, Category A projects and Category B, projects undergo the complete EIA processwhereas Category B2 projects are excluded from complete EIA process.

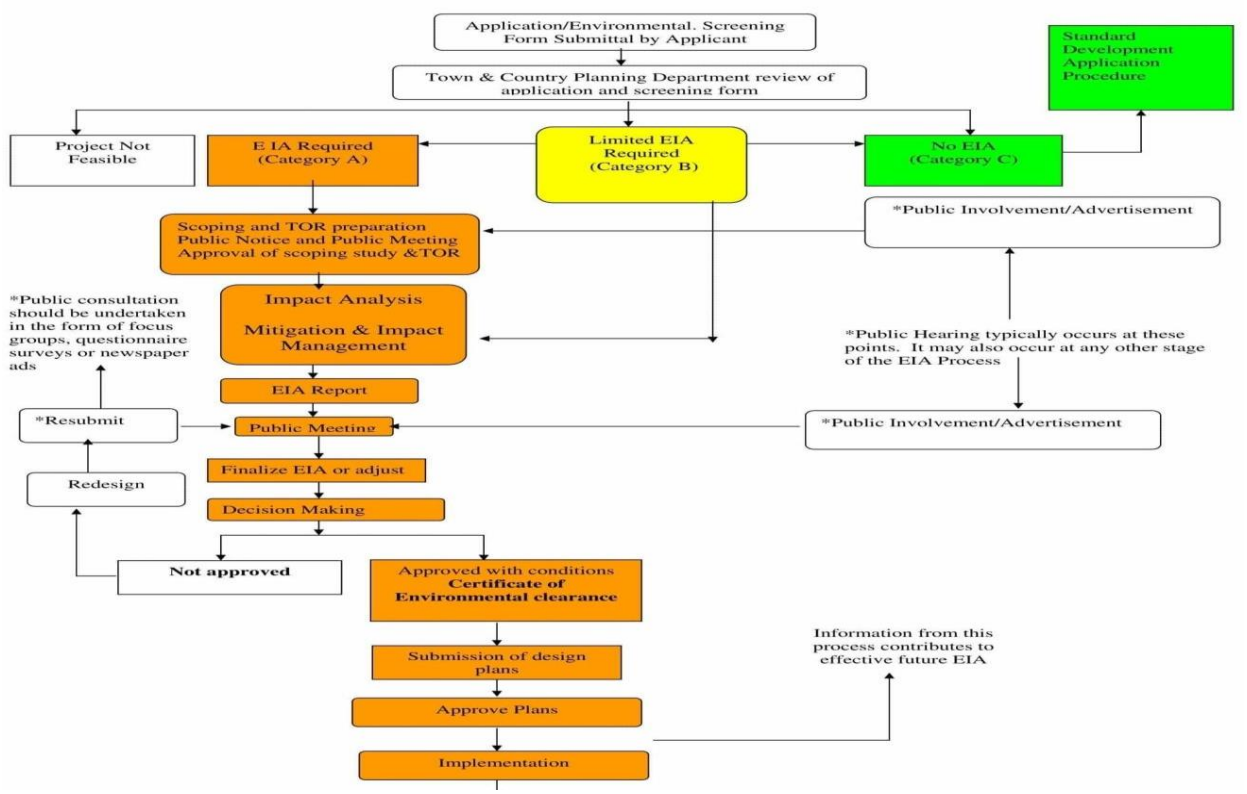


Figure 14.36: Flow chart of EIA

14.1.5 Water Supply-Sewerage System-Waste Water-Sustainable developmenttechniques

1. **Water supply system**
   - It is an infrastructure for the collection, transmission, treatment, storage, and distributionof water for homes, commercial establishments, industry, and irrigation, as well as for such public needs as firefighting and street flushing.
   - Of all municipal services, provision of potable water is perhaps the most vital. Peopledepend on water for drinking, cooking, washing, carrying away wastes, and other domestic needs. Water supply systems must also meet requirements for public, commercial, andindustrial activities.
   - In all cases, the water must fulfill both quality and quantity requirements.

➢ **Surface water and groundwater -**

- Surface water and groundwater are both important sources for community water supply needs.
- Groundwater is a common source for single homes and small towns, and rivers and lakes arethe usual sources for large cities.
- Although approximately 98 percent of liquid fresh water exists as groundwater, much of itoccurs very deep.
- This makes pumping very expensive, preventing the full development and use of all groundwater resources.

- **Water Requirements -**
  - Municipal water supply systems include facilities for storage, transmission, treatment, and distribution. The design of these facilities depends on the quality of the water, on theparticular needs of the user or consumer, and on the quantities of water that must beprocessed.
- **Water Treatment -**
  - Water in rivers or lakes is rarely clean enough for human consumption if it is not first treated or purified. Groundwater, too, often needs some level of treatment to render it potable.

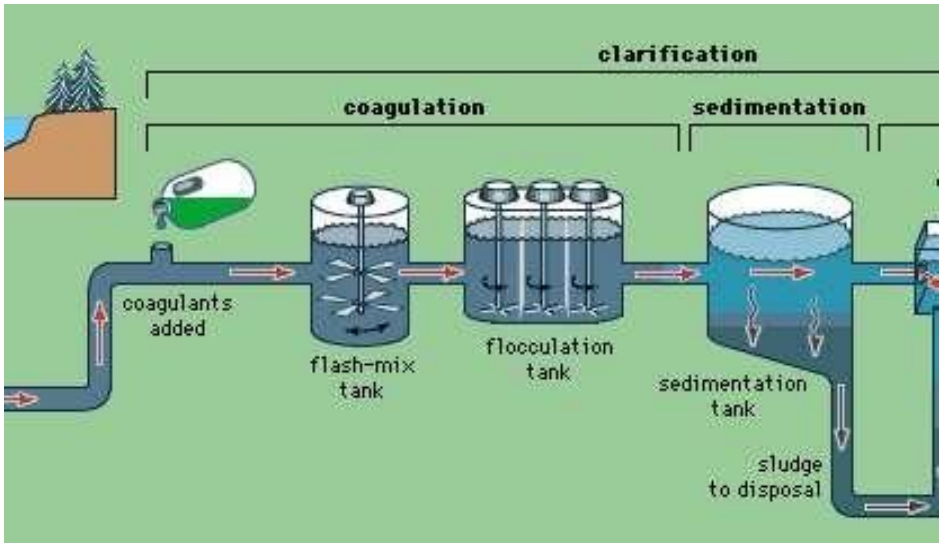


Figure 14.37: Water treatment

- The primary objective of water treatment is to protect the health of the community. Potable water must, of course, be free of harmful microorganisms and chemicals, but public supplies should also be aesthetically desirable so that consumers will not be tempted to use waterfrom another, more attractive but unprotected source.
- The water should be crystal clear, with almost no turbidity, and it should be free of objectionable color, odor, and taste.
- For domestic supplies, water should not be corrosive, nor should it deposit troublesome amounts of scale and stains on plumbing fixtures.
- Industrial requirements may be even more stringent; many industries provide special treatment on their own premises.
- The type and extent of treatment required to obtain potable water depends on the quality of the source. The better the quality, the less treatment is needed.
- Surface water usually needs more extensive treatment than does groundwater, because most streams, rivers, and lakes are polluted to some extent.
- Even in areas remote from human populations, surface water contains suspended silt, organicmaterial, decaying vegetation, and microbes from animal wastes.

- Groundwater, on the other hand, is usually free of microbes and suspended solids because ofnatural filtration as the water moves through soil, though it often contains relatively high concentrations of dissolved minerals from its direct contact with soil and rock.

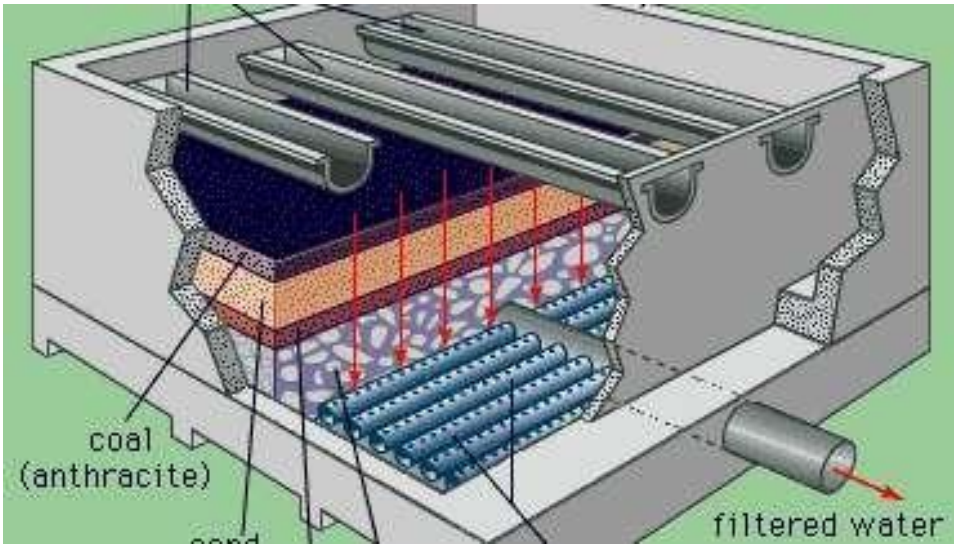


Figure 14.38: Schematic diagram of a rapid-filter water treatment facility.

2. Sewerage system

- Sewerage system**,** network of pipes, pumps, and force mains for the collection of wastewaters,or sewage, from a community.
- Modern sewerage systems fall under two categories: domestic and industrial sewers andstorm sewers.
- Sometimes a combined system provides only one network of pipes, mains, and outfall sewersfor all types of sewage and runoff.

➢ **Types of sewerage system -**

i. Combined Sewerage System

- A combined sewer system is a sewer that accepts storm water, sanitary water/sewage, then the sewage is treated in STP (sewerage treatment plant). This system is mainly used in the towns where streets are narrow and rain fall is less than the moderate.

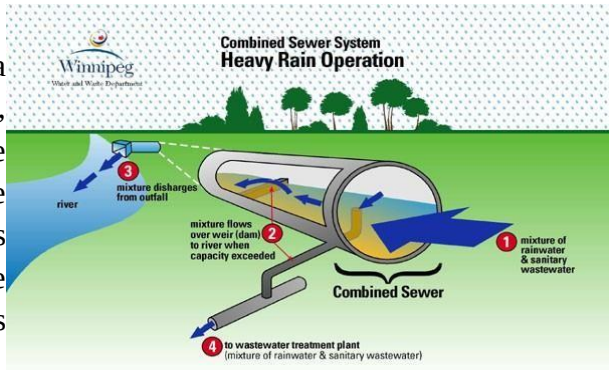


Figure 14.39: Combined Sewerage System

→ **Advantages**

a) Less construction cost.
b) There will be No chocking problem.
c) Strength of the toxic water will be reduced.

→ **Disadvantages**

a) Due to sewage the toxicity of storm water will increase.
b) Initial cost of piping will be high.
c) Problem in handling.

ii. Separate sewerage system

- In this system the sanitary sewage and storm water are carried separately in two sets of sewers. The sewage is conveyed to waste water treatment plant (WWTP) and the storm water is discharges into rivers without treatment.

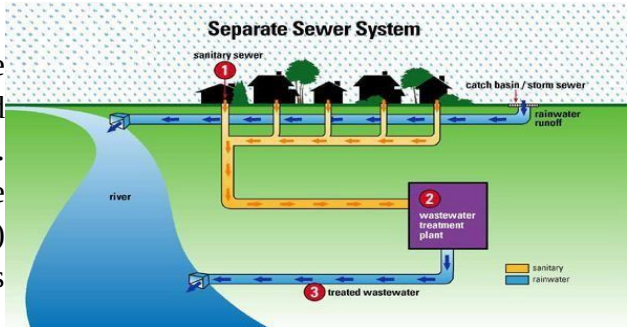


Figure 14.40: Separate sewerage system

→ **Advantages**

a) The rain water will not become toxic.
b) More efficient than combined system.

→ **Disadvantages**

a) Problem of chocking.
b) Flushing system will be required for cleaning purpose**.**

iii. Partially combined or partially separate system

- A partially separate system is a combination of a combined sewerage system and separate sewerage systems. This type of sewerage system helps decrease the load from a combined sewerage system because only the water from initial rain falls (water from acid rain) is added to sewage water and after than this system works as separate system.

→ **Advantages**

a) The sizes of sewers are not very large as some portion of storm water is carried through opendrains.
b) Combines the advantages of both the previous systems. Silting problem is completelyeliminated.
c) Storm water will be less toxic as compare to previous two systems.

→ **Disadvantages**

a) The storm water is unnecessary put load on to the treatment plants to extend.
b) The toxicity of sewage water will increase.

3. Waste Water-Sustainable development techniques

➢ **Sustainable Treatment types**

1. Lagoons/wetlands
2. Anaerobic digestion
3. Soil aquifer treatment

1. Lagoons/ wetlands

- In wetland treatment, natural forces (chemical, physical and solar) act together to purify the wastewater, thereby achieving wastewater treatment.
- A series of shallow ponds act as stabilization lagoons, while water hyacinth or duckweed acts to accumulate heavy metals.
- Multiple forms of bacteria, plankton and algae act to further purify the water.

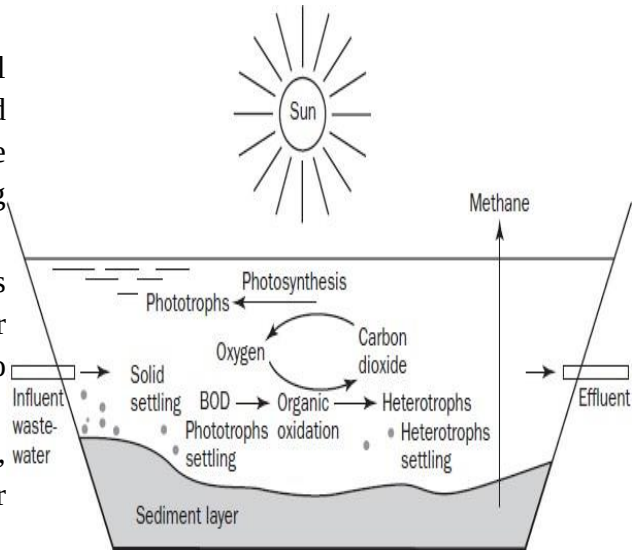


Figure 14.41: Lagoon process

→ **Advantages of wetland treatment**

- It is mechanized treatment systems.
- Allows for total resource recovery.
- Considered as a low-cost technology if sufficient, non-arable land is available.

→ **Disadvantages of wetland treatment**

- Affected by the climate.
- Some locations may make it unsustainable.
- Mechanical problems may include clogging with sprinkler and drip irrigation systems.
- High demand for large area of arable, flat land. Existing significant odor problems.

2. Anaerobic digestion

- Anaerobic Digestion Anaerobic bacteria degrade organic materials in the absence of oxygen and produce methane and carbon dioxide.
- The methane can be reused as an alternative energy source (biogas).

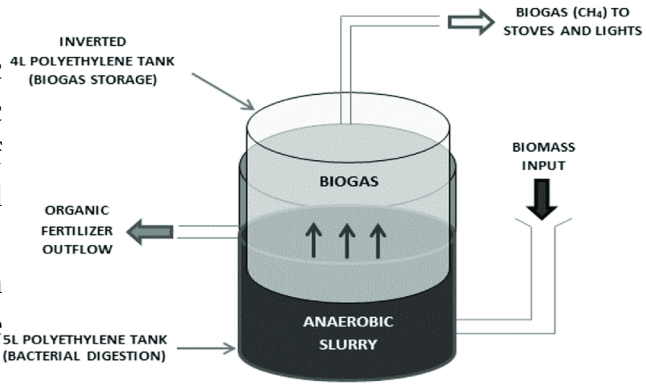


Figure 14.42: Anaerobic digestion

→ **Advantages of Anaerobic Digestion**

- No, or very low energy demand.
- Production of valuable energy in the form ofmethane.
- Low investment costs and low spacerequirement.
- Applicable at small as well as large scale.

→ **Disadvantages Advantages of Anaerobic Digestion**

- Low production of excess sludge.
- Low nitrogen and phosphorus requirements.
- High treatment efficiencies.
- Effluents contain valuable fertilizers (ammonium salts).

3. Soil aquifer treatment

- Soil Aquifer Treatment SAT (soil aquifer treatment) is a geo purification system where partially treated sewage effluent artificially recharges the aquifers and then withdrawn for future use.
- By recharging through unsaturated soil layers, the effluent achieves additional purification before it is mixed with the natural groundwater.

→ **Advantages of Soil Aquifer Treatment**

- Cost is lower.
- Remove pathogen efficiently.
- Operation is not highly technical Breaks the pipe-to-pipe connection of directly reusingtreated wastewater from a treatment plant.

→ **Disadvantages of Soil Aquifer Treatment**

- Can change the soil and groundwater hydrological properties.
- Requires a big area for the infiltration basin.

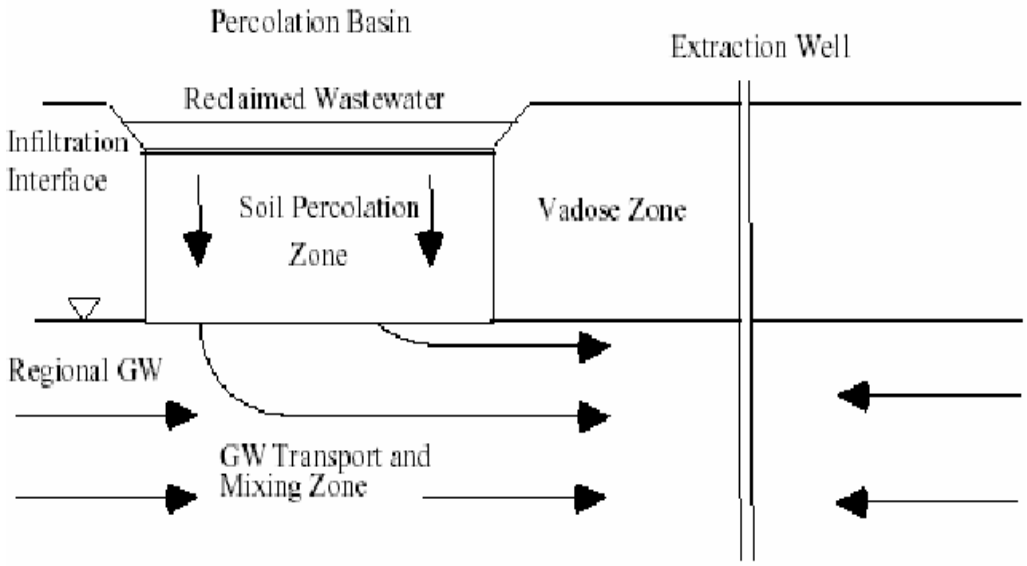


Figure 14.43: Soil Aquifers Treatment

14.1.6 Case Study on Sewage Treatment Plant: Delawas, Jaipur

I. INTRODUCTION:

A STP can be express as the factory, which prevents the environment from waste produced by human beings. When the waste produced is beyond the limit of environment to decompose, STP is only the solution. The present STP reduces the waste produces manure& energy and helps us to keep our rivers, ponds clean. Various types of STP_s are introducing each day, according to the requirement and economic view. STP in Delawas is working on ASP (activated sludge process). It consists of two-phase capacity of each is 62.5MLD. It is a best example of STP known for not using any chemicals in whole treatment process & not using any pump in sewerage system for bringing the sewage to STP from 25 Km. The farthest point of sewerage is 25Km and nearest is 1Km from the STP. This type of STP_s can also be termed as energy saver of a country. As it recharges the groundwater, flow freely and be used for irrigating purposes. The STP of Delawas consist inlet section, which is common for both phase of STP. The raw sewage first collects here.

Figure.1. Inlet section of STP

After commencement of water in inlet section it is screened through automated screens. Screens are inclined at an angle of 45 degree.

After removing the solid waste from water, it transfers to grit chamber for removing the grit; the grit obtained from this chamber is highly nutritious for crops. The chamber is trapezoidal in shape for easy collection of grit. The whole process is fully automatic.

Figure.2. Showing automated screening

After grit separation, the water is sent to primary clarifier for further processing through Parshall Flume for regulating the flow velocity. This is generally made at an angle varies from 1 12degree in STPs. By this mechanism, we are capable to increase the retention period in primary clarifier.

Figure.3. Showing the inner view of grit removal

In primary clarifier, the sludge removes through gravity separation method. Then it transfers to secondary clarifier passing via aeration tank for activated sludge process.

Figure.4. View of Parshall Flume

In aeration tank, oxygen is providing with the help of blower for survival of bacteria. A small quantity of sludge returned from secondary clarifier to aeration tank for activated sludge process. Air blowers are being operated with variable frequency drive (VFD). Man, Machine Interface (MMI) is provided through programmable logic control system (PLC) for handling anaerobic sludge digester.

Figure.5. Primary clarifier

From aeration tank, the wastewater goes to secondary clarifier. This is the final treatment process for water in this plant. The water from here opens to Amanisah runnel finally.

Figure.6. Aeration tank

The sludge collected at different steps of process sent to the sump and then to the digester dome. The sludge is dewatered by using centrifugal pumps and the thickened sludge is sent to dome for anaerobic digestion. This process gives biogas and digested sludge, which use as manure by local farmers. The gas produce is using for revenue collection. The gas sent to CNG bottling plant, which gives them cost price of 6.50 RSPNm^3.

Figure.7. Condary clarifier

For smooth running of plant and follow the BIS standards for treated water, lab is setup on the STP site. The laboratory is fully furnished and all necessary equipment's for testing water is available here. In this laboratory, the water is testing at every stage for ensuring the health of the STP.
A model of the whole plant is also available at the site for point of study or knowing the whole process of STP. The authors when rush to the site is welcomed and introduced first by model before actual prototype. The model situation is in office building.

Figure.8. View of sludge digester

Objective of the study:
The chief objective of this case study is to check sustainable development with using treated water without any harmful cause to environment with the satisfaction of common residents of the area. By a keen study on STP Delawas, we try to understand its waste to energy generation, waste reduction & treated water consumption in a economical way. The study also includes a wide survey, which helps the Nagar Nigam, Jaipur to develop the process in people's acceptable way.

Study Area:
The study area is confined to STP Delawas, Pratap Nagar,sector 28, Jaipur and nearby area for mass survey through google form. The data collected from STP office is useful to analyze rather the treated water fit for any other use or not and relate this result to the result obtained from the online survey through google form in the area to solve out the problem without harming environment and even not breaking sentiments of locals.

Figure.9. Satellite image of the plant

Historical Background:
One of the most ancient systems of wastewater management was constructed in Mohenjo-Daro near Indus River (Pakistan) at about 1500B.C. some traces of sewerage development and advancement also seen in Rome. After this, this process is widely accepted all over the world. For treating sewage of Jaipur, RUIDP constructed STP based on activated sludge process in Delawas and handed over it to JMC (Jaipur Municipal Corporation). Unit-I commissioned on 15-2-2006 and unit II in March 2011. From 2009 onwards, the STP starts production of biogas, which further reduces the power consumption cost and dependability on power supply by JVVNL (Jaipur ViddhutVitran Nigam limited).

II. RELATED WORK:

Prachi N. Wakode, Sameer U. Sayyad (2014) study and evaluate the performance of 25MLD STP at kalian (Raj.). Dharmraj Jangid, Akhilendra B. Gupta (2014) study the waste to energy concept of STP, Delawas. N. Muthukumaran & N.K. Ambujan (2003) compare the treated water of Tiruchirappali city with FAO irrigation standards and find it fit for irrigation. They also conduct a survey for knowing people's view on using this water. Sunita L akhiwal, Dr. Surendra Singh Chauhan (2015) study the seasonal variation in physic-chemical parameters of secondary treated water from STP, Delawas.

Identification of Problems Associated: Authors travelled along the confined area and try to understand the disposal method for treated water by STP Delawas. This fact came into light that the water after secondary treatment left open in Amanisha Nallah which ultimately meet to Dhund river and pollute it. Local farmers for irrigation purpose use the water illegally and without any noticeable information to local bodies. There are no measures taken to remove phosphorus and nitrogen from treated water, which ultimately can cause eutrophication in Dhund River. On the governmental level, there is no plan for reusing or proper disposal of treated water. The treated water even not disinfected before drain it into runnel (nallah) and in open run smells bed to

passersby This would prove a fatal mistake in case of any road accident or if animal drink this. Local farmers for utilizing as manure for their fields take the sludge produce from the plant away. However, on official level, there is no record of this sludge and even no proper method of disposal of sludge. Due to RIICO industrial area nearby and cloth dying, the STP receive toxic waste from industries but no testing of heavy metals concentration at inlet and outlet of plant is done on regular basis. The treated water is not using by STP to make its surrounding area green, no plantation on large scale with treated water seen except in front of office and generator room. No holding tank is there for wastewater reuse in an organized manner.

Survey Questions:

The mass survey is based on some basic questions including nine multiple-choicequestions, which shows the thinking of people on the issue. Out of nine, seven questionscomprise yes or no answer-based questions & two questions are of more choice. The questions of yes or no type are:

- Are you aware about the fact that in Delawas, Pratap Nagar sewage treatment Plant exists?
- Are you aware about the fact that this treated water is using in nearby farms to produce crops?
- Are you comfortable in using these products, which are producing by this treated water?
- Are you comfortable in using biogas fuel in your kitchen?
- Are you comfortable in using the manure produced in this plant in your own garden?
- In your opinion, treatment plants should be setup on large scale.
- Have you participated as an active member in any survey based on STP before this?
- Questions comprise more than two choices:
- In your opinion, which treatment should be suitable for disposal of sewage? STP

These questions and their answers given by the subjects are the key resource for the author for generating this case study. Some subjects suggest reusing this water recharging the arid lands but authors consider it in option of “flow in the river” because both optionsgive a way to coup the water naturally.

Graphs based on answers of survey:

Result and Analysis Based on data available:

Notation Used

RSI - Raw Sewage Inlet

AT - Aeration Tank

FO - Final Outlet

POF- Primary overflow

Based on data available at plant office, we analyse the variation in pH, TSS, COD, BOD of the various parts of the STP. pH of the different sections of STP:

Parameters	Mar-16	May-16	Oct-16
RSI	7.47	7.45	7.38
POF	7.51	7.49	7.53
AT	7.50	7.50	7.54
RAS	7.33	8.18	7.32
FO	7.68	39.83	7.69
Digester	7.07	6.95	9.85

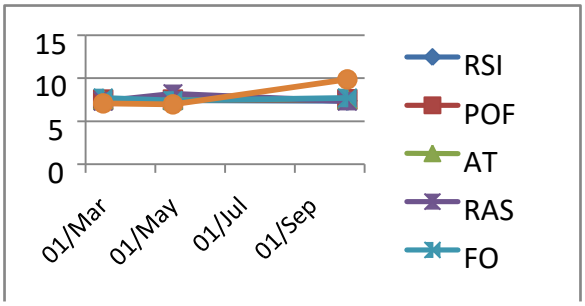


Figure.10. Showing variation in pH

TSS of different sections of STP:

Parameters	Mar-16	May-16	Oct-16
RSI	587	578	470
POF	228	225	206
FO	40.10	139.87	40

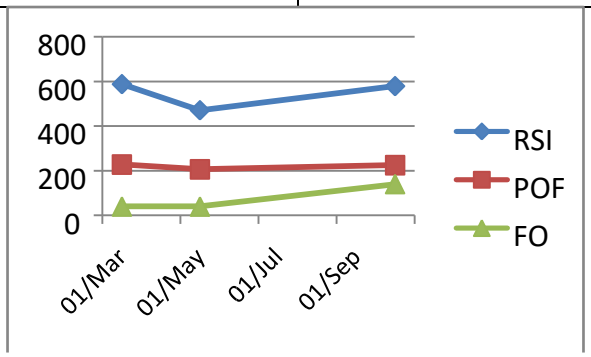


Figure.11. Showing variation in TSS

COD of different sections of STP:

Parameters	Mar-15	May-16	Oct-16
RSI	802	800	800
POF	360	360	357
FO	140.90	136	24.97

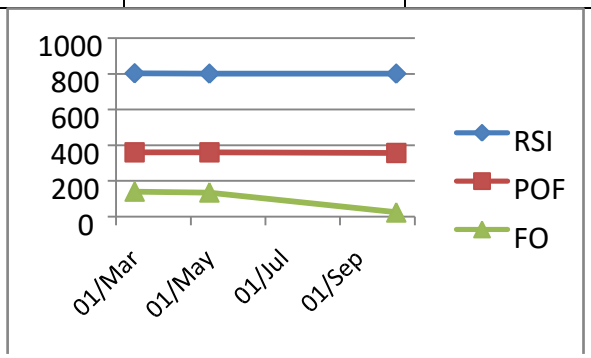


Figure.12. Showing variation of COD

III. RECOMMENDATION:

The authors view the whole STP and its confined region and collect local views for analyzing the problem and try to give best solution. The STP Delawas recommended to establishing a storage tank for proper utilization of treated water. The authors also advices them to use chlorination and tertiary treatment of water to reduce its smell and to avoid problem of eutrophication. In authors view, the water should be used in agriculture, horticulture but a legalize pattern should be followed. For proper security of STP, boundary should be fenced with throne wiring.

IV. FUTURE PLAN OF STP:

On visiting the plant and meeting with M. Venkatesh (currently chief engineer of Plant), we come to know that future plan is for establishing tertiary treatment units with coordination of TATA in future if required.

V.CONCLUSION:

The STP is currently working well and farmers can use this water, as it cannot harm the crops, even increase the yield of crop. However, the irrigated crops should be of commercial purpose as people strongly opposed to use this water for farming food. The STP produced biogas, which can help in meeting about its 75%-80% energy requirement for operation and maintenance. The concept of waste to energy of the designer is a subject of appreciation. The treated water can also be used for recharging groundwater or for horticulture and planting trees on both sides of road of the area. This practice will definitely again help in reducing power consumption as no need for pumping water from ground for planting trees and for commercial crops irrigation. This type of STP should setup on large scale so they will help India in improving health and sanitation with sustainable development. The survey report shows the open mind of majority of the subjects who take part in this survey enthusiastically.

Chapter: 15
Smart and/or Sustainable features of Chapter 8 & 13 designs, Impact on society.
with doing small changes, Period, Amount Expenditure and Benefit

Sr. no.	Description	Period to implement	Amount (In Rs.)
1.	**Sustainable design**		
	Bio-gas Plant	Within 1 year	1,94,142
	Green House	Long term (3-5 year)	20,125
2.	**Physical design**		
	Children Park	Within 1 year	83,243
	Septic Tank	Immediately	27,142
3.	**Social design**		
	Rain Water Harvesting System	Within 1 year	70,960
	Bank	Immediately	9,56,353
4.	**Socio-cultural design**		
	Community hall	Within 1 year	65,74,107
	Post-Office	Long term (3-5 year)	9,43,743
5.	**Smart design**		
	Dry Compose Public Toilet	Immediately	2,00,488
	Library	Within 1 year	5,51,407
6.	**Heritage design**		
	Clock tower	Long term (3-5 year)	4,26,406
	Museum	Long term (3-5 year)	5,53,805

[Table 15: Design Implementation details]

Chapter: 16
Survey by Interviewing with Talati And/orSarpanch

Vishwakarma Yojana: Phase VIII
RANGPAR (BELA) VILLAGE SURVEY
An approach towards "Rurbanisation for Village Development"

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Survey with Interviewing

SURVEY BY INTERVIEWING WITH TALATI AND/OR SARPANCH

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

CHAPTER- 16

Sr.	Questions	Yes/ No	Remarks
1	What are the sources of income in village?	Yes	Agriculture
2	What are the chances of employment in village?	No	-
3	What are the special technical facilities in village?	No	-
4	Is any debt on village dwellers?	No	-
5	Are village people getting agricultural help?	No	-
6	Is women health awareness Program organized in village?	No	-
7	Are women having opportunity to work and income?	No	-
8	Child girl education is appreciated in village?	Yes	There is a one primary school in village and all girls are going there.
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	People of village are aware about vaccination.
11	Women help line number information is provided to village people?	Yes	-
12	Is water scarcity in village? How many days per year?	No	-
13	Is village under any debt?	No	-
14	Is any serious issue due to debt from bank or any person happened in village?	No	-
15	Is any suicide like incident observed in village due to government policy, debt or threatening?	No	-
16	Is any death of patient occurred due to unavailability of medical facility in village?	No	-
17	How many disabled (physically challenged) is observed in village? Provide list with Male/female/girl/boy with age and type of disability and reason of disability.	No	-
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

Chapter: 17
Irrigation / Agriculture Activities and AgroIndustry, Alternate Technique

17.1 Introduction

- **A history of agricultural irrigation**
  - Humans have relied on agriculture to feed their communities for thousands of years and theyhave needed irrigation to water their crops for almost as long.
  - Irrigation involves artificially supplying water to the land to enhance the growth of crops.
  - The earliest form of irrigation dates back at least 8,000 years, and the technique remains an important part of successful agricultural practices across the world. Here is a brief history of irrigation from the earliest days until modern times.

- **Egypt and Mesopotamia**
  - The earliest known systems of irrigation began in 6000 BC in Egypt and Mesopotamia. In Egypt, the Nile flooded for a few months each year, and the waters were diverted to the fieldsto allow farmers to grow crops where otherwise they would be unable to do so. In 3100 BC, alarge irrigation project was built, which involved the construction of dams and canals up to 20 kilometres in size.
  - However, the flooding was uncertain, and high flows could wash away dikes and flood entirevillages, whereas low flows would not provide the crops with enough water.
  - In Mesopotamia, the Tigris and Euphrates floodwaters were used in the same way. The Sumerians dug canals in what are considered the first ever works of engineering. It is thoughtthat canals could be used for up to 1,000 years before being replaced.

- **Terrace irrigation**
  - Terrace irrigation is an ancient technique that was used all over the world, including in Chinaand India, but it was used especially in the Americas. The Zana Valley in Peru provides an example of this technique, and remains of irrigation canals have been found here that date back to 4,000 BC, which are the earliest systems in the Americas that we know of. However, the technique could have been used even earlier than this.

- **Shri lankan irrigation**
  - Irrigation in Sri Lanka dates back to about 300 BC during the reign of King Pandukabhaya. A very complex system of underground canals was used, and this is the first place where artificial reservoirs for storing water were built in an incredible feat of engineering. In fact, they were so well designed that they still exist to this day.

- **North American irrigation**
  - Two systems of irrigation were used in North America, which are known as the Chaco and Hohokam systems. The Hohokam system was used by the Hohokam people in Arizona, and the Chaco system was used by the Anasazi in New Mexico.
  - The Hohokam people-built canals in the early centuries of the first millennium, whereas the Chaco system dates to about 900 AD. This also used canals to divert water into fields and reservoirs in the San Juan basin.

17.2 Irrigation and its types

- There are different types of irrigation practiced for improving crop yield. These types of irrigation systems are practiced based on the different types of soils, climates, crops and resources. The main types of irrigation followed by farmers include:

1. **Surface Irrigation**
   - In this system, no irrigation pump is involved. Here, water isdistributed across the land by gravity.

2. **Localized Irrigation**
   - In this system, water is applied to each plant through anetwork of pipes under low pressure. i.e., Sprinkler Irrigation
   - Water is distributed from a central location by overhead high-pressure sprinklers or from sprinklers from the moving platform.

3. **Drip Irrigation**
   - In this type, drops of water are delivered near the roots ofthe plants. This type of irrigation is rarely used as it requires more maintenance.
   - Reduce the impact of drought and climate change on food Production.
   - Avoid contamination of groundwater and rivers caused byfertilizer leaching.
   - Support rural communities, reduce poverty and reducemigration to cities.

4. **Centre Pivot Irrigation**
   - In this, the water is distributed by a sprinkler systemmoving in a circular pattern. i.e., Sub Irrigation
   - Water is distributed through a system of pumping stations gates, ditches and canals by raising the watertable.

5. **Manual Irrigation**
   - This a labour intensive and time-consuming system of irrigation. Here, the water is distributed through watering cans by manual labour.

Figure 17.1: Surface irrigation

Figure 17.2: Localized irrigation

Figure 17.3: Drip irrigation

Figure 17.4: Center pivot irrigation

Figure 17.5: Manual irrigation

- **Methods of Irrigation**
  - Irrigation can be carried out by two different methods:
    1. Traditional Methods
    2. Modern Methods

1. Traditional Methods of Irrigation -

- In this method, irrigation is done manually. Here, a farmer pulls out water from wells orcanals by himself or using cattle and carries to farming fields. This method can vary in different regions.
- The main advantage of this method is that it is cheap. But its efficiency is poor because of theuneven distribution of water. Also, the chances of water loss are very high.
- Some examples of the traditional system are pulley system, lever system, chain pump. Among these, the pump system is the most common and used widely.

2. Modern Methods of Irrigation -

- The modern method compensates the disadvantages of traditional methods and thus helps inthe proper way of water usage.
- The modern method involves two systems:
  i. Drip system
  ii. Sprinkler System

i. **Drip System**
- In the drip system, water supply is done drop by drop exactly at roots using a hose or pipe.This method can also be used in regions where water availability is less.

ii. **Sprinkler system**
- A sprinkler system, as its name suggests, sprinkles water over the crop and helps in an evendistribution of water. This method is much advisable in areas facing water scarcity.
- Here a pump is connected to pipes which generate pressure and water is sprinkled throughnozzles of pipes.

17.3 Importance of irrigation

- Insufficient and uncertain rainfall adversely affects agriculture. Droughts and famines are caused due to low rainfall. Irrigation helps to increase productivity even in low rainfall.
- The productivity on irrigated land is higher as compared to the un-irrigated land.
- Multiple cropping is not possible in India because the rainy season is specific in most of the regions. However, the climate supports cultivation throughout the year. Irrigation facilities make it possible to grow more than one crop in most of the areas of the country.
- Irrigation has helped to bring most of the fallow land under cultivation.
- Irrigation has stabilized the output and yield levels.
- Irrigation increases the availability of water supply, which in turn increases the income of thefarmers.

17.4 Agriculture in Rangpar (Bela) village

- The main occupation of the Rangpar (Bela) villagers is agricultural activity.
- They grow various crops such as cotton, Peanut and wheat.
- They are also aware about various irrigation systems.
- They have to go outside from the village to sell their agricultural products.

Use of chemical fertilizers	Yes
Use of chemical insecticides	Yes
Use of chemical weedicide	Yes
Soil health card	No
Irrigation: canal /tank/bore well/other	Other
Drip of sprinkler irrigation: drip/sprinkler/none	Drip

[Table 17: Agriculture Input]

Chapter: 18.
Social Activities – Any Activities Planned byStudents

- Social awareness to children of village about healthand cleanliness around them.
- We have visited the primary school and clean theschool with children.
- Cleaning activity done at school ground at the village with students.

Figure 18.1: Cleaning Activity

- Awareness talks in the classroom of school bystudents about Covid-19 and its precautions.
- Also, a talk on awareness and importance ofeducation especially for a girl child.
- They also give us information about their educationsystem and subjects which they are study.
- Games played with children for friendlyenvironment.
- Also, they give us information about public distribution system and agriculture activity of village.
- We really enjoy with them.

Chapter: 19.

Rangpar (Bela) SAGY Questionnaire Survey formwith the Sarpanch Signature

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Rangpar (Bela) Gram Panchayat: Rangpar Ward No. –

Block: Morbi. District: Morbi.

State: Gujarat. L S Constituency: Morbi. LS Constituency

1. Family Identity and Size

Name of Head of Household	Rajeshbhai Devjibhai Pandya							Male/ Female	M
SECC Survey ID:	–	Family Size	8	Over 18	6	6 to 18	2	Under 6	0

2. Category & Entitlement Details (Tick as appropriate)

Social Category[1]	General	Life Insurance	1. All Adults 2. Some Adults 3. None	AABY	1. Yes 2. No	Kisan Credit Card	Yes / No: Yes
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]
Rajesh Devjibhai Pandya	54	M	N	2	06	Y	Y	0
Vimal Rajeshbhai "	29	M	N	2	08	Y	Y	0
Vishal Rajeshbhai "	26	M	N	2	08	Y	Y	0
Manjuben Rajeshbhai "	49	F	N	2	05	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
Shradha Vimalbhai	12	F	N	1	04	Y	8	Y
Chirag Vimalbhai	09	M	N	1	03	Y	5	Y

4. Children below 6 years

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

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

[2] Enter the BPL Survey round being used in the Gram Panchayat for identification of BPL Families (e.g. 1997/2002/2011)

[3] *Marital Status: Not Married – 1, Married – 2, Widowed – 3, Divorced/Separated – 4*

[4] *Level of Education: Not Literate – 01, Literate – 02, Completed Class 5 - 03, Class 8th – 04, Class 10th-05, Class 12th-06, ITI Diploma-07, Graduate-08, Post Graduate/Professional – 09 (write the highest level applicable)*

[5] No Pension – 0, Old Age Pension – 1, Widow Pension – 2, Disability Pension – 3, Other Pension – 4 (mention)

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

	Always		Sometimes		Never
After use of Toilet	Soap	Other Hand wash	Soap	Other	
Before Eating	Soap	Other	Soap	Other Hand wash	

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	X	X

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: —
Cooking: LPG/Biogas/Kerosene/Wood/Electricity
Mention if Any Other: —
If cooking in Chullah: Normal/ Smokeless

12. Landholding (Acres)

1. Total	6789	2. Cultivable Area	519
3. Irrigated Area	6032	4. Uncultivable Area	238

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) Shop	

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
Cottons		
Peanuts		
Castor		

17. Livestock Numbers

Cows: 46	Bullocks: 25	Calves: —
Female Buffalo: 4	Male Buffalo: 7	Buffalo Calves: —
Goats/ Sheep: 56	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

Nap goal

19. Do children play musical instrument (mention)

No

Schedule Filled By: Haarid B. Doshi

Principal Respondent: Rajeshbhai Devjibhai Pandya

Date of Survey: 11/4/2021

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: Rangpar

b. Block: Morbi

c. District: Morbi

d. State: Gujarat.

e. Lok Sabha Constituency: Morbi parliamentary constituency

f. Number of Wards in the Gram Panchayat: 1

g. Number of Villages in the Gram Panchayat: 1

h. Names of Villages: Rangpar (Bela)

Demographic Information

Number of Households 403 Total Population 2129 Male 1092 Female 1037

SC HHs 40 ST HHs – OBC HHs – Other HHs 363

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

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
o	Agriculture Credit Cooperative Society	N	at Morbi
p	Nearest Agro Service Centre	N	at SH
p	MSP based Government Procurement Centre	N	at Morbi
q	Milk Cooperative /Collection Centre	N	at Morbi
r	Veterinary Care Centre	N	at Morbi
s	Ayurveda Centre	N	at Morbi
t	E – Seva Kendra	N	at morbi
u	Bus Stop	N	at SH
v	Railway Station	N	at Morbi
w	Library	N	at Morbi
x	Common Service Centre	N	at morbi.

IV. Sports Facilities in the Gram Panchayat

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

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

V. Education, ICDS

a. Number of Angan Wadi Centres: 1

b. Number of villages without Angan Wadi Centres 0

Names of such villages: –

c. Schools (Number)

Primary Private: 0 Primary Govt.: 1

Middle Private: 0 Middle Govt.: 1

Secondary Private: 0 Secondary Govt.: 1

Higher Secondary Private: 0 Higher Secondary Govt: 0

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)	–	–	Y	–	–	at GP	–
b.	Kerosene	–	–	Y	–	–	at GP	–
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 ✓ / Not Covered	Rangpar	-
b.	Hand Pump Coverage in Villages:	Covered ✓ / Not Covered	Rangpar	-
c.	Coverage under Covered Drains:	Covered ✓ / Not Covered	Rangpar	-
d.	Coverage under Open Drains:	Covered - / Not Covered	-	-
e.	Villages with Household Electricity Connection (Numbers)	Connected ✓ / Not Connected	Rangpar	-

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	519	d.	Pasture / Grazing Land	-	g.	Check Dam	X
b.	Irrigated Land	6032	e.	Forests/ Plantations	171	h.	Wells/Bore Wells	✓
c.	Un-irrigated Land	66	f.	Other Common Land	-	i	Tanks /Ponds ✓	1 ✓

[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)	09
b)	Number of Households receiving pension (old age, widow, disability)	09
c)	Number of eligible Households who are not receiving pension	-
d)	Number of Households eligible for Ration Card	403
e)	Number of eligible HHs having ration cards	403
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	0
l)	Number of landless households	0
m)	Number of IAY beneficiaries	0
n)	Number of FRA[2] beneficiaries	0
o)	Number of Community Sanitary Complexes	0
p)	Number of Households headed by single women	17
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	-

Name and Signature of Surveyor and Respondent'

H.B.Doshi Haard Doshi K.R.chavda Kishor chavda Surveyor	ફુલજીભાઈ નકુમભરવાડ સરપચ. રંગપર ગ્રામ પંચાયત PRI Respondent (Preferably Gram Panchayat Chairperson)	અનુ પરસોતમ G4 સરપચ. રંગપર ગ્રામ પંચાયત Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	11/04/'21 Date of Survey

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

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: Rangpar (Bela)
b. Ward Number: –
c. Gram Panchayat: Rangpar
d. Block: Morbi.
e. District: Morbi.
f. State: Gujarat.
g. Lok Sabha Constituency: Morbi L.S. Constituency
h. Number of Habitations / Hamlets in the Gram Panchayat: –
i. Names of Habitations / Hamlets: –

Demographic Information

Number of Households 403 Total Population 2123 Male 1092 Female 1031

SC HHs 40 ST HHs – OBC HHs – Other HHs 363

II. Access to Infrastructure/Amenities etc.

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

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

1

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
l	Library	N	at Morbi
m	Common Service Centre	N	at Morbi
n	Veterinary Care Centre	N	at Morbi

ii. Road Connectivity

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

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

iii. Drinking Water Facilities

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

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

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

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

iv. Coverage of Habitations under Waste Management System

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

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

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

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

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

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

v. Coverage of Habitations under Electrification

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

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

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

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

vi. Sports Facilities in the Village

a.Number of Play Grounds in the Village (minimum size 200 square meters): 0

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

vii. Education, ICDS

a. Number of Anganwadi Centres: 1

c. Schools (Number)

Primary Private: 0 Primary Govt.: 1

Middle Private: 0 Middle Govt.: 1

Secondary Private: 0 Secondary Govt.: 1

Higher Secondary Private: 0 Higher Secondary Govt: 0

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	519	d.	Pasture / Grazing Land	–	g.	Check Dam	X
b.	Irrigated Land	6032	e.	Forests/ Plnatations	171	h.	Wells/Bore Wells	✓
c.	Un-irrigated Land	66	f.	Other Common Land	–	I	Tanks /Ponds 1	✓

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'

H.B.Doshi Haarid B. Doshi.	કુસુમબા મહેન્દ્રસિંહ સરપચ. રંગપર ગ્રામ પંચાયત	મનસુ પરસોતમ ઉપ સરપચ. રંગપર ગ્રામ પંચાયત	11/04/21
K.R.Chavda Kishor R. Chavda	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
Surveyor			

Chapter: 20
TDO-DDO-Collector emails sending Soft Copyattachment in the report

Gmail Haard Doshi <haardbdoshi47@gmail.com>

Detailed Project Report of Rangpar(Bela), Morbi.
1 message

Haard Doshi <haardbdoshi47@gmail.com> Tue, Jun 15, 2021 at 5:46 PM
To: tdo-morbi@gujarat.gov.in, ddo-mor@gujarat.gov.in, collector-mor@gujarat.gov.in

Respected Sir/Madam,

My name is Haard Doshi.
Greetings from the Civil Engineering Department,Government Engineering College - Rajkot.

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

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

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

Our Proposed Designs with an approximate cost :-

Sr. No.	Description	Period to implement	Amount (In Rs.)	Benefits
1.	Bio-gas Plant	Within 1 year	1,94,142	It is used for renewable energy sources as well as cheap energy sources compared to LPG gas.
2.	Children Park	Within 1 year	83,243	It is used for the purpose of playing children in a safe place and a dust free and clean environment.
3.	Rain Water Harvesting System	Within 1 year	70,960	It is used to store the rainwater which might be helpful to villagers in forms like, drinking water, Irrigation use, Agriculture purpose, etc.
4.	Community hall	Within 1 year	65,74,107	It is a necessary facility in case of any small events, annual meetings, get-together functions, family occasions etc.
5.	Dry Compose Public Toilet	Immediately	2,00,488	To provide facilities of toilets and reduce use of water.
6.	Clock tower	Long term (3-5 year)	4,26,406	For the aesthetic and heritage

				of the people of the village.
7.	Green House	Long term (3-5 year)	20,125	It is a building designed for the protection of tender or out-of-season plants against excessive cold or heat.
8.	Septic Tank	Immediately	27,142	It reduces the strength of sewage to the extent of about 30-35%.
9.	Bank	Immediately	9,56,353	It is used to save the Rs. of the people & people can easily withdraw or deposit money in bank, etc.
10.	Post-Office	Long term (3-5 year)	9,43,743	It 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, etc.
11.	Public Library	Within 1 year	5,51,407	It is used for reading and internet purposes for villagers.
12.	Auditorium	Long term (3-5 year)	5,53,805	It is an institution created in the public interest. They engage their visitors, foster deeper understanding and promote the enjoyment and sharing of authentic cultural and natural heritage.

Please find here with attached Detailed Report of Rangpar(Bela) Village.

RANGPAR (BELA) Village Report Phase-VIII (Part-II) .pdf
15310K

Chapter: 21
Comprehensive report for the Entire village

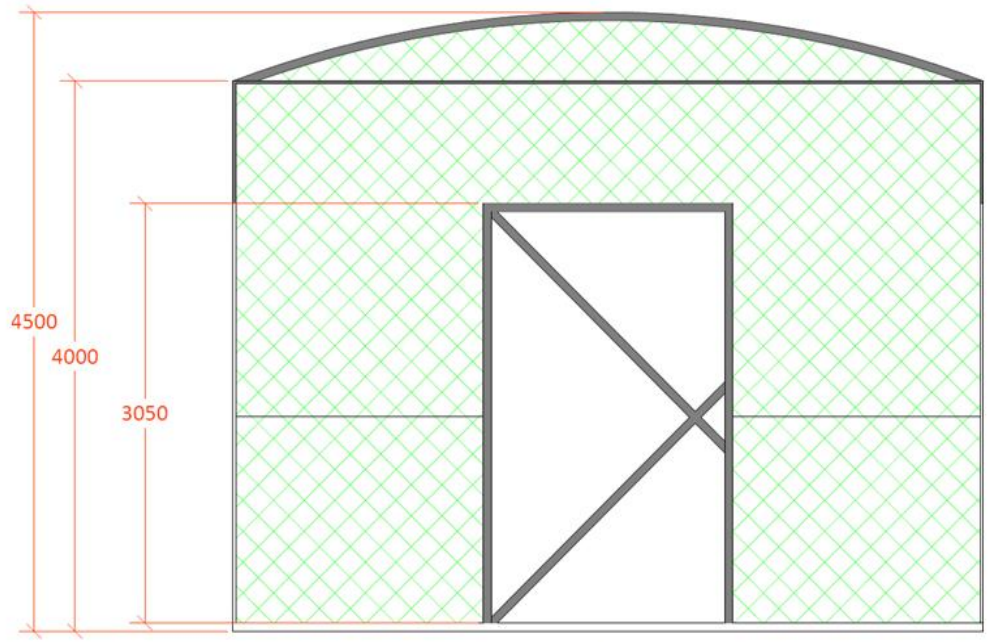
We have visited Rangpar (Bela) village and interact with various authorities of village like sarpanch, Talati Mantri as well as people of village. We explain them what is Vishwakarma Yojana and main aim of Vishwakarma project. We conduct techno-economic survey of village to identify various existing facilities.
We have also visited various places like gram-panchayat, bus stands, temples, Primary school and other amenities. Existing condition of various amenities as well as various infrastructures was examined by us like. road condition, housing condition, drainage system, etc.

We explain various design of our project under different infrastructure such as Green House (Sustainable design), Septic Tank (Physical design), Public Bank (Social design), Post-office (Socio-cultural design), Public Library (Smart village design) and Museum (Heritage design).
We discuss with Lilakha and Rangpar (Bela) Village authorities and dwellers of village and filled different types of survey form and analyze it. Using Techno-economic survey we get existing condition of village like demographical details, geographical details, occupational detail, physical infrastructure details, social infrastructure details, socio-cultural facilities, sustainable infrastructure facilities, and other facilities.

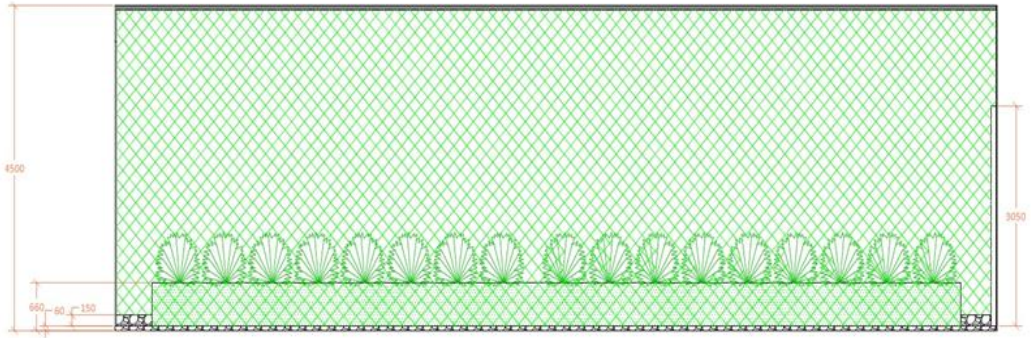
By use of Gap Analysis we compare all the available facilities and required facilities in Lilakha village. We observe available amenities in village like, road network, drinking water facility, educational facility, health facility, sanitation facility, transportation facility, and renewable source facility. We also observe which facilities are required for batter growth of village by interaction with different authorities of ideal village and smart village.

- Green House (Sustainable design)
- Septic Tank (Physical design)
- Public Bank (Social design)
- Post-office (Socio-cultural design)
- Public Library (Smart village design)
- Museum (Heritage design)

By providing this required facility to village, development and growth of village can be possible. So ultimately migration rate and urban city pressure can be reduced and livelihood of village dweller will increase and lastly this project is helped us to understand our skills and make it even batter. We got deep knowledge about development of village and various infrastructure facility design of village. Lastly, we enjoyed the informational as well as practical journey of civil work.



ELEVATION



Section AA

SECTION

→ All dimensions are in meter. unless stated otherwise.

→ Drawing should not be read for scale.

→ Design is Prepared for only educational purpose and correctionof all data must be checkbefore use.

→ Design is not responsible for any kind of worng data.

→ Minimum Grade of concrete is M20 and all Steel Grade is Fe415 as per IS: 456-2000.

→ All load bearing brick masonary wall in cement mortar in proportion of 1:6.

→ Check first the plot Dimensions.

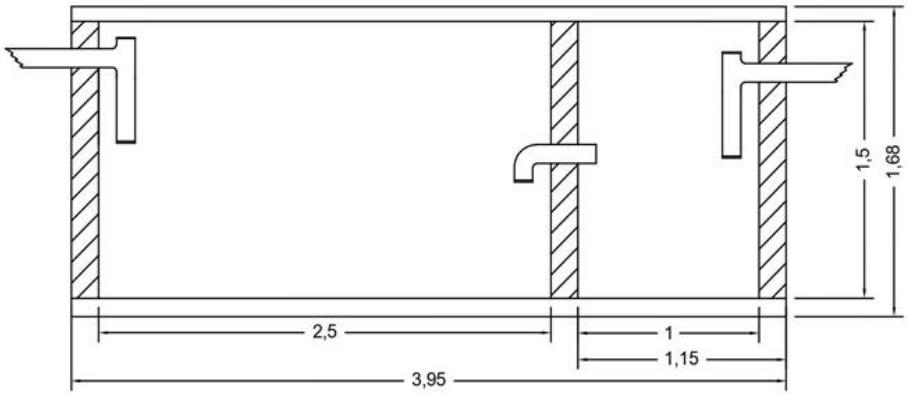
Design By :-

Haard B. Doshi

Kishor R. Chavda

Green House

Design Number	1
Date	15/04/2021
Vishwakarma Yojna	
Scale	1:10



SECTION

SECTION

3D MODEL

→ All dimensions are in meter. unless stated otherwise.

→ Drawing should not be read for scale.

→ Design is Prepared for only educational purpose and correctionof all data must be checkbefore use.

→ Design is not responsible for any kind of worng data.

→ Minimum Grade of concrete is M20 and all Steel Grade is Fe415 as per IS: 456-2000.

→ All load bearing brick masonary wall in cement mortar in proportion of 1:6.

→ Check first the plot Dimensions.

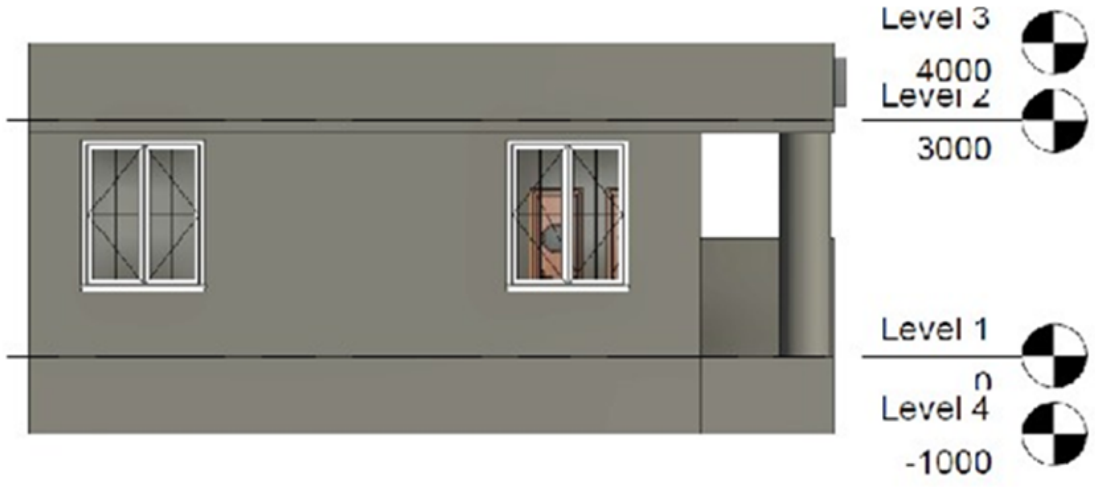
Design By :-

Haard B. Doshi

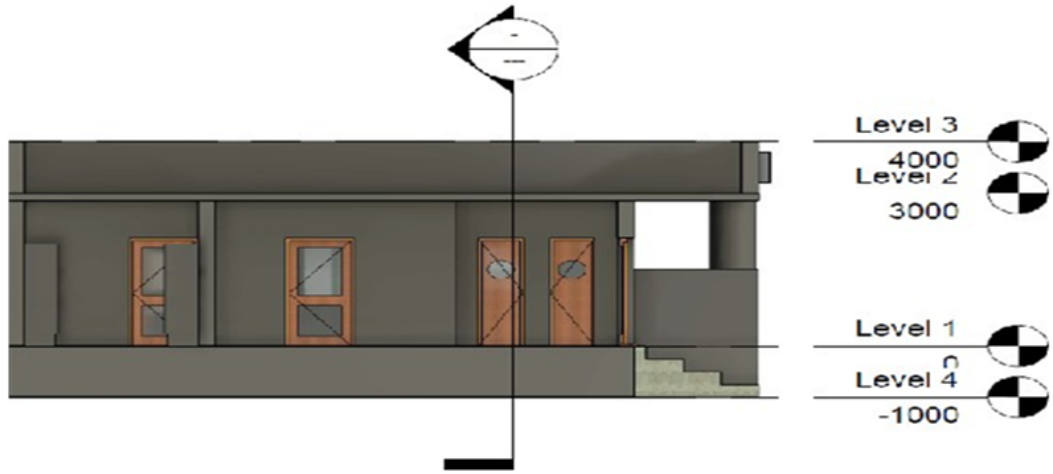
Kishor R. Chavda

Septic Tank

Design Number	2
Date	15/04/2021
Vishwakarma Yojna	
Scale	1:10



ELEVATION



SECTION

→ All dimensions are in meter. unless stated otherwise.

→ Drawing should not be read for scale.

→ Design is Prepared for only educational purpose and correctionof all data must be checkbefore use.

→ Design is not responsible for any kind of worng data.

→ Minimum Grade of concrete is M20 and all Steel Grade is Fe415 as per IS: 456-2000.

→ All load bearing brick masonary wall in cement mortar in proportion of 1:6.

→ Check first the plot Dimensions.

Design By :-

Haard B. Doshi
Kishor R. Chavda

Bank	
Design Number	3
Date	15/04/2021
Vishwakarma Yojna	
Scale	1:10

3D MODEL

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→ All load bearing brick masonary wall in cement mortar in proportion of 1:6.

→ Check first the plot Dimensions.

Design By :-

Haard B. Doshi

Kishor R. Chavda

Bank

Design Number	3
Date	15/04/2021

Vishwakarma Yojna

Scale	1:10

ELEVATION

SECTION

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→ Design is not responsible for any kind of worng data.

→ Minimum Grade of concrete is M20 and all Steel Grade is Fe415 as per IS: 456-2000.

→ All load bearing brick masonary wall in cement mortar in proportion of 1:6.

→ Check first the plot Dimensions.

Design By :-

Haard B. Doshi

Kishor R. Chavda

Post-Office

Design Number	4
Date	15/04/2021
Vishwakarma Yojna	
Scale	1:10

3D MODEL

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→ Design is not responsible for any kind of worng data.

→ Minimum Grade of concrete is M20 and all Steel Grade is Fe415 as per IS: 456-2000.

→ All load bearing brick masonary wall in cement mortar in proportion of 1:6.

→ Check first the plot Dimensions.

Design By :-

Haard B. Doshi

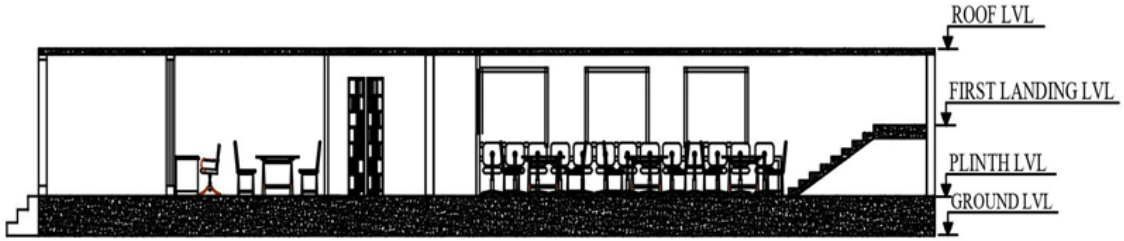
Kishor R. Chavda

Post-Office

Design Number	4
Date	15/04/2021

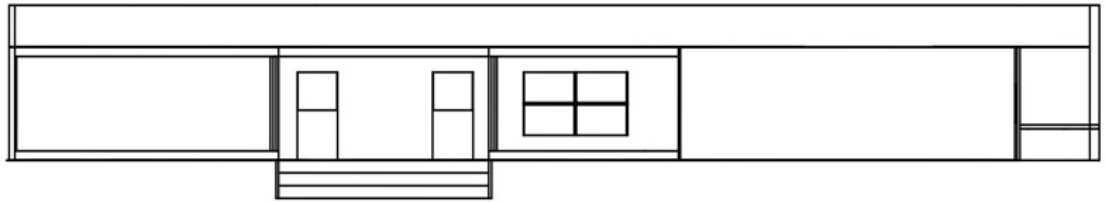
Vishwakarma Yojna

Scale	1:10



SECTION FROM A-A'

SECTION



FRONT ELEVATION

ELEVATION

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→ Minimum Grade of concrete is M20 and all Steel Grade is Fe415 as per IS: 456-2000.

→ All load bearing brick masonary wall in cement mortar in proportion of 1:6.

→ Check first the plot Dimensions.

Design By :-

Haard B. Doshi

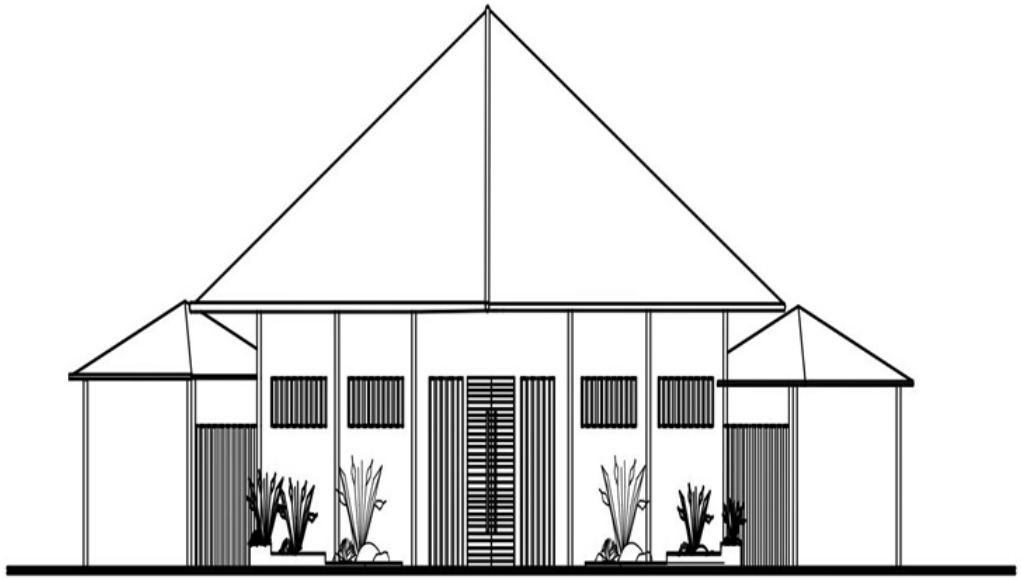
Kishor R. Chavda

Public Library

Design Number	5
Date	15/04/2021

Vishwakarma Yojna

Scale	1:10



Front Elevation

ELEVATION

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→ Design is not responsible for any kind of worng data.

→ Minimum Grade of concrete is M20 and all Steel Grade is Fe415 as per IS: 456-2000.

→ All load bearing brick masonary wall in cement mortar in proportion of 1:6.

→ Check first the plot Dimensions.

Design By :-

Haard B. Doshi

Kishor R. Chavda

Museum

Design Number	6
Date	15/04/2021

Vishwakarma Yojna

Scale	1:10