DETAILED PROJECT REPORT

VISHWAKARMA YOJNA: VIII
AN APPROACH TOWARDS RURBANISATION
BAMBHANIYA Village

BHAVNAGAR District

PREPARED BY

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Prof. CHINTAN A. GAJJAR

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

Detailed Project Report for,

VILLAGE : BAMBHANIYA

DISTRICT: BHAVNAGAR

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 carriedout by them under our supervision and guidance.

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Internal(Evaluator) Guide Name and Signature:	**Prof. C.A. GAJJAR**
College Name:	**Government Engineering College, Bhavnagar**
College Stamp:	

ABSTRACT

Vishwakarma Yojana project and how you do your vision project: Vishwakarma Yojana is an approach towards rurbanisation and Vishwakarma Yojana would provide "Design to Delivery" solution for development of villages in 'Rurban' areas. The team has conducted Vishwakarma Yojana Project for Bambhaniya Village with the vision of the developmental work in villages that could be undertaken as per the need of the village, in particular includes Physical, Social and Sustainable infrastructure facilities.

About your village description: Bambhaniya village is located in Bhavnagar Tehsil of Bhavnagar District in Gujarat, India. It is situated 110km away from Bhavnagar, which is both district & sub-district headquarter of Bambhaniya village. As per 2009 statistics, Bambhaniya is the Gram Panchayat of Bambhaniya Village. The total geographical area of village is 774.28hectares. Bambhaniya has a total population of 1902 peoples. There are about 989 houses in Bambhaniya village. As per 2019 stats, Bambhaniya Villages comes under Bhavnagar Rural assembly & Bhavnagar parliamentary constituency. Bhavnagar is nearest town to Bambhaniya which is approximately 110km away. The basic facilities available in the village are like post-office, small scale industries, panchayat building drainage facilities, pucca road, school, etc.

About existing village condition: In Bambhaniya village, drainage system is unavailable. The condition of roads is Poor except entrance. All the village roads are Pucca roads. There is no transportation facility in the village. In the village lack of basic facilities like public toilet, poor condition of panchayat building, Drainage system, public garden, community hall, etc.

About your proposed designs your view for village development: For development of the village infrastructure facilities like panchayat building, secondary school and public facilities like bus station are required. For sustainable development of the village rain water harvesting system, solar street light may be provided. Based on the survey we tried to give design of required basic facilities to fulfill their needs. By providing these basic facilities to villager's migration rate will be decreased. And this is ultimate aim of the Vishwakarma yojana.

About future scope of the village development: According to UDPFI norms, the team can enhance and design basic facilities which are unavailable at present in the village. These may include but not limited to (a) physical infrastructure including Solid waste Management, Water supply in village, (b) social infrastructure including some Community Hall, Recreational club, socio cultural center, (c) Recreational Facilities like Joggers park, Redevelopment of existing pond of Bambhaniya village, etc. In a nutshell, the future scope would be study of urban replicating amenities that would be sustainable in rural areas of Bhavnagar.

Key Words: Rurban, Smart village, Gap analysis, Sustainable development.

ACKNOWLEDGEMENT

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

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ABBREVIATIONS

Short name	Full name
RCC	Reinforced Cement Concrete
WBM	Water bound macadam
CPWD	Central Public Work Department
IRC	Indian Road Congress
PHC	Public health centre
ESR	Elevated service reservoir
VY	Vishwakarma Yojana
SH	State Highway
MDR	Major District Road
VR	Village Road
PCC	Plain Cement Concrete
TDO	Taluka Development Officer
DDO	District Development Officer
SC	Schedule caste
ST	Schedule Tribe
U/G	Underground sump
PHC	Public Health Center
SWOT	Strength Weakness Opportunity
NGO	Non-governmental Organization
CHC	Community health centre
APMC	Agricultural produce market committee
PMGSY	Pradhan Mantri Gram Sadak Yojana
RGGVY	Rajiv Gandhi Grameen Vidyutikaran Yojana
IAY	Indira Awash Yojana
NRHM	National Rural Health Mission
PMAGY	Pradhan Mantri Adarsh Gram Yojana
SSA	SarvaSiksha Abhiyan

CHAPTER:-1

1 Ideal village- mota aasarana(civil concept)

1.1 Background & Study Area Location

Mota Asrana is a village panchayat located in the Bhavnagar district of Gujarat state,India. The latitude 21.1578775 and longitude 71.6035504 are the geocoordinate of the Mota Asrana. Gandhinagar is the state capital for Mota Asrana village. It is located around 260.6 kilometer away from Mota Asrana. The surrounding nearby villages and its distance from Mota Asrana are Nana Asrana 2.5 KM , Kinkaria 2.8 KM , Bambhaniya3.6 KM , Akhegadh 4.7 KM , Dudhala No.2 5.5 KM , Ugalvan6.3 KM , Moti Vadal 6.5 KM , Lusadi 6.8 KM , Goras 7.6 KM. The village has mixture of covered block paving, kutcha road and bituminous types on different roads, while its major road connects with the national highway. Mota aasarana village has facilities like primary schools, temples, Gram Panchayat, Balakgram Aashram etc. and overall the village was observed as free from major pollutant sources etc.

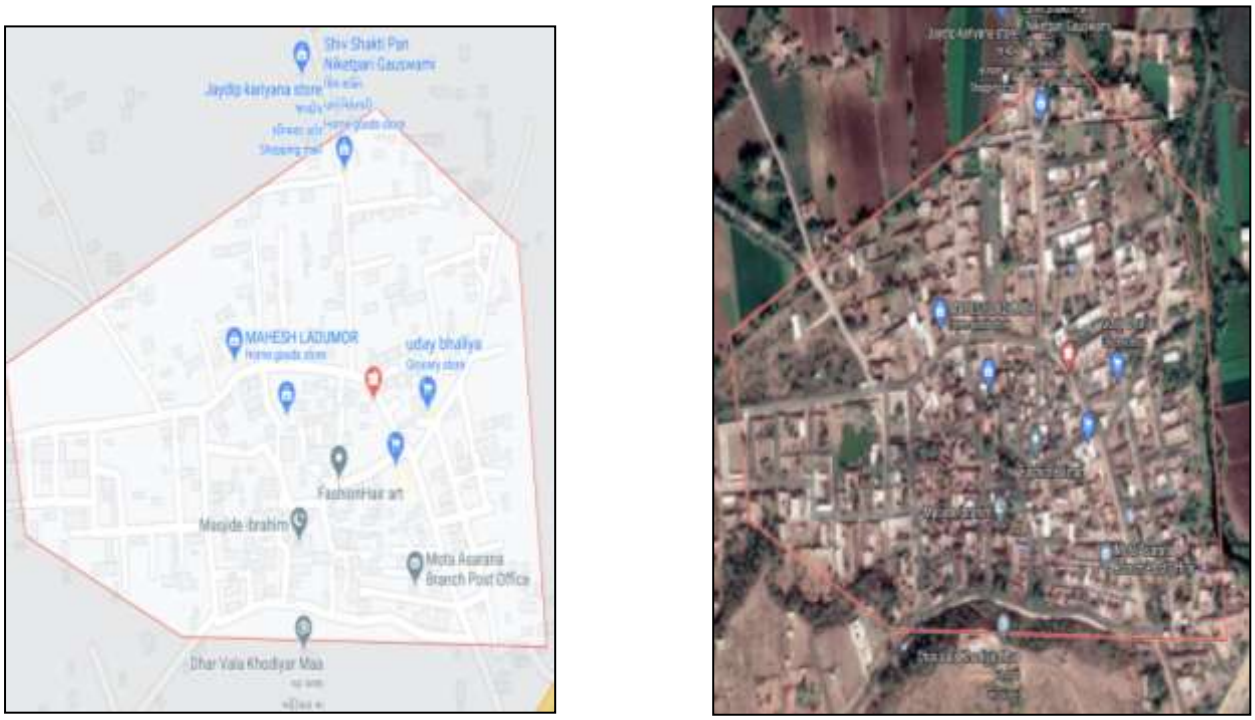


Fig 1 map of mota asrana village

1.2 Concept: Ideal Village, Normal Village

1.2.1Objective:

68.9% of our population lives in rural areas (Census 2011). Though number is expected to fall in the coming years, it is still estimated that more than half of our population would be rural even in 2050. Despite there being several past initiatives by governments at all levels –Central, State and Local –in the past, the level of improvement has not kept pace with the rising aspirations among Indians. On most development parameters, there is still a significant gap between rural and urban India. Hence, in this context, the major objectives of ideal village in context of normal village should be as follows:

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

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

1. punsari (Gujarat):

Punsari is **a** village located in Sabarkantha district in the state of Gujarat, India. Punsari is considered as India's smartest village. The village is located at about 80km from the state capital, Gandhinagar. Facility available in village is biogas plants, Closed-circuitcameras, water purifying plants,

air-conditioned schools, Wi-Fi, biometric machines– the village has it all. And all of it was done in a matter of eight years, at a cost of Rs. 16 crore. The man behind the transformation is its young tech-savvy sarpanch – 33-year-old Himanshu Patel – who proudly states that his village offers –the amenities of a city but the spirit of a village.

2.dhanora (rajsthan) :

Dhanora. Situated in the heartland of Chambal, this tiny village in the Dhaulpur district of Rajasthan has a population of 2,000. Until 2014, it was bereft of sanitation, internal roads, or potable water. It even faced issues like encroachment, power fluctuation, unemployment and crippling poverty. Enter the same village now, and you will be wonderstruck. The village is situated 30 km away from Dholpur district head quarter and 248 km from Jaipur.

3.dharnai (bihar) :

Once struggling to get basic electricity like most villages in India, Dharnai has now changed its fate and become the first village in India to completely run on solarpower. Residents of Dharnai had been using diesel-based generators and hazardous fuel like cow dung to meet the electricity requirement for decades, which were both costly and unhealthy. Since the launch of Greenpeace‘s solar-powered 100 kilowatt micro-grid in 2014, quality electricity is being

provided to more than 2,400 people living in this village in Jehanabad district.

4. Payvihir(Maharashtra):

An obscure village in the foothills of Melghat region of Amravati district in Maharashtra, Payvihir, has set an example for the country by consistently showing how communities and NGOs can work together to conserve the environment and ensure sustainable livelihood for people. Recently, the village also came up with an out-of-the-box idea of selling organic sitafals (custard apples) and mangoes in Mumbai under their brand Naturals Melghat.

1.2.3 The Idea of a model/Smart Village

Development is a highly complex, relative, and multi-dimensional concept. The core focus of this term even today continues to be economic growth. However, some quintessential terms such as sustainability and inclusiveness have been added to broaden the scope of this concept. From a holistic perspective, development is directed to achieve goals in health, education, public infrastructure, and empowerment of the people particularly at grass-roots level. The term rural development represents improvement in the quality of life of the people in rural areas. As per Chambers (1983), “rural development is a strategy to enable a specific group of people, poor rural women and men, to gain for themselves and their children more of what they want and need”. According to Sreedhar and Rajasekhar (2014), rural development as a phenomenon can be viewed as the result of interactions between various physical, environmental, technological, economic, socio-cultural, and institutional factors in the rural

areas of a nation. Sreedhar and Rajasekhar add that as a strategy, rural development is the approach or operational design to bring about the desired positive change in the socio-economic and cultural life of the people. Although development of rural areas has always been a priority of Indian government since independence, off late rapid urbanisation has diverted attention of the government onto urban areas. Hence, in a nutshell, an equal attention needs to be paid to the goal of rural rejuvenation.

1.2.4 Ancient History Civil / Electrical concept about Indian Village / other Countries Perspective about village and its new Development

Following the Gandhian vision and dream of Gram Swaraj (village level self-governance) (Bardhan, 2007), rural development has always been given critical salience in the planning process of independent India. It began with launching of the Community Development Programmes (hereafter CDP) in 1952 followed by the National Extension Services (hereafter NES) in 1953. These two programmes had ambitious objectives and envisioned community participation but failed miserably due to their topdown development paradigm (see the works of Sreedhar & Rajasekhar, 2014; Patel, 2014; UNDP, 2000). Later, successive Five-Year Plans led to the creation of essential physical and institutional infrastructure to bring about socio-economic changes in rural areas (Patel, 2014). The Fifth Five-Year Plan proposed different approaches to rural development such as Area Development, Target Group Approach, and comprehensive development approach. Schemes involving special financial and fiscal concessions, bank loans on soft terms, and capital subsidies were also introduced into underdeveloped areas to attract increased investments for development. (Patel, 2014). The Integrated Rural Development Programme (hereafter IRDP) launched in 1976 aimed at alleviating rural poverty and at holistic rural development through self-employment opportunities. The IRDP was conceptualized as a programme oriented towards development of a given area rather than development of a specific sector. It was designed to alleviate poverty through local level planning, taking into account the development of local resources including human resources through formulating projects on scientific lines.

IRDP also failed to realise its targets. “Swarnjayanti Gram Swarozgar Yojana” (SGSY) is a programme for self-employment of the rural poor and has been implemented since 1999, after restructuring and merging the erstwhile IRDP

and its allied programmes. In 2011, the government announced National Rural Livelihood mission with an objective to further the cause of rural development. All these programmes have met with partial success but still much needs to be achieved. It is important to identify and understand specific concerns, needs, and challenges in different rural areas of the country and adopt specific policies rather than adopting a "one – size fits-all" approach. Universal programmes need to be tweaked to suit local requirements so that their success is guaranteed.

India has a chequered history of Panchayati Raj (rural grass-roots institutions) starting from self-sufficient and self-governing village communities to modern-day organized village governance system in the format of Panchayati Raj Institutions or PRIs. The informal village level council of five elderly men (traditional Panchayats) and the present day democratically elected Panchayats state a lot about the deep-rooted culture of self-governance in this country. Sir Charles Metcalf called the traditional Panchayats of India little republics. However, these informal Panchayats suffered the onslaught of Mughal and British imperialism and could never be revived through democratic means in the pre- independence period. The CDP and NES were the first failed baby steps taken in that direction. The Balwant Rai Mehta Committee (1956) and Ashok Mehta committee (1966) recommended that a formal democratically elected structure had to be crafted at the grass-roots level in order to actualise the objectives of rural development programmes. Most of the other government committees7 also recommended that people's participation in planning and implementation and grass-roots leadership is a key to fructify objectives of rural development.

During his position as a Prime Minister of India, Late Shri Rajivbhai Gandhi's contribution to realising the Gandhian dream of rural self – governance is unforgettable. However, his government's initiative in the form of the 65th and 66th constitutional amendment bills was defeated in the upper house of the Indian Parliament. Finally, after the pronouncement of New Economic Policy in 1991, what followed in 1993 was a new polity policy in the form of the historic 73rd and 74th Constitutional Amendment Acts, which added the third tier to the Indian federal polity. These two acts constitutionally recognized rural local governance and made it responsible for performing twenty-nine functions. These functions are exclusively to be performed by a three-tier Panchayati Raj Structure which begins with Gram Panchayat (local body at the village level), Panchayat Samiti (local body at the block level, i.e. above village) and Zilla

Parishad (local body at the district level, i.e. above block). This has led to decentralization of not only functions but also of functionaries and finances. It has widened the scope for people's participation in the process of rural as well as self-development. Joshi (2017) calls these Panchayats the central processing units of Indian democracy.

The above stated history can be concluded as a statement that 'These grass-roots level units are the schools of Indian democracy.' If they are fed with appropriate inputs, it will be easier to earn outputs that will strengthen democracy as a whole in India. These institutions have been strengthened through salient constitutional provisions such as reservation of seats for women and marginalised sections of the society, and constitution of state election commission and state finance commission. However, the ground analysis of these institutions reveals that they have not been honestly vested with the functions, functionaries, and financial resources in many states in India. This masses the spirit of decentralized democracy and hampers rural development programmes as well. In fact, it still remains a rubber stamp third tier of Indian federalism (Tremblay, 2001). Financial paucity is the biggest problem faced by the PRIs. If PRIs are to work as prime mechanism of development, they have to be given proper financial aid, especially in a global world. However, the situation is not so bad that it does not give us any ray of hope. Certain villages in India are growing exceptionally well. Hiware Bazar, located in the District of Ahmednagar, in Maharashtra, has transformed from a place fraught with issues to possibly the richest village in India. The sole reason for this fairy-tale change is one man called Popatrao Pawar. He banned all addictive substances to minimize expense and encouraged the villagers to invest in rainwater harvesting, etc. There are a record 60 millionaires in the village and barely any poor. From 168 below poverty line families in 1995, Hiware Bazar now has just three. The villagers continue to strive to see the day when not one person is poor. Mawlynnong, 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 kilometres from Shillong, the village offers a skywalk that can be taken as you explore it. According to visitors, you cannot find a single cigarette butt or a plastic bag lying around there.8 Ankapoor is located in the District of Nizamabad in the state of Telangana. Ankapoor has been globally recognized as a "model agricultural village" for its achievements in introducing modern technologies in agriculture while ensuring the participation of all sections of the

village community, particularly women. Organizations like the Indian Council for Agricultural Research (ICAR), International Rice Research Institute (IRRI), Manila and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) have formally commended the developments in agriculture in the village. Kumbalangi is essentially a fishing hamlet that has developed as a unique rural tourist destination in Kerala's Ernakulam district. The Kumbalangi Integrated Tourism Village Project was launched in 2004, focusing on eco-tourism, while offering tourists a glimpse of the rich and rustic life of the Indian countryside. The important attractions in Kumbalangi include organic farm produce used to prepare meals for tourists, toddy tapping, and crab farming. To keep the village clean and serve its energy needs, households are also provided with subsidies for setting up mini biogas plants in their households. These villages in different parts of our country are guiding posts and give hope and optimism to work in the direction of holistic rural development.

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

1.3.1 Ideal village: mota asrana

Fig 2: PHC

Fig 3: public toilet

Fig 4 : gram panchayat

Fig 5: Information board

Fig 6: Aaganwadi

Fig 7 : primary school

Fig 8 : internal road

Fig 9 : water tank

Fig 10 : major road

Fig 11 : house condition

1.3.2 Smart village : mota khuntavada

Fig 12 : police station

Fig 13 : bank

Fig 14 : PHC

Fig 15 : Post office

Fig 16 : ATM

Fig. 17 : Information board

Fig. 18 : internal street road

Fig. 19 : Kuchha road

Fig. 20 : Gram panchayat

Fig. 21 : PHC

fig. 22 : secondary school

Fig. 23 : Dairy of village

1.4 SWOT analysis of Ideal village / Smart Village

SWOT Stands for the Stregth, Weakness, Opportunities and Threats.

Strength of village :

- Education
- 24 hours Wi-Fi facilities
- Central sound system
- Woman empowerment (Sakhi mandal)
- 24 X 7 Electricity available
- R.C.C. road in village
- Mobile Library
- Mobile Toilet Block
- Skill Development Centre
- Water Treatment plant
- Water Tank
- Bank

Weakness of village :

- No public library
- No recreationalarea or public garden
- Old method of agricultural system
- Lack of maintenance of some existing facilities

Opportunity in village :

- Women Empowerment
- Skill Development Centre (Sewing Operating, Basic Computer Course,Beauty parlor & Garment Sector)
- Private Nursing Homes
- Shopping Shops
- The rise ofliving standard ofpeoples.
- To make a village witha 100% employment

Threat of village:

- Illiteracy of some people in village
- Lack of fundand technical knowledge in agriculture field.

1.5 Future prospects of Development of the Ideal village / Smart Village

Future plans: After successfully serving for two terms as village headman, Himanshu Patel stepped down from the post since this time it was reserved for a female candidate. He now wants to focus on preparing a team of young local level leaders who are not only from his own state but from across the country.

He has already networked with a thousand such young village headmen from different corners of India, cutting across party ideologies. The aim of such a group is to share experiences of rural development among themselves. Nonetheless, what is important to note here is that Himanshu Patel does not intend to replicate the model of Punsari in other parts of the country. He rather believes that every village should be a unique example rooted in its own ecology and environment. He has been appointed programme officer to overlook the implementation of Nandgram project which is based on a PPP model. Vedanta Company is contributing 1000 crore rupees under its CSR initiative. The proposed programme focuses on nutrition of infants and children and fights against under and malnutrition in India.

1.6 Benefits of the visits of Ideal village / Smart Village

In context of Vishwakarma Yojana Project, the study of ideal / smart village strengthens the thinking process about how the allocated should be developed. One may think for the allocated villages in respect of Punsari Village:

- To trigger processes which lead to a holistic development of the identified Gram Panchayats
- To substantially improve the standard of living and quality of life of all section of the population through -
    - Improved basic amenities
    - Higher productivity
    - Enhanced human development
    - Better livelihood opportunity
    - Reduced disparities
    - Access to right and entitlements
    - Wider social mobilization
    - Enriched social capital
- To generate models of local level development and effective local government which can motivate and inspire neighboring Gram Panchayats to learn and adapt
- To nurture the identified Adarsh Grams as schools of local development to train other gram panchayat

1.7 Electrical / Civil aspects required in Ideal village / Smart Village

As mentioned earlier, the study area village is situated in Mahuva Taluka, hence the team members have identified 'Mota Khuntavda' as smart village and 'Nana Aasarana' as an ideal village. Nana Aasarana has many facilities and amenities by which it is ideal. This village is having all weather road and block paved streets. In terms of sanitation, they have public toilet in the village. A post office in good condition working in the village, educationally village is in good shape, so overall the team members can adopt this village in the ideal village category because it is also fulfilling various criteria.

Mota Khuntavda is village situated near National Highway and hence the people living in the village enjoying many commercial benefits there. This village has piped water connection and citizens are having tap water at their houses and they are having adequate water supply for all the activities, village has pucca road and street light system and sanitation is also good there. Viewing economical aspect it has facilities of banks, ATMs, Post office, market etc and overall education structure is also in good quality. So that is why the team members can consider this village as smart village.

After gap analysis and viewing these villages, our village Bambhaniya does not have some basic amenities like Primary health centre, in some areas still drainage system is not available, on Economical aspect a single Bank or ATM not available there. Education structure is at its peak condition because it has number of schools and Anganwadis. Our village is not having street light system also. As many more things are to be planned there the team members can surely say, and an effort the team members made here under Vishwakarma Yojana to introduce some designs and concepts for village development.

CHAPTER : 2

2 Literature Review – (Civil & Electrical Concept)

2.1 Introduction : Urban & Rural village concept

Urban area concept :

Urban is that area where the population density Is more and new facilities are provided to the people. Urban area is the region surrounding a city. Most of inhabitantsof urban areas have nonagricultural jobs. Urban areas have municipality , corporation,cantonment board or notified town area committee etc. According to census 2011, there are 7,935 towns, 4,041 statutory town and 3,894 census towns. All places with a municipality, corporation, cantonment board or notified town area committee, etc.A minimum population of 5,000; At least 75% of the male main working population engaged in non-agricultural pursuits.

Rular area concept :

All the areas which are not characterized as urban area is called rural area. In which the population is very low compared to urban areas. Mainly they depend on agricultural activities. According to census 2011, there are 6, 40,867 villages in India. The area where population is associated with agricultural activity is known as rural area.Rural areas are also known as the 'village' in India. It has a very low population density. 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 consideredrural in nature. In these areas the panchayat makes all the decisions.

2.2 Importance of the Rural development

Rural development usually relates to the method of enhancing the quality of life and financial well-being of an individual specifically living in populated and remote areas. Traditionally rural development is centered on the misuse of land-intensive natural resources such as forestry and agriculture. But today, increasing urbanisation and change in global production, networks have transformed the nature of rural areas.

Today, rural development still remains the core of the overall development of the country. It has become more than two-thirds of the country's people is dependent on agriculture for their livelihood and one-third of rural India is still below the poverty line. Therefore, it is important for the government to be productive and provide enough facility to upgrade their standard of living.

Rural development is a complete term that concentrates on the action taken for the development of rural areas, which improve the village economy. However, few areas that demand more focused attention and new initiatives are.

- Education
- Public Health and Sanitation
- Women Empowerment
- Infrastructure Development (e.g. electricity, irrigation, etc.)
- Facilities for agriculture extension and research
- Availability of Credit
- Employment opportunity

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

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

2.3 Ancient Villages / Different Definition of: Rural Urban Villages

In the following content, various definitions of 'urban village' have been presented to know how the term has various horizon ranging from local level to international level and also in context of various research scholars as well as universities:

(1) As mentioned in topic no. 2.1, the urban village as an entity exists only as a concept. Administratively, it merges with the urban ward as soon it gets notified, but has starkly different characteristics from the rest of the ward. The rural-urban conflicts are strongly manifested here.

(2) As per the definition given by Gaigongmei Gangmei, "Urban village typically would mean a well-planned set-up with a village-concept of being fairly self-sufficient and not having the need to travel long distances to get daily things done. What is most important, perhaps, is that it's intended to tackle the problem of increasing population in cities."

(3) As stated in topic no. 2.1 and observed by Mr. Kapil Chaudhary – Urban Planner and Director of Spatial Designs that "The Delhi urban villages have some of these salient features, especially mixed-use zoning. What has become more apparent, thought, is how each urban village differs from each other."

(4) In urban planning and design, "An urban village is an urban development typically characterized by medium-density housing, mixed use zoning, good public transit and an emphasis on pedestrianization and public space."

(5) In July 2002, Biddulph M., et. al., stated the concept of 'urban village' and provided its use in cases like (a) To investigate the variety of values and meanings ascribed to developments informed by the village as a lived experience accords with the intentions and perceptions of those who promote and use it, *(c)* To assess the extent to which principles of development accord with user aspirations.

(6) In context of Mr. E. Christopher Mare, Doctoral Researcher of Village Design Institute, Fielding Graduate University (2006), has mentioned the concept of 'urban village' in context of a briefing sheet – practiced in U.K. – as "An urban village is a concept of settlement which is small enough to create a community in the truest sense of the word – a group of people who support each other, but big enough to maintain a reasonable cross section of facilities." Within the same report, the researcher mentioned one of the key characteristics of an urban village as "Each

Urban Village is planned and developedthrough a Master Plan,backed by a series of codes, and an environmental urban village concept, on the part of all those individuals involved, *(b)* To assess the extent to which the urban

(7) action plancoveringhow the environmental impact of the village is to be managed andminimized."

On the other way, the concept of 'rural village' is very clear and specific in terms of the synonymous words' conjunction in the form of 'rural' and 'village'. There is very thin difference between the same. The team, based on the background of various colleagues and discussion with elders as well as faculties, identifies the difference in a way that when a person uses the term 'village' that means the location will have specific revenue boundary, agriculture as its main economy and has limited mix-zoning in land use; while when a person uses the term 'rural' that means it adds a sense of imaginary comparison in context of urban area and may comprise single or multiple villages who have either mix-zoning type of land use as well as agriculture and small scale industries as their major economy drivers.

One famous newspaper "The Hindustan Times" published an opinion type article with the headline as "India needs a rural centric development model" (24th July, 2020) stating in context of migration activities observed during the COVID-19 situation in India. It also revealed the fact that India is the second largest country in terms of numbers of migrant workers, while the first is China. The article concluded with the statement as "To convert the 'crisis into an opportunity', this is the alarming time for India to identify and implement rurban development models as well as rural centric development models."

Further, in an article of Retd. Prof. Vijay Kumar Sarabu, Warangal, India, who has published nearly 100 publications, has mentioned in his 'Way forward article' in October-2018 that "Government should go for appraisal of various rural development schemes and programmes in order to uplift rural areas. Rural entrepreneurship finds it difficult to take off is due to lack of capital accumulation, risk taking and innovation. The rural development programs should combine infrastructure development, education, health services, investment in agriculture and the promotion of rural non-farm activities in which women and rural population can engage themselves. Rural development and rural entrepreneurship is the way of converting developing country into

developed nation."
As a concluding approach of this topic, the following chart can be referred for urban and rural villages' origin, evolution and their present perspective for respective development in context of case study of San Joes City of California:

2.4 Scenario: Rural / Urban village of India population Growth

As per the article published in Down To Earth's print edition (dated 16-31 October, 2019,) entitled as "Census 2021: India's Urban-Rural Conundrum", it is mentioned that if one is *g*oing by census definition, a habitation is declared urban, if it has a minimum population of 5,000; at least 75 per cent of the male working population is engaged in non-agricultural pursuits; and population density is at least 400 people per sq km. Such habitations are called Census Towns.

For the first time in history, the Census 2011 reported a decline in the population growth rate of rural India. However, at that time India was still predominantly rural, with the urban population being just 30 per cent. Between Census 2001 and Census 2011, the number of Census Towns increased from 1,362 to 3,894. This indicates that people in rural areas are quitting farming or joining non-farm livelihoods. Another concern is that these non-farm jobs are mostly in urban areas. In recent years, these urban employment sources have not been able to meet the surging job demands due to the exodus from agriculture. As the latest economic data points out, manufacturing, construction and other related sectors have not been able to generate employment as they used to earlier. All these sectors are experiencing slowdown.

This leaves us with that big conundrum: The team members urbanise and celebrate it as a sure shot path to prosperity, but urbanisation doesn't provide basic livelihood to people who have migrated from rural areas. The trend that can be observed from past 5 to 6 decades is also presented below:

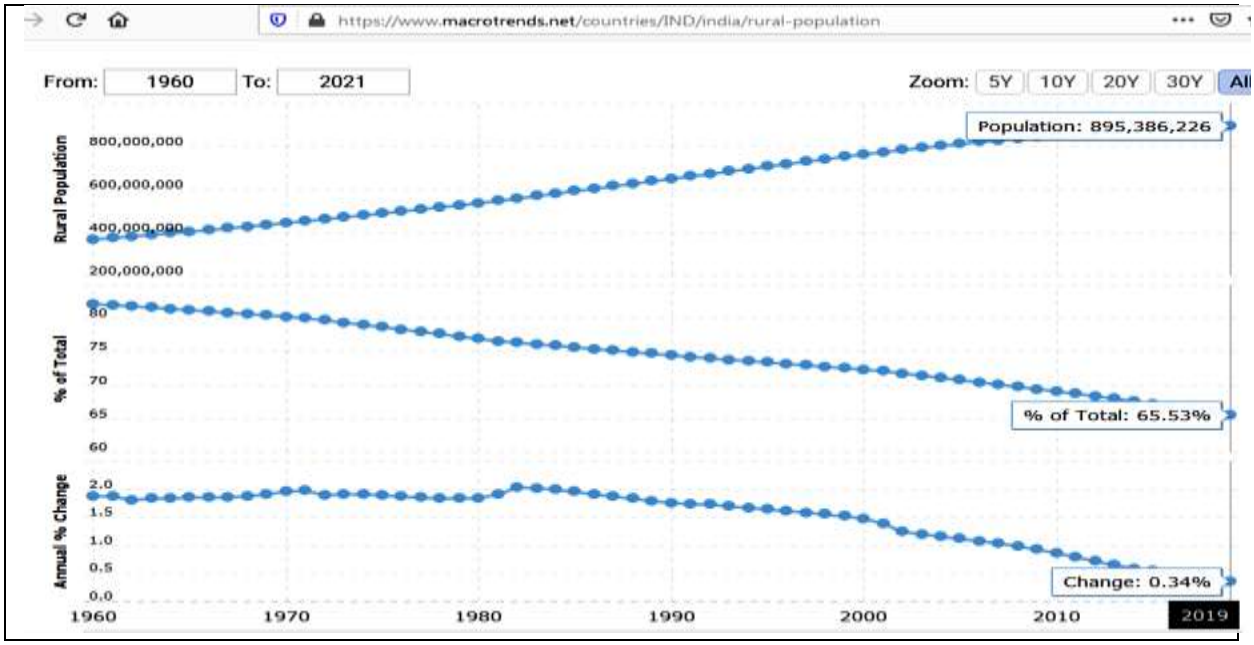


FIG. 26: RATE OF CENSUS

With the above latest article details, the team hereby wants to present some glimpse of Population Census of 2011 – Population – Growth – Variation, with the reference of "Rural – Urban Distribution of Population in India – Census 2011", by Dr. C. Chandramouli, Registrar General & Censor Commissioner of India – year 2011, which are as follows:

- Out of the total of 1210.2 million population in India.the size of Rural population is833.1 million (or68.84% of the Total Population).
- Urban population 377.1 million (or 31.16%) ; Increase in Rural areas: 90.4 million ; Increase in Urban areas: 91.0 million
- During 2001-11 the growth of Rural Population has been 12.18%
- Growth in Rural Population in India is steadily declining since 1991
- General decline in Rural Growth Rate among all 3 categories during the lastdecade2001-11
- Whereas Non-EAG (Empowered Action Group) decline in growth since 1971-81,the EAG States (i.e. Rajasthan, Uttar Pradesh, Uttarakhand, Bihar, Jharkhand, Madhya Pradesh, Chhatisgarh and Orissa) have declined only during the last decade.
- Growth in Rural Areas in Non-EAG States during 2001-11 has sharply declined to 5.71%.
- There has been a spurt in growth of population in Urban areas in the country, which could be due to: Migration, Natural increase and inclusion of new area under 'urban'.

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

As per details from Census 2011, Gujarat has population of 6.04 Crores, an increase from figure of 5.07 Crore in 2001 census. Total population of Gujarat as per 2011 census is 60,439,692 of which male and female are 31,491,260 and 28,948,432 respectively. In 2001, total population was 50,671,017 in which males were 26,385,577 while females were 24,285,440. The total population growth in this decade was 19.28 percent while in previous decade it was 22.48 percent. The population of Gujarat forms 4.99 percent of India in 2011. In 2001, the figure was 4.93 percent.Recently as per Gujarat census data, 83.92% houses are owned while 13.54% were rented. In all, 65.95% couples in Gujarat lived in single family. In 2011, 57.87% of Uttar Pradesh population had access to Banking and Non-Banking Finance Corporation. Only 3.13% of Uttar Pradesh population had internet facility which is likely to improve in 2021 due to Jio. 6.10% of family in Uttar Pradesh owned car while 34.14% owned two wheller. In few months the team members will also get details of election data for Gujarat.

Out of total population of Gujarat, 42.60% people live in urban regions. The total figure of population living in urban areas is 25,745,083 of which 13,692,101 are males and while remaining 12,052,982 are females. The urban population in the last 10 years has increased by42.60 percent .Sex Ratio in urban regions of Gujarat was 880 females per 1000 males. For child (0-6) sex ratio the figure for urban region stood at 852 girls per 1000 boys. Total children (0-6 age) living in urban areas of Gujarat were 2,952,359. Of total population in urban region, 11.47 % were children (0-6).Average Literacy rate in Gujarat for Urban regions was 86.31 percent in which males were 90.98% literate while female literacy stood at 70.26%. Total literates in urban region of Gujarat were 19,672,516.

Description	Rural	Urban
Population (%)	57.40 %	42.60 %
Total Population	34,694,609	25,745,083
Male Population	17,799,159	13,692,101
Female Population	16,895,450	12,052,982
Population Growth	9.31 %	36.00 %

Sex Ratio	949	880
Child Sex Ratio (0-6)	914	852
Child Population (0-6)	4,824,903	2,952,359
Child Percentage (0-6)	13.91 %	11.47 %
Literates	21,420,842	19,672,516
Average Literacy	71.71 %	86.31 %
Male Literacy	81.61 %	90.98 %
Female Literacy	57.78 %	70.26 %

TABLE 1 : COMPARISION OF RURAL & URBAN AREA

2.6 Rural Development Issues - Concerns - Measures

The development of rural India is grim and scaling up more in coming days. The reason behind is that more fund is pumping for development at urban then rural and hence, migration is steadily increasing every year after Independence towards cities.Under SGSY programmes, some of the challenges identified by Chandra Dass (2004) are given below so as to overcome them:

1. There should be a regular follow-up of development of skills, maintenance of accounts, enhancement of productivity, marketing, selling etc.
2. Proper identification of local needs and demand-based trades to be encouraged.
3. Enterprises with a sustainable outlook, from the entrepreneur's point of view rather than from the stakeholder's point of view, should be evolved.
4. Ranking of areas of training for rural people to be done with sincerity. It includes agriculture, animal husbandry, handicrafts, food and paddy processing.
5. Very practical oriented syllabus for training is to be designed.
6. The trainers should have integrated outlook and must emphasis on practical training.
7. District level Marketing Information Centre (MIC) to be established.
8. Promoting opportunity for marketing outside their locality.
9. Quality of low-cost products with enhanced capacity of artisans to face global threat.

10. Code of conduct, value and moral education workshops for both stakeholders and beneficiaries need to be conducted.
11. Enhancing skills and knowledge programmes should also cover stakeholders and Panchayati Raj Institute (PRI) representatives.
12. Encouragement and special thrust required for PRIs and officials.
13. Opportunities for experiential learning, attending training and exposure visit for stakeholders and rural entrepreneurs should be increased in proportion to the increasing number of target groups.

In context of the above challenges, Mr. Vasava B., researcher from Veer Narmad University, Gujarat, has identified some of the practical suggestions and measures based on his experience while working with several rural area and NGOs like developmental, activist who are educating, making awareness and implementing projects at rural levels for the holistic development of all strata of class and caste, which are as follows:

1. Involvement Beneficiaries from the Beginning till End.
2. Planning to be done at Micro to Macro levels.
3. Creating Ownership of Project Work & Assets.
4. Educating Beneficiaries about the Project Proposal(s) through PRA Exercise.
5. Recruiting Committed, Honest and Trustworthy Local Personnel for Implementation of Project Activities.
6. High lighting major activities done by VOs/NGOs/Departments at Public place(s).
7. Avoiding shifting/transferring committed and hardworking staff till project work is completed.
8. Panchyati Raj Institutions' members should be paid salary/honorarium against their work –which will reduce malpractices and corruption.
9. Promoting Social Audit among all Stakeholders.
10. Strengthening Local Bodies like PRIs, Village Institutions, SHGs, VOs, etc.

Further, the researcher concluded with the statements that without giving proper exposure, training to all stakeholders and not having commitment, transparency, openness and honesty with beneficiaries it will be more challenges for development in rural India. But there is nothing is impossible for good things,

yes, there may be lots of hurdles but when people's participation is there it will be achievable. If the team members have to reduce overcrowded cities then holistic approach is necessary for rural development; otherwise it will be wasting of money, energy, resources and many more. Strategies can be decided once the ground reality is understood in a proper manner and as per the situation, any strategy can be decided as per the community and their ideology, their past records and so on. Here it is given real example which cannot be possible everywhere, but everything is shown to beneficiaries, their participation is there from the beginning would lead towards sustainable development with less hazards.

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

Various infrastructure guidelines have been tabulated here for the provisions of different infrastructure facilities in context of Urban Development Plans Formulation and Implementation (UDPFI) guidelines.

Village Facilities	Planning Commission/UDP FINorms	Required as per Norms
Social Infrastructure Facilities		
Education		
Anganwadi	Each or Per 2500 population	0
Primary School	Each Per 2500 population	0
Secondary School	Per 7,500 population	0
Higher Secondary School	Per 15,000 Population	1
College	Per 125,000 Population	0
Tech. Training Institute	Per 100000 Population	0
Agriculture Research Centre	Per 100000 Population	0
Skill Development Center	Per 100000 Population	0
Health Facility		
Govt/Panchyat Dispensary orsub PHC or health center	Each Village	0
Primary Health & Child HealthCenter	Per 20,000 population	0
Child Welfare and MaternityHome	Per 10,000 population	0
Multispeciality Hospital	Per 100000 Population	0

Public Latrines	1 for 50 families (if toilet is notthere in home, specially for slum pockets & kutcha house)	1
Physical Infrastructure Facilities		
Transportation		
Pucca Village Approach Road	Each village	NO NEEDED
Bus/Auto Stand provision	All Villages connected by PT(ST Bus or Auto)	BUS STAND
Drinking Water (Minimum 70lpcd)		
Over Head Tank	1/3 of Total Demand	0
U/G Sump	2/3 of Total Demand	0
Drainage Network - Open		
Drainage Network - Cover		0
Waste Management System		0

Socio- Cultural Infrastructure Facilities		
Community Hall	Per 10000 Population	1
community hall and Public Library	Per 15000 Population	1
Cremation Ground	Per 20,000 population	0
Post Office	Per 10,000 population	0
Gram Panchayat Building	Each individual/group panchayat	1
APMC	Per 100000 Population	0
Fire Station	Per 100000 Population	0
Public Garden	Per village	0
Police post	**Per 40,000Population**	0

TABLE 2 : UDPFI NORMS

2.8 Other Projects / Schemes of Gujarat / Indian Government

The Government of Gujarat, having realised the importance of the all-inclusive rural development, has been constantly endeavoring to make rural life better. While it continues to do so, it has achieved fantastic results because of this sustained effort. The basis of Gujarat model of development is 'People's Participation', as it reflects in its pledge of 'Collective Efforts and Inclusive Growth'. The Rural Development stories emanating out of Gujarat show how

the State Government has enabled people to uplift their livelihoods through this model.

Gujarat has effectively utilized the funding from Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), a momentous initiative towards pro-poor growth, to create sustainable and productive assets and in turn helped boosting the rural economy, protecting the environment, empowering rural women, reducing rural urban migration and fostering social equity among others.

'Mission Mangalam' is an award-winning venture aimed at poverty elimination and women empowerment. It aims at uplifting women belonging to the poor families by giving them enough support to enable them to utilize their skills and improve their conditions. The programme is implemented by Gujarat Livelihood Promotion Company.

Much of the area of this state remains arid with saline water which is unusable for the agricultural purpose. This area depends mainly on seasonal rain-water. Thus, to effectively manage and conserve rain-water, Watershed Management Programme was incorporated. It aims at promoting agriculture by eliminating the scarcity of water resource and in turn create employment opportunities for the rural families.

The state government recognizes the practical and social importance of one's own house and thus, Gujarat has been pro-active in the implementation of Indira Aawas Yojana, which provides pucca houses to the rural poor. With all this and more, the Government of Gujarat has been proactive in the amelioration of rural lives, and it aims at continuing its efforts with increased vigour.
But in above details, what may be the role of a student or academic institution, especially of a higher and / or technical education? The answer lies within the vision and mission of Vishwakarma Yojana Project under which the developmental work in villages that could be undertaken as per the need of the village in particular includes Physical infrastructure facilities (Water, Drainage, Road, Electricity, Solid waste Management, Storm Water Network, Telecommunication & Other), Social infrastructure facilities (Education, Health, Community Hall, Library, Recreation Facilities & other) and renewable energy (Rain water harvesting, Biogas plant, Solar Street lights & Other) for Sustainable development.

CHAPTER – 3

3 Smart (Cities/ Village) Concept Idea and its Visit (Civil & Electrical Concept)

3.1 Introduction: Concepts, Definitions and Practices

There is no universally accepted definition of a smart city. It means different things to different people. The conceptualisation of Smart City, therefore, varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city residents. A smart city would have a different connotation in India than, say, Europe. Even in India, there is no one way of defining a smart city.

In the approach of the Smart Cities Mission, the objective is to promote cities that

provide core infrastructure and give a decent quality of life to its citizens, a clean and

sustainable environment and application of 'Smart' Solutions. The focus is on sustainable and inclusive development and the idea is to look at compact areas, create **replicable model which will act like a light house to other aspiring cities**.

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

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

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

Regarding the concept of 'Smart Village', Government of India's Ministry of Rural Development has already launched 'Shyama Prasad Mukherji Rurban Mission (SPMRM) and this National Rurban Mission has identified a term 'Rurban Village', which has been adopted as a concept of 'Smart Village' for

the report preparation by the team.

Large parts of rural areas in the country are not stand-alone settlements but part of a cluster of settlements, which are relatively proximate to each other. These clusters typically illustrate potential for growth, have economic drivers and derive locational and competitive advantages. Hence, making a case for concerted policy directives for such clusters, these clusters once developed can then be classified as 'Rurban'. Hence, taking cognizance of this, the advantages of clusters, both from an economic view point as well as to optimize benefits of infrastructure provision, the Mission aims at development of 300 Rurban clusters, in the next five years. These clusters would be strengthened with the required amenities, for which it is proposed that resources be mobilized through convergence of various schemes of the Government, over and above which a Critical Gap Funding (CGF) would be provided under this Mission, for focused development of these clusters.

Mission's Vision

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".

Mission's Objective

The objective of the National Rurban Mission (NRuM) is to stimulate local economic development, enhance basic services, and create well planned Rurban clusters.

Mission's Outcome

The larger outcomes envisaged under this Mission are: (i) Bridging the rural-urban divide-viz: economic, technological and those related to facilities and services,(ii) Stimulating local economic development with emphasis on reduction of poverty and unemployment in rural areas,(iii) Spreading development in the region,(iv) Attracting investment in rural areas.

3.2 Vision-Goals, Standards and Performance Measurement Indicators

Goals:

Determine which technologies, strategies, applications, and institutional arrangements demonstrate the most potential to address and mitigate, if not solve, transportation challenges identified within a city.

Vision:

Mobility on Demand (MOD) is an emerging concept built on shared use approaches and a shift in mass transit. It augments public transportation and supports the efficient movement of people.

A major component includes advanced traveler information systems that provide real time traffic, transit, parking, and other transportation-related information to travelers.

Accordingly, the purpose of the Smart Cities Mission is to drive economic growth
and improve the quality of life of people by enabling local area development and
harnessing technology, especially technology that leads to Smart outcomes. Area based development will transform existing areas (retrofit and redevelop), including
slums, into better planned ones, thereby improving live ability of the whole City. New areas (greenfield) will be developed around cities in order to accommodate the expanding population in urban areas. Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services.
Comprehensive development in this way will improve quality of life, create employment and enhance incomes for all, especially the poor and the disadvantaged, leading to inclusive Cities.
The purpose of the Smart Cities Mission is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to Smart outcomes. Area-based development will transform existing areas (retrofit and redevelop), including slums, into better planned ones, thereby improving liveability of the whole City. New areas (greenfield) will be developed around cities 7 in order to accommodate the expanding population in urban areas. Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services. Comprehensive development in this way will improve quality of life, create employment and enhance incomes for all, especially the poor and the disadvantaged, leading to inclusive Cities. Following are various guidelines adopted for Smart City Development:

Culture, Government of India M.. *National Mission on Cultural Mapping And Roadmap*. Ministry of Culture, 2017.
Heritage City Development and Augmentation Yojana (HRIDAY). New Delhi, India: Ministry of Urban Development, Govt. of India, 2014.
Guidelines for Swachh Bharat Mission (SBM). New Delhi, India: Ministry of Urban Development, Govt. of India, 2014.
AMRUT Mission Statement and Guidelines In AMRUT Mission Guidelines. New Delhi, India: Ministry of Urban Development, Govt. of India, 2015.
Smart City Mission Statement and Guidelines In Smart Cities Mission Guidelines. New Delhi, India: Ministry of Urban Development, Govt. of India, 2015.

Each aspiring city competes for selection as a smart city in what is called a 'City
Challenge'. There are two stages in the selection process. After the number has been
indicated to the respective Chief Secretaries, as outlined in para 8 above, the State/UT
will undertake the following steps/stages:

Stage 1 of the competition: ***Shortlisting of cities by States***

The State/UT begins with shortlisting the potential smart cities on the basis of conditions precedent and scoring criteria and in accordance with the total number allocated to it. The first stage of the competition will be intra-state, in which cities in the State will compete on the conditions precedent and the scoring criteria laid out.These conditions precedent have to be met by the potential cities to succeed in the first round of competition and the highest scoring potential smart cities will be shortlisted and recommended to participate in Stage 2 of the Challenge.

The cities emerging successful in the first round of competition will be sent by the
State/UT as the recommended shortlist of smart cities to MoUD by the stipulated date(to be indicated in the letter to Chief Secretaries).

Stage 2 of the competition: ***The Challenge round for selection***

In the second stage of the competition, each of the potential 100 smart cities

preparetheir proposals for participation in the 'City Challenge'. This is a crucial stage as each city's Smart City Proposal (SCP) is expected to contain the model chosen, whether retrofitting or redevelopment or green field development or a mix thereof, and additionally include a Pan-City dimension with Smart Solutions. The SCP will also outline the consultations held with the city residents and other stakeholders, how the aspirations are matched with the vision contained in the SCP and importantly, what is the proposal for financing of the smart city plan including the revenue model to attract private participation. An evaluation criteria for the SCPs has been worked out by MoUD based on professional advice and this should act as guidance to the cities for preparing their proposal. The criteria and the documents to be sent with the application are also framed under Smart City Mission.By a stipulated date, to be indicated by MoUD to the States/UTs, proposals will be submitted to MoUD for all these 100 cities. These will be evaluated by a Committee involving a panel of national and international experts, organizations and institutions.The winners of the first round of Challenge will be announced by MoUD. Thereafter, while the winning cities start taking action on making their city smart, those who do not get selected will start work on improving their SCPs for consideration in the second round. Depending on the nature of the SCPs and outcomes of the first round of the Challenge, the MoUD may decide to provide handholding assistance to the potential Smart Cities to upgrade their proposals before starting the second round.

While in context of 'Smart Village' or 'Rurban Village' and f*or* effective planning and development of rural areas, efficient use of rural land and investment for various activities like housing, physical and social infrastructure, transportation, etc. has to be made. This warrants thatnaturalresources particularly rural land is used in an efficient and equitable manner. For the promotion of integrated and inclusive rural development, spatial planning becomes imperative. Hence, in the year 2019, the "Guidelines for Model Land Uses, Development Controls, and Service Level Benchmarks with Appropriate Enforcement Mechanisms for Rurban Clusters"were prepared and submitted to The Ministry of Rural Development by School of Planning and Architecture, New Delhi. Along with the report, the following three detailed reports have been published as an open source on the website platform by the Ministry of Rural Development.

3.3 Technological Options

The strategic components of area-based development in the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (greenfield development) plus a Pan-city initiative in which Smart Solutions are applied covering larger parts of the city. Below are given the divisions of the three models of Area-based smart city development:

- ***Retrofitting*** will introduce planning in an existing built-up area to achieve smart city objectives, along with other objectives, to make the existing area more efficient and liveable. In retrofitting, an area consisting of more than 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare a strategy to become smart. Since existing structures are largely to remain intact in this model, it is expected that more intensive infrastructure service levels and a large number of smart applications will be packed into the retrofitted smart city. This strategy may also be completed in a shorter time frame, leading to its replication in another part of the city.
- ***Redevelopment*** will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizens. For instance, a new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage. Two examples of the redevelopment model are the Saifee Burhani Upliftment Project in Mumbai (also called the Bhendi Bazaar Project) and the redevelopment of East Kidwai Nagar in New Delhi being undertaken by the National Building Construction Corporation.
- ***Greenfield development*** will introduce most of the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, plan financing and plan implementation tools (e.g. land pooling/ land reconstitution) with provision for affordable housing, especially for the poor. Greenfield developments are required around cities in order to address the needs of the expanding population. One well known example

is the GIFT City in Gujarat. Unlike retrofitting and redevelopment,greenfield developmentscould be located either within the limits of the ULB or within the limits of the local Urban Development Authority (UDA).

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

3.4 Road Map and Safe Guards

In context of 'Smart Village' or 'Rurban Village' and *f*or effective planning and development of rural areas, efficient use of rural land and investment for various activities like housing, physical and social infrastructure, transportation, etc. has to be made. This warrants that natural resources particularly rural land is used in an efficient and equitable manner. For the promotion of integrated and inclusive rural development, spatial planning becomes imperative. Hence, in the year 2019, the "Guidelines for Model Land Uses, Development Controls, and Service Level Benchmarks with Appropriate Enforcement Mechanisms for Rurban Clusters" were prepared and submitted to The Ministry of Rural Development by School of Planning and Architecture, New Delhi. Along with the report, the following three detailed reports have been published as an open source on the website platform by the Ministry of Rural Development.

GIS is an essential economic development tool that many cities use for planning, analyses, and building lively communities that attract businesses and residents.

The second step in establishing a smart city roadmap is by developing a policy that drives the whole initiatives. The policy needs to define the roles, responsibilities, strategies, and objectives of the smart cities.

Smart Maps are designed so that users can quickly and intuitively interact with them despite having virtually no training, ensuring that information reaches the widest possible audience. Smart Maps are built

to update quickly and correctly as cities change and evolve.

3.5 Issues & Challenges

Issues in 'Smart Cities'

- Poor urban spatial planning is evident in the city with residential and industrial areasdeveloped without adequate supporting infrastructure such as public open spaces,education, healthcare and adequate road network etc.
- Proliferation of informal sector- both residential/commercial, large number of slums withevery third resident in city is a slum dweller.
- More growth in private owned vehicles has resulted in traffic increase &congestion along with deteriorating air quality.
- Public transport sector within few cities of Gujarat is yet poor.
- High cost of water.
- Weak environmental resilience and waste management, nearly 50% of population haveaccess to sewerage network and a few percentages of roads have storm water drainage.
- Tremendous potential for enhanced opportunities in youth-oriented education, skill development and commercial avenues.
- Entrepreneurial city with a culture focused on work and business; has heterogeneous & cosmopolitan population.
- Larger and increasing number of internet users in the state is suitably poised to enter a new era of economic and digital vibrancy by specializing in respective and quaternary sectors.
- Development/Investments under Super Corridor, IT Park, Medcity, nearby Industrial areas are expected to provide employment to the people in upcoming years.

Challenges in 'Smart Cities'

- Unchecked growth of slums along with unplanned/haphazard development shall continue to pose greatest threat to city's rational growth and quality of life, which is receding.

- Slums are spread across various cities in varying degrees of squatter, have made delivery of services to urban poor difficult, negatively affecting the general visage of the city.
- Environmental degradation in various cities in general and contamination of natural drainage paths in particular coupled with inadequate public green/open spaces pose threat for the cities.
- Traffic congestion, rapid increase in private vehicles and lack of adequate multi-modal public transport options, unless mitigated shall continue to degrade air quality adversely impacting public health and increased commute times.

3.6 Smart Infrastructure - Intelligent Traffic Management

This can be understood with real life example in the form of success story. The success story of Smart City Ahmedabad Development Limited (SCADL) in transforming their manually operated bus transit system into a smart transportation system has to serve as the best example. Smart City Ahmedabad Development Limited (SCADL) partnered with NEC to build a transportation system that reflects a smart city.

A smart city is the one where everything from menial routines to tourist activities is effortless and having an intelligent transport management system truly aids this. The key is to have systematic processes and smart technologies in each part of the transportation. For example, the SCADL's smart transportation system took care of different aspects of the problem like - the lack of a strict schedule, the inconsistent and un-secure payment options, lack of tracking options for the vehicles, inefficient routing, etc.

Each of these aspects of the problem was assessed and an easy solution was set in place. The Automated Fare Collection Service (AFCS) facilitated the easy cashless payment option via prepaid RuPay card or smartphone for the passengers, while the Automatic Vehicle Location System (AVLS) allowed them to get the current location and other information of the bus, in real time. The Vehicle Planning Schedule and Dispatch System (VPSD) provided a revamped and optimized schedule for the buses and the Depot Management System (DMS) helped with the allocation and optimization of the crew and the overall bus operations. In addition to this, Passenger Information System (PIS) provided real-time bus information via mobile app, website, and in-station

boards to enable passengers to plan their route and estimate waiting and arrival times.

This successful implementation of the intelligent transport management system stands testament to what the future can hold. This smart transportation system was successfully launched in 2017 and has played a monumental role in citing Ahmadabad as a smart city. This success story stands as an inspiration to India's smart city dream. It proves that with proper processes that optimally utilize the power of IoT and data analyzing technology, building 100 smart cities is not farfetched. But it makes another thing much clearer - having an intelligent transport management system is the heart of making this dream a reality.

3.7 Cyber Securityor any other concept

India’s digitalisation roadmap is expected to catapult its digital economy to 1 trillion USD by 2025. India is witnessing an unforeseen digital transformation, and at the same time, a rapid rate of urbanisation. The Government of India’s 100 Smart Cities Mission blends these digitalisation and urbanisation waves, and endeavours to accomplish urban renewal through a Pan-City Smart Solutions initiative, and technology-enabled ‘city improvement (retrofitting), city renewal (redevelopment) and city extension (greenfield development)’. While the smart city initiative focuses on sustainable development of our cities and harnessing digital technologies for integrated citizen service delivery, it demands a strong focus on cyber security. It is imperative for stakeholders to review and make efforts towards ensuring the safety, security and privacy of citizens and enhancing our cities’ capability to mitigate cyber security risks.

Recognising cyber security as a key priority, the Ministry of Housing and Urban Affairs (MoHUA) published the ‘Cyber Security Framework for Smart Cities’ on 20 May 2016 and issued an advisory to all smart cities to drive conformance to this framework.

This report on ‘Creating cyber secure smart cities’, jointly developed by DSCI and PwC, is an attempt to reinforce the attention that smart city administrators need to give to cyber security in all their projects while incorporating smart solutions. The report acknowledges that cyber security is the combined responsibility of various stakeholders. With a fine blend of global and Indian instances, this report serves as a preliminary guide for smart city stakeholders to

understand the risks and steps that need to be taken to enhance the cyber security posture of smart cities.

3.8 Retrofitting – Redevelopment – Greenfield Development District Cooling

The strategic components of area-based development in the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (greenfield development) plus a Pan-city initiative in which Smart Solutions are applied covering larger parts of the city. Below are given the divisions of the three models of Area-based smart city development:

- ***Retrofitting*** will introduce planning in an existing built-up area to achieve smart city objectives, along with other objectives, to make the existing area more efficient and liveable. In retrofitting, an area consisting of more than 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare a strategy to become smart. Since existing structures are largely to remain intact in this model, it is expected that more intensive infrastructure service levels and a large number of smart applications will be packed into the retrofitted smart city. This strategy may also be completed in a shorter time frame, leading to its replication in another part of the city.
- ***Redevelopment*** will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizens. For instance, a new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage. Two examples of the redevelopment model are the Saifee Burhani Upliftment Project in Mumbai (also called the Bhendi Bazaar Project) and the redevelopment of East Kidwai Nagar in New Delhi being undertaken by the National Building Construction Corporation.
- ***Greenfield development*** will introduce most of the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, plan financing and plan implementation tools (e.g. land pooling/ land

reconstitution) with provision for affordable housing, especially for the poor. Greenfield developments are required around cities in order to address the needs of the expanding population. One well known example is the GIFT City in Gujarat. Unlike retrofitting and redevelopment, greenfield developments could be located either within the limits of the ULB or within the limits of the local Urban Development Authority (UDA).

3.9 Strategic Options for Fast Development

The smart village strategy template is a tool to help local communities to develop a local development strategy that is adapted to the 'smart village' concept. The template aims to help creating a vision and a development path for the village in the medium to long term.

Smart village strategies have to be S.M.A.R.T. (specific, measurable, achievable, realistic and time-bound). However, the type of measures taken, their timing, etc. will much depend on the local context and, are therefore, not pre-defined. The smart village strategy template is not developed to respond to a specific funding stream or programme

The strategy template consists of:

- Standard local development strategy components, such as
- Description of assets and opportunities of the village as well as challenges and
- needs and a SWOT analysis;
- A clear intervention logic including a hierarchy of objectives to respond to SWOT,
- key actions to achieve objectives, expected outputs and results;
- Planning of financial and human resources;
- Specification of the capacity needed for implementation, management and monitoring procedures.

3.10 India's Urban Water and Sanitation Challenges and Role of Indigenous Technologies The problem of access to safe drinking water and sanitation facilities in urban areas of India is a major concern. There is a need to reuse treated wastewater in order to meet the current and future demands for water.

The consistent increase in the rate of growth of India's population has also led to the increase in demand for water, particularly in the urban areas where the rate of increase is highler compared to rural areas. In 2001, urban population was 285 million and assuming water supply of 135 litres per capita per day, the domestic water demand is estimated at around 38,475 million litres per day (MLD), whereas as in 2011 urban population was 377 million with a domestic water demand of 50,895 MLD. It shows that growth in urban population leads to additional water demand of 12,420 MLD in urban areas. The water supply of 135 litres per capita per day (LPCD) as a service level benchmark should be given for domestic water use in urban local bodies. However, currently as per Central Public Health and Environmental Engineering Organisation (CPHEEO), an average water supply in urban local bodies is 69.25 LPCD. This indicates that there is a vast gap between the demand and supply of water in urban areas of India.

The problem of access to safe drinking water and sanitation facilities in urban areas of India is also a major concern. It is estimated that by 2050, half of India's population will be living in urban areas and will face acute water problems. At present, 163 million people do not have access to safe drinking-water and 210 million people lack access to improved basic sanitation in India. In urban areas, 96% have access to an improved water source and 54% to improved sanitation. Whereas in rural areas, which accounts for 72% of India's population lives, only 84% have access to safe water and only 21% for sanitation. In addition, there is a lack of wastewater treatment facilities to treat the wastewater of a growing population. There is a need to reuse treated wastewater in order to meet the current and future demands for water.

The prevention of pollution of water sources is extremely critical in order to continue to supply water of quality standards. Available data suggests that pollution levels have increased in surface water as well as groundwater. More than 100 million people in urban areas exposed to poor water quality. The a lack of sufficient infrastructure, services and funds to support water and wastewater

treatment facilities required for an urban area further exacerbates the problem. Moreover, the drainage and solid waste collection services are not adequate in most of the urban areas. The systems are either poorly planned and designed, or operated without inadequate maintenance. Use of natural capacities of soil and vegetation (green infrastructure) can be applied to absorb and treat waste water. Natural systems are found to be more cost-effective and require low building, labour and maintenance costs.

The time has come to have a retrospect view on the water use and misuse to take serious actions that will lead towards sustainable urban water management. Sustaining healthy environments in the urbanized world of the 21st century represents a major challenge for human settlements, development and management. Again, flexible and innovative solutions are needed to cope with sudden and substantial changes in water demand for people and their associated economic activities.

In order to meet the future urban water challenges, there needs to be a shift in the way the team members manage urban water systems. An Integrated Urban Water Management approach must be adopted which involves managing freshwater, wastewater, and storm water, using an urban area as the unit of management. The approach encompasses various aspects of water management, including environmental, economic, technical, political, as well as social impacts and implications. The international convention has the broad aim of facilitating water for all in a safe and sustainable way, thereby aiming to achieve SDG 6.

This event will provide a platform to highlight current and future water related issues and recognize good water governance practices and solutions through discussions among water experts from various fields such as academics, research, policy, industry and civic society.

3.11 Initiatives in village development by local self-government

Different ministries of the government of India formulate various development schemes not to raise the profit but to maximise the welfare of the people. Some schemes like National Rural Livelihood Mission, MGNREGA, Bharat Nirman etc. are made by the government for rural development of India.

Some important facts related to the various rural development schemes are mentioned below for the aspirants of some prestigious exams like IAS/PCS/SSC/CDS/Banking etc.

1. Deen Dayal Upadhyay Grameen Kaushal Yojna
2. Roshni: Skill Development Scheme for Tribals
3. Swachchh Bharat Mission
4. Sansad Adarsh Gram Yojna
5. Heritage Development and Augmentation Yojna (HRIDAY)
6. Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)
7. National Rural Livelihood Mission
8. Pradhan Mantri Gram Sadak Yojna
9. Training to Rural Youth for Self Employment (TRYSEM)
10. Antyodaya Anna Yojna (AAY)
11. Village Grain Bank Scheme
12. National Rural Health Mission
13. Aam Aadmi Bima Yojna
14. Kutir Jyoti Programme
15. Sarva Siksha Abhiyan

TABLE 3 : DETAILS OF YOJAYA

3.12 Smart Initiatives by District Municipal Corporation

The Bombay Provincial Municipal Corporation (BPMC) Act (1949) is the governing act for the Ahmedabad and Surat Municipal Corporations, while Bhavnagar Municipal Corporation was constituted under the Gujarat Municipalities Act (1963). Because of these acts, and the constitutional amendments, the municipal corporations have been relatively financially autonomous bodies. It becomes the responsibility of the local bodies (Municipal Corporation/ Urban Development Authority/ Municipality) to provide for the services of water supply and distribution, sewerage collection and treatment, solid waste collection and disposal, and Urban transportation including roads, flyovers, by passes, bus and/ or rail network for urban transportation.The Bhavnagar Municipal Corporation has maintained the transparency and developed contact medium through digital medium in the form of website and

mobile based application. An illustration of various services are given as part of screenshot from BMC's website.

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

Government of India initiated a program regarding wildlife conservation:

Talking about diversity, India is one of the 17 mega diversities in the world and is home to 7.6% of all mammal, 12.6% of bird, 6.2% of reptile, and 6.0% of flowering plant species. The country also has some of the most bio diverse regions on the planet and it comprises of four of 35 biodiversity hotspots of the world like the Western Ghats, the Eastern Himalayas, Indo-Burma and Nicobar Islands in Sunderland. So far, the country_s wildlife is preserved in 120+ national parks, 515 wildlife sanctuaries, 26 wetlands, and 18 BioReserves, out of which 10 are part of the World Network of Biosphere Reserves. Evidently, this large bio diverse land needs protection, and inarguably conservation is a mandatory measure.The view which kept in mind was recent human encroachment, based on that the Indian Government took effective initiatives to conserve wildlife in the country, and amongst it, most commendable initiatives is the Wildlife Protection Act of 1972, which prohibits trade of rare and endangered species.

3.14 How to implement other Countries smart villages projects in Indian village context (Regarding Environment , Employment, etc.)

Worldwide Initiatives for 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 of good education and healthcare systems, access to clean water, sanitation, economic growth, enhanced security, gender equality, etc. The most important vision of the Initiative is to apply more holistic and integrated approaches to enable the access to the energy in the rural contexts, while connecting/involving governments, developmental and private sector in the process. The component most emphasized is how to connect renewable sources of energy with ICT. 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. To find the most suitable solutions, there is a wide range of professionals working on the field and otherwise: villagers, NGOs, development organizations, entrepreneurs, policy makers, engineers, and experts from the field of humanities. Their search for solutions is encompassing and, based on long-term research, analyzing local and regional circumstances, identifying cross-cutting issues and proposing suitable solutions. More than 30 workshops have been organized where more than thousand stakeholders from 70 countries have presented their views and evidence. By now, the majority of their activities were funded by Cambridge Malaysian Education and Development Trust and Malaysian Commonwealth Studies Centre.

Similarly, the IEEE Smart Village initiative is aiming to promote off-grid communities through education and the creation of sustainable businesses in the energy sector. The initiative was originally established as a Community Solutions Initiative (2009) and took over the current name in 2014.The activities are spread worldwide, by now serving more than 50,000 people, living in34 villages, mostly located in African continent (e.g., Benin, Cameroon, Kenya, Malawi, Namibia, Nigeria, South Sudan, Zambia), but also in Haiti and India. Its main financing mechanism is fundraising. Beside the development of energy-smart villages mentioned before, the main products of the initiative's effortsare a SunBlazer II—a mobile solar-based power base station and Learning beyond the Light Bulb—a nine-month program of remote study that enables the exchange of practices of all communities in order to create the mutual benefit, and equips the students with knowledge on different development models and other skills and knowledge needed for the fieldwork.

One of the most propulsive worldwide programs is the CIGAR research program on Climate Change, Agriculture and Food Security (CCAFS) that started in 2011. The program is fundedby the CIGAR fund and different donors (e.g., Australia, Irish Aid, Netherlands, New Zealand, Switzerland, Thailand, UK Aid, US Aid, the EU, and the International Fund for Agricultural Development). Within its framework, the concept of Climate Smart Villages is being developed and put into practice in different parts of the world, whereas the ones with the most climate-related difficulties are chosen (West and East Africa, Latin America, South and Southeast Asia). This is an ever evolving program where different stakeholders (researchers, politicians, framers, local residents) are collaborating in order to find the most productivity enhancing and smart solutions considering the local conditions. Their solutions are based on smart technologies and services, designed in collaboration with local people,

and aim atlessening the climate footprint from the perspective of the developing agricultural activities, while not reducing their benefits for the given community. The program is claimed to be very successful, as there is more than 30 existing climate-Smart Villages all over the globe. More importantly, the villages are on a good track to being sustainable in the long term as the programaims to train the local people and not providing locals with the external teachers on the long-term basis. Within this objective, an important role is also played by women. One of the other practical outputs of the program is, for example, the CCAFS Climate Analogues Tool for making rain and climate predictions, developed to help smaller farmers make decisions based on accurate information.

Initiatives, Operation and Implementation in India

Perhaps one of the most extensive and most recent attempts of smart transformation development is India. Firstly, urbanization of India is increasing rapidly as never before. According to the predictions of the United Nations, by 2050, almost 814 million of Indian people will live in towns and cities, which is twice as many as today. Secondly, in 2015, the Government of India, Ministry of Urban Development launched a nationwide program Smart city mission. The aim of the Mission is the comprehensive development of (physical, institutional, social, economic) infrastructure, and thus improvement of the quality of life and to attract people and investments. The governmental mission covers 100 cities, selected in the "City Challenge" process, but also recognizes that there is no single definition of the Smart City that would encompass important factors for all the different cases and therefore aims to set the examples that could be replicated in various regions and cities within the country.

Thirdly, a Smart City initiative was supplemented by the Indian Smart Villages Initiative aimed at harnessing the benefits of ICT for the people living in the rural sites. the urbanization processes, in India, around 67% of population still lives in the rural areas, but rural-urban migrations are posing big problems in India. For example, according to the estimates of Indian Ministry of Statistics and Programme Implementation, in years 2009/2010 more than 60% of the male rural-urban migrations was due to employment related reasons. Agriculture only has a minor part in the Indian economy (e.g., around 17%),compared to the services sector that is flourishing (almost 54%). As it has been stated by Srivatsa, to somehow maintain the "equilibrium" between the urban and rural areas, the smart development of both has to be parallel and simultaneous. In this way, the large migration from rural to urban areas can be limited or even

stagnate [5] (p. 4). It is anticipated that carefully designed Smart Villages will provide a basic framework for local people to enhance their participation on a local level and to improve their economic, social and living conditions and thus make their community stronger and more flexible for the challenges of the outside world. Within the "Digital India" plans, Indian government envisages that, by the year 2019,250,000 Indian villages will have access to the internet and telecommunications networks. Therefore, there is a need to design and develop villages that have established good endo- and exogenous connections, e.g., they have good connections to the outside world, but, at the sametime they maintain their independence in providing employment and services. To summarize, in the Indian case, two approaches are used as being complementary, Smart Villages serving as engines to Smart Cities' economic growth, by producing services and goods for rural but also for wider (inter)national markets. Unfortunately, there is nosynthesis on how many Smart Villages has already been developed/ established in India, there are only some fragmented lists and websites dedicated to specific villages, which makes it difficult to keep up with the numbers.

A closer look at the initiatives working at the worldwide level presented above enables us to make some very broad conclusions. Looking at the main objectives and activities taking place with in their frameworks, but also regarding some other reports [27,28] and models, the energy sector the core of dealing with sustainable and smart community development. Eventhough the focus on sustainable energy supply is not explicitly in the forefront of the global developmental initiatives ,it is implicitly involved within other objectives, such as lessening the climate footprint of agricultural practices. As it will become more evident in the next sub-chapter, a closer look at the European practices reveals also that focus areas of global initiatives have different social and economic conditions and therefore propose different solutions adapted to needs of the communities. Whereas global initiatives are primarily focusing on the areas with the lack of basic infrastructure (electricity, water supply, internet access, etc.), the Europe an initiatives are working in the areas with basic infrastructure already provided and are there fore addressing different challenges of smart and sustainable development through products and services with social, economic, and environmental benefits.

3.15 Visit of Selected Smart Village for the Vishwakarma Yojana Project

Our opted smart village is Mota khuntavada village is situated in Mahuva Teshil , District Bhavnagar and in State of Gujarat India. Village has population of 10334 Peoples as per census data of 2011, in which male population is 5295 and female population is 5039. Total geographical area of Mota khuntavada village is 3225.86 Hectares. Total number of house hold in village is 2058.

Mota khuntavada village over-view :

Gram panchayat	**Mota khuntavada**
Tehsil	Mahuva
District	Bhavnagar
State	Gujarat
Area	3225.86 hect.
Population	10334
Households	2058
Nearest Town	Mahuva (25km)

TABLE 4 : VILLAGE OVER-VIEW

Particulars	Total	Male	Female
Total House	2058	-	-
Populations	10334	5295	5039
Child	1694	911	783
Schedule Caste	378	208	170
Schedule Tribes	24	13	11
Total Workers	3422	2821	601
Main Worker	3284	-	-

TABLE 5 : CENSUS DATA OF 2011

CHAPTER :- 4

4 Introduction about Bambhaniya Village

4.1Introduction

4.1.1. About Bambhaniya Village

Bambhaniya village is located in Mahuva Taluka of Bhavnagar District in Gujarat with total 317 families residing. The Bambhaniya village has population of 1902 of which 965 are males while 967 are females as per Population Census 2011. A major profession of Bahutha is farming, laboring, and industrial jobs.80% of total income of village generate by farming.Basic infrastructure like primary school, aganwadi, panchyat office,sub centre, drinking water supply network, etc.

4.1.2. Study justification/ need of the study

The necessity of the study of the village is that identify the village which facility available and which kind of development needed. Urbanization is a strategy design to approach the infrastructure facility towards the village and provide the basic facility to village dwellers.

Needs of the study:

- For growth of economic in village.
- Redefine the role of NGO and developed marking.
- To minimize migration rate to the village.
- Improvement of village project growth.

4.1.3 Study Area

Our village Bambhaniya situated in Mahuva district . the distance from Bhavnagar head quarter to 115km away. The total geographical area of Bambhaniya village is 774.28hectares with population of 1902 peoples.

4.1.4. Objectives of the study

- connectivity, employment opportunities and supporting physical and social infrastructure.

- Identification of sanitation facilities that need improvement.
- Electricity connections like street lighting provides.
- Refurbishing of village lakes, water tanks and wells, construction of rain water harvesting structures for sustainable Development.
- Basic Physical Infrastructure should be the priority focus and be provided.
- To reduce migration rate to the village.
- Development of socio culture facilities like community hall, public library, recreational activities and repairing of existing amenities.
- Repair & maintenance of Existing Infrastructure.
- To reduce migration rate to the village activities and repairing of existing amenities.
- Repair & maintenance of Existing Infrastructure.
- Promote integrated development of rural areas with provision of quality housing, better
- Development of various infrastructure in villages

4.1.5. Scope of the Study

- In Bambhaniya village many people commute from village to other city for job, business, employment etc. From guideline of Vishwakarma Yojana Phase VIII the team members will study about village and carry out various surveys from village.
- In the village the team members will conduct techno- economic survey and collect all information from village such as Socio-cultural infrastructure, sustainable infrastructure etc.
- According to survey the team members will know about their problems, existing condition, requirement of facilities etc. From this the team members can carry out gap analysis as per census 2011 and also the future action plan to village. From all the information the team members will try to provide best work for village development as per guideline of smart village development.
- The team members will provide many design report and maintenance work for village for better efficient usage.

4.1.6 Methodology for development of your village

Firstly, the team members studied what are various objectives and the need of the Vishwakarma Yojana. Then, the team members completed our Literature Review that includes the basic definitions of rural area, urban area, Rurbanisation, Sustainable development etc. Gap Analysis is done using the collected data and various suggestions made by us on the development of the village and based on this suggestions the team members will design proposed facilities in the village according to the need and population of the village.

4.1.7 List of Objects Available related to Civil Methodology

- To study the existing facilities and parameters of village.
- To identify the issues and problems of the village.
- The information and data from visit will help us to develop the methodologyfor improvementin village.
- The primary data collected through survey will give the level of servicesavailable in village and its requirements for improvement.
- Reduce migration from rural to urban areas due to lack of basic services andsufficient economic activities in rural areas.

4.2. Study Area Profile of Bambhaniya

4.2.1 Study Area Location with brief History land use details

Bambhaniya village is located in Mahuva taluka of Bhavnagar district in Gujarat. It is located 115 Km towards from district headquarters Bhavnagar, the total geographical area of Bambhaniya village is 774.28 hectares. Agriculture is the main profession of this village. village having a good education, drinking water and roads are the main concerns of this village.bambhniya village is also facility provided for dairy worker.dairy work is second profession of village.hygin is proper maintain in villge.ramtaliya river in passing the near bambhaniya village.

People of this village are living in very peaceful manner.and people are also helpful to eachother.

Table 2 : study area

Bambhaniya - Village Overview	
Gram Panchayat :	Bambhaniya
Block / Tehsil :	Mahuva
District :	Bhavnagar
State :	Gujarat
Pincode :	364280
Area :	774.28 hectares
Population :	1,902
Households :	314
Assembly Constituency :	Mahuva
Parliament Constituency :	Amreli
Nearest Town :	Mahuva (18 km)

4.2.2 Base Location Map, Land Map

Fig.24 : MAP OF VILLAGE

4.2.3. Physical & Demographical Growth

Bambhaniya is a Village in Mahuva Tehsil, Bhavnagar district and Gujarat State. Bambhaniya village's Pin code is 364280. Bambhaniya Village Total

population is 1902 and number of houses are 314, Female Population is 60%. Total 1902 people in the village are literate, among them 965 are male and 937 are female. Literacy rate (children under 6 are excluded) of Bambhaniya is 70%. 81% of male and 59% of female population are literate here. Overall literacy rate in the village has increased by 14%. Male literacy has gone up by 9% and female literacy rate has gone up by 17%.Area village is 774.28 hectares.

Census Parameter	Census Data
Total Population	1902
Total No of Houses	314
Female Population %	49.3 % (937)
Total Literacy rate %	58.8 % (1118)
Female Literacy rate	24.5 % (466)
Scheduled Tribes Population %	0.1 % (2)
Scheduled Caste Population %	1.2 % (22)
Working Population %	28.9 %
Child(0 -6) Population by 2011	317
Girl Child(0 -6) Population % by 2011	46.7 % (148)

Table 3 : DEMOGRAPHICAL GROWTH

Physical Growth

- Anganwadi
- Primary school
- Panchayat building
- PHC Sub Centre
- Drinking water supply network
- Pucca road connected with other village

4.2.4 Economic Profile / Banks

Majority of the population is engaged in agriculture followed by service. Bambhaniya has 42% (549). There were 549 engaged in work activities. 95.45% of workers are describe their work as main work. While 4.55% were involved for less than 6 months. Of 549 workers engaged in main work, 230 were cultivators while 93 where agricultural labour.

4.2.5 Actual Problem faced by Villagers and smart solution

Villagers are facing problems in many areas like transportation, social development, heath-care, education, street lighting, drainage system, ESR etc., i.e. there is no community hall present in village as Primary Health Centre is

also not available. Street light system is not provided yet in the village, so here in this part 1 the team members are providing some planning proposals and solutions for village development by using various resources.

4.2.6 Social scenario -Preservation of traditions, Festivals, Cuisine

The Village is home to 1902 people, among them 965 are male and 937 are female. 99% of the whole population are from general caste, 1.16% are from schedule caste. Child (aged under 6 years) population of Bambhaniya Village is 317, among them 58% are boys and 42% are girls. Here people of Hindu religion live, so all the major festivals are celebrated. As many people migrated to Surat for jobs they come here every year to enjoy Diwali at their home.

4.2.7 Migration Reasons / Trends

There are some reasons behind migration from this village.

- Education facilities is poor.
- Due to Diamond industry rise, trend became to migrate Surat for workmanship.
- Agricultural revenue is not sufficient.
- Amenities are not available like healthcare, Higher education and proper job, etc.
- For job purposes

These are the major reasons and trends for migration.

4.3. Data Collection Bambhaniya (Photograph/Graphs/Charts/Table)

4.3.1. Describe Methods for data collection

In Vishwakarma Yojana the team members are collecting the data and analyzing it using appropriate method.

The methodology of the total work process as shown below: -

- The whole work is done after detailed study &appropriate guidance Bambhaniya village.
- All data & analysis are made as per formats & appropriate study methods.
- The whole project is made as per the requirement of Bambhaniya Village.
- In this project, it has been conducted Problem identification, Problem involution, Infrastructure feasibility Study & Design

preparation ‘for solving them. Questionnaires: Villages related questions are asked to Sarpanch/Talati in order to consume Information.

- ❖ Interview: Interaction is made with local peoples of the villages to attainhistory and present condition of the village.

4.3.2. Primary survey details

Bambhaniya village is located in Mahuva Taluka of Bhavnagar District in Gujarat. It is located 115 KM towards South West from district headquarters Bhavnagar. the total geographical area of Bambhaniya village is 774.28 hectares.

4.3.3 Average size of the House- Geo-Tagging of House

Average size of house is 5 m X 7 m

In Bambhaniya, approximate ratio of the houses is 65% house Pukka and 35% kutcha and the average bungalow type houses are more preferable to build by the dwellers.

FIG. 25 : GEO-TAGGING OF HOUSE

4.3.4 No of human being in one house

There are 314 Households in the village and an average 6 persons live in every family.

4.3.5 Material available locally in the village and Material Outsourced by the villagers

Materials like Cement, Marble, Steel Reinforcement, Sand, Aggregate have to be Purchased from outside as there is no material shop in the Village.

Most of the houses have been constructed of RCC frames. There are very few Kuccha Homes madeof Bricks and Stones in the Village. The ratio of kuccha to Pukka House is 35:65.

4.3.6 Geographical Details:

Bambhaniya is at an elevation of 35m above sea level and is located at a distance of 115 km from District Headquarter.

Locality Name	Bambhniya
Sub District	Mahuva
District	Bhavnagar
State	Gujarat
Language	Gujarati
Area(In hect.)	774.28
Goverment	Panchayat
Pin code	364280

TABLE 4 : GEOGRAPHICAL DETAIL

4.3.7 Demographical Detail - Cast Wise Population Details / Which ID proof using by villagers

The Bambhaniya village has population of 1902 of which 965 are males while 937 are females as per Population Census 2011. Schedule Caste (SC) constitutes 01.16% of total population in Bambhaniya village. The village Bambhaniya currently does have 0.11% Schedule Tribe (ST) population.

Most of the people are using AADHAR card for identification processes. Other proofs such as Driving License, Voter ID etc are used.

4.3.8 Occupational Detail - Occupation wise Details / Majority business

Bambhaniya has 52% (942) population engaged in either main or marginal works. 54% male and 49% female population are working population. 51% of total male population are main (full time) workers and 2% are marginal (part time) workers. For women 36% of total female population are main and 93 are marginal workers

4.3.9 Agricultural Details / Organic Farming / Fishery

Cotton and Groundnut are the main Crops grown in the Village. Hardly one percent of farmers are doing organic farming over conventional and fishery activity is not observed as village is lack of any big water body there.

4.3.10 Physical Infrastructure Facilities - Manufacturing HUB / Ware Houses

There are no large Scale Manufacturing Industries in the Village. Small scale industries no such as diamond polishing in the village.

- Panchayat building
- Anganwadi
- Primary school
- PHC Sub centre
- Underground drainage
- Drinking water supply network
- WBM and R.C.C. roads

4.3.11 Tourism development available in the village for attracting the tourist

There is no major tourist attraction in the village.

4.4 Infrastructure Details (With Exiting Village Photograph)

4.4.1Drinking Water

Main source of drinking water Mahi Pariyojana, and also tanks available for storage, tap water facility inducted at most houses. There are One water tanks available in Bambhaniya village. tank capacity is 1,00,000 litre. but is not sufficient for village as per population of village.Drinking water is adequate

and also has a storage capacity.For domestic and drinking purpose Panchayat collect water from dug well and lake.

4.4.2 Drainage Network / Sanitation Facilities

Village has satiesfactory condition of drainage network.there is no available public toilet.

4.4.3 Transportation & Road Network

Local transport facilities like 3-wheelers, Auto-rickshaw, are available to reach the village.There is no bus stop in the village.The approach road of village is bituminous while the internal roads are block paving.

4.4.4 Housing condition

Both kutchha and pucca houses are there in Bambhaniya village. Approx. ratios of kutcha and puccahouses are 35:65. Housing conditions are needed to be improved. Most of houses have sanitation facilities in the form of bath and toilet. Houses are having metered electricity connection.

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

- Primary School
- Panchayat Bhavan
- Anganwadi

Education Facilities

- One primary schools and are available in the Bambhaniya village which is sufficient for whole village population. One anganwadi is available in Bambhaniya village. ITI College is not available in village because there is less number of people doing higher studies.

Community Hall: In Bambhaniya, community hall is not available.

Library is not available in villge.

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

Existing condition of the buildings at village are satisfectory and well maintained as most of them are old constructed like Grampanchayat building and Model School.

4.4.7 Technology Mobile/ WIFI / Internet Usage Details

Most of the adults use mobile phones. There are no WiFi towers in the village. Clear information regarding internet usage is not available. There are no Cyber Café in the Village.Gram Panchayat building is having WiFi connection.

4.4.8 Sports Activity as Gram Panchayat

No such activities are done in the village

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

The assembly polling is done at School and Panchayat Office. Birth and Death Records are kept in Gram Panchayat itself. There is no Community Hall in the Village.pond is available in village.public garden is not available.

4.4.10 Other Facilities (e.g like foot path development-Smart toilets-Coin operated entry, self-cleansing, waterless, public building)

No such facilities are available

4.4.11 Any other details

There is a small water body available in the corner of village, which is mostly used for cattle / animal usage. This village is known for communal harmony.

4.5 Electrical Concept

4.5.1 Renewable energy source planning particularly for villages

Planning for a home renewable energy system is a process that includes analyzing your existing electricity use, looking at local codes and requirements, deciding if you want to operate your system on or off of the electric grid, and understanding technology options you have for your site. Photo courtesy of Thomas Kelsey.

Maybe you are considering purchasing a renewable energy system to generate electricity at your home. Although it takes time and money to research, buy, and

maintain a system, many people enjoy the independence they gain and the knowledge that their actions are helping the environmental.

A renewable energy system can be used to supply some or all of your electricity needs, using technologies like:

- Small solar electric systems
- Small wind electric systems
- Microhydropower systems
- Small hybrid electric systems (solar and wind).

4.5.2 Irrigation Facilities

Irrigation is the application of controlled amounts of water to plants at needed intervals. Irrigation helps to grow agricultural crops, maintain landscapes, and revegetate disturbed soils in dry areas and during periods of less than average rainfall. Irrigation also has other uses in crop production, including frost protection, suppressing weed growth in grain fields and preventing soil consolidation. In contrast, agriculture that relies only on direct rainfall is referred to as rain- fed.

In the village various farming practices are observed and mainly the manual furrow and controlled flooding irrigation techniques are used. No special farming and irrigation methods such as drip or sprinkler has not been observed in the village.

There are many different types of irrigation systems, depending on how the water is distributed
throughout the field. Some common types of irrigation systems include:

Surface irrigation :
Water is distributed over and across land by gravity, no mechanical pump involved.

Localized irrigation
Water is distributed under low pressure, through a piped network and applied to each plant.
Drip irrigation
A type of localized irrigation in which drops of water are delivered at or near the root of plants.
In this type of irrigation, evaporation and runoff are minimized.

Sprinkler irrigation
Water is distributed by overhead high-pressure sprinklers or guns from a central location in the field or from sprinklers on moving platforms.

Center pivot irrigation
Water is distributed by a system of sprinklers that move on wheeled towers in a circular pattern. This system is common in flat areas of the United States.

Sub-irrigation
Water is distributed across land by raising the water table, through a system of pumping stations, canals, gates, and ditches. This type of irrigation is most effective in areas with high water tables.

Manualirrigation
Water is distributed across land through manual labor and watering cans. This system is very labor intensive.

4.5.3 Electricity Facilities with Area

Power is supplied through the electric poles to the houseold and residential buildings.

4.6 Existing Institution like - Village Administration – Detail Profile

4.6.1 Bachat Mandali

Bachat mandali is available in village.

4.6.2 Dudh Mandali

Village have small dudh mandali.

4.6.3 Mahila forum

mahila forum is available in village.

4.6.4 Plantation for the Air Pollution

In a village every year plantation program is arranged by panchayat.

4.6.5 Rain Water Harvesting

No facility of rain water harvesting in a village.

4.6.6 Agricultural Development

Main source of income in this village is farming. Farmers use drip irrigation system to do farming.The main agriculture product is wheat, ground nut , Dangar, cotton ,toor**.**

CHAPTER : 5

5 Technical Options with case studies

5.1 concept (civil)

5.1.1Advance Sustainable construction techniques/Practices and Quantity Surveying

Sustainable construction is the practice of creating a healthy environment that's based on ecological principles. According to Professor Charles.J.Kibert, sustainable construction focuses on six principles: "conserve, reuse, recycle/renew, protect nature, create non-toxic and high quality."

Although many different business sectors are doing what they can to be more sustainable, the construction sector is unique because it has the chance to significantly affect the way these practices are applied. This is because of the large amounts of materials and energy that the industry uses.

The term 'advanced construction technology' covers a wide range of modern techniques and practices that encompass the latest developments in materials technology, design procedures, quantity surveying, facilities management, services, structural analysis and design, and management studies.

Sustainable construction technologies typically include mechanisms to lessen energy consumption. The construction of buildings with wood, for instance is a sustainable construction technology because it has a lower embodied energy in comparison to those build of steel or concrete. Sustainable green construction also makes use of designs that cuts back air leakage and allows for free flow of air while at the same time using high performance windows and insulation techniques.

Sustainable resource sourcing as the name suggests is a prime example of sustainable construction technology because it ensures the use of construction materials designed and created from recycled products and have to be environmentally friendly. In most cases, agricultural wastes or by-products are used to produce the construction materials. Overall, the materials are remanufactured, recycled, recyclable, and obtained from sustainable sources.

Many organizations are recognizing the value of sustainable and green building methods. New advances in materials, technology and practices enable

companies to use environmentally friendly processes that also lead to better overall efficiency. Here are the top 10 sustainable building methods currently in use or under development.

1. IoT Integrated Automated Building Systems

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

2. Synthetic Roof Underlayment

The underlayment on roofs is typically asphalt-based, which breaks down relatively quickly. Replacing this layer is necessary to keep moisture out of the building's interior. Synthetic roof underlayment offers an alternative that weighs less and holds up to the wear and tear of an exterior environment. This material uses polymer that comes from recycled scrap materials. It also eliminates VOCs from the underlayment.

3. Green Roofs

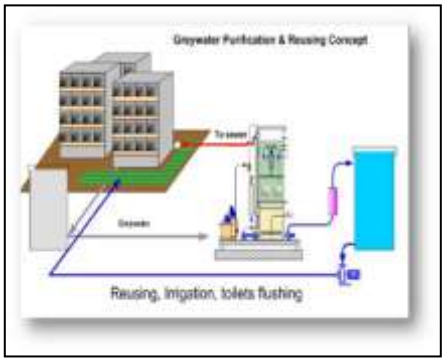
Another innovation for the top of commercial properties comes from green roofs. Grass, plants, flowers, bushes and other greenery grows on the roofing material. Stormwater is absorbed into the soil and managed more easily than with a bare roof. Heating and cooling costs are reduced, and the air quality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

4. Grid Hybrid System

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

5. Passive Solar

Another way to leverage a sustainable solar energy source is to construct the building based on the passive solar concept. The facility's location and design maximize solar energy for heating during winter, while reducing its impact during warmer months.



6. Greywater Plumbing Systems

Greywater systems reduce the facility's need for fresh water, as everything except for toilet streams can be processed for reuse. The most common uses for this water include irrigation and supplying toilets with water.

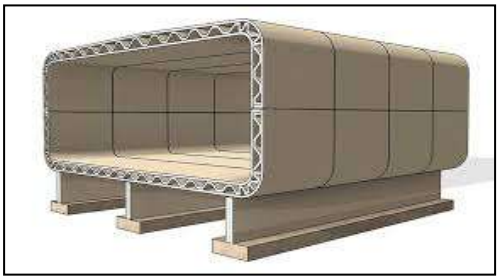
7. Electrochromic Glass

Electrochromic glass can shift from clear to opaque based on external stimuli such as an electrical current or UV rays. It eliminates the need for shades and other window treatments, while adapting to current conditions passively. Additional benefits include blocking the vast majority of UV rays.

8. Solar Thermal Cladding

Solar thermal cladding is a passive solar building method designed specifically to hold heat during the winter. The sun's energy is stored within this material and passed through to the building for heat retention purposes.

9. Structural 3D Printing



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

10. Self-healing Concrete

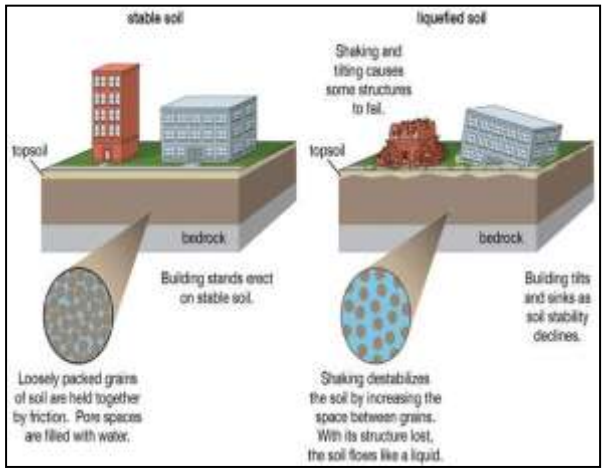
This material is in its early stages, but once it's commercially viable it opens up many sustainable possibilities. Everything from roads to walkways can benefit from concrete that heals itself. Road crews would no longer need to shut down busy streets and highway lanes to address potholes and cracks.

5.1.2 Soil Liquefaction

Soil liquefaction is the phenomenon in which the stiffness and the strength of the soil are lost under the action of earthquake force or due to rapid loading conditions.Soil liquefaction occurs in a fully saturated soil.

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 vibroflotation (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.



The village has covered major depending upon agriculture farming. Black soil is rich in chemical properties and very suitable for the growth of cotton, jowar, wheat, linseed, groundnut and gram. In horticulture crops–Mango, Sapota, Guavaand ,Bananaa remain fruit crops and vegetables like Peas ,Brinjal, Tomato, Greenchilli etc. are grown. In black soil, there should be proper drainage of water. There are mainly two problems in black soil i.e. water logging and soil salinity. Black soil is called black soil fire. This colored soil is black and it is made from the rocks of lavaandrichin clay. Black soils are highly moisture-retentive, extremely compact, and tenacious when wet, being substantially compressed to create deep, large cracks on drying and self-plowing. Black soils get very high fertility credits. The sea resuitable for leguminous crops such as cotton, turning, and citrus fruits. Certain crops include maize, Jowar, millets, linseed, tobacco, safflower, sugarcane, vegetables, and soon. Black soils are rich I n calcium, potassium, and magnesium, but low in nitrogen. Sandy soil is low in nutrient content but helps grow trees like coconut, cashew, and casuarinas in high-rainfall areas. As the name suggests, the black soil is darkand sticky with a clay-like quality. It holds well the moisture and become shard under dry condition and sticky under wet conditions. The soil consist of less than 30 percent clay, wedge-shaped pedestrians, and cracks that regularly open and close. Black soil is usually used in areas with regular raint oraisemillet ,cotton, soybean, sorghum, and pigeonpea. Up onirrigation of the soil, black soil is used to cultivate other crops, such assugarcane, maize,tobacco ,andcitrus. The soil may be use dasamaterial for construction. If you are commercially growing crops, you need to learn about crops that are ideal for blacksoil.

Effects of Liquefaction on Buildings :

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

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

The effects of soil liquefaction on the built environment can be extremely damaging. Buildings whose foundations stand directly on the sand, which liquefies, will experience a sudden loss of support. Where a thin crust of non-liquefied soil exists between building foundation and the liquefied soil, a 'punching shear' type foundation failure may occur. The irregular settlement of ground may also break underground utility lines. The upward pressure applied by the movement of liquefied soil through the crust layer can crack weak foundation slabs and enter buildings through service ducts, and may allow water to damage the building contents and electrical services.

Bridges and large buildings constructed on pile foundations may lose support from the adjacent soil and buckle or come to rest at a tilt after the earthquake induced shaking.

5.1.3 Sustainable Sanitation

Sustainability focuse something the needs of the present with outcome promising the ability of future generations to meet their needs. The concept of sustainability is composed of three pillars : economic, environmental, and social also known in for mallyas profits, planet, and people. Investors can be wary of companies that commit to sustainability. Although the optics can be beneficial to share price, investors worry about companies being transparent with their earnings results. Big brands often make pledges to sustainability, but it often takes along time to achieve sustainability goals.

Technological sustainability :

Technology should be a prime pillar while designing a sanitation system. Socioeconomic and demographic matrix should be prepared at a micro-level prior to the design of the sanitation system. Availability and type of land, availability of water, density of population, social and economic status of the community should be the prime factor and appropriate technological solution should be applied to design community or geography specific toilets. Technological sustainability should be determined by trained engineers. In most

low-resource settings, local governments have insufficient capacity and capability strength to build community-level infrastructure and even less human capital for long-term maintenance.

Behavioral sustainability :

Behavioral sustainability such as training the soft skills to the mass to strengthen capacity building and understanding of the interaction between the cultural, biological, physical, and social environmental factors. Programs should be focused on training communities to use the toilet and sensitize the people on the need to keep their surrounding dirt free. There is a strong need to create awareness among the population. Adopting the toilet using behavior is an inexpensive alternative to building toilets. Behavior and cultural transformation as a frugal innovation is a bottom-up approach and can easily be adapted to different population that makes it highly scalable. Awareness programs should additionally be designed geographically and aimed to create awareness among diverse and specific mindset of people spread over the target area.

Sustainability in program delivery :

A robust and innovative program can additionally be proven as failed due to poor delivery mechanism, implementation, and lack of monitoring system. The Government should focus on creating a strong and sustainable mechanism and policy for delivering the plans, funds, and ideas at the grassroots level. There should be focused monitoring of the implementation backed by a penalty and incentive schemes that will encourage the channel to deliver and implement the program in a much more effective and scheduled manner. Information, Education, and Communication (IEC) which is a combination of several methods of propagation of information and education on public health should be used to create mass awareness toward sanitation and public health along with other related benefits. Audiovisual aids, video recording, and screening, display of photographs related to best practices on personal and community hygiene, street plays with the script composed in communicable/folk local language, and providing training to the youth to make presentations are among several methods of implementing IEC to create a sustainable program delivery.

Sustainable community toilet :

Following are some of the important income generating activities that may formulate sustainable framework for community toilets in the slum:

- Pay and use system meets the demand of the community and is an economically viable income generating activity

- Monthly membership systems should offer some discounts/perks to the user and at the same time should provide a guaranteed user for the month
- Sanitary shop and multi-utility stores near toilet complexes, where fast-moving products and services such as mobile/dth recharge, snacks, and tea will be available
- Making candles, cards, and handicraft training session for women
- It may be a good idea to convert the urines/excreta into fertilizer and compost, and sell it exclusively to the people of the elite class who maintains huge greeneries at their home/gardens/lawns.

Sustainability of sanitation is a key challenge as well as a scope to improve sanitation facilities in India. The Government should use more technical tools, expertise to develop a sustainable framework of latrines, sewages across the country, and strengthening capacity and capability building. Sustainability is not only related to the physical part of the issue, it additionally covers the physiological aspects where the attitude, behavior, and cultural beliefs of the society should be changed and people should accept the improved mean of sanitation rather continuing the decade old practices.

5.1.4 Transport Infrastructure / system

The road construction type or methods are classified as below:

1) Earth road
2) Soil stabilized roads
3) Water bound macadam road
4) Bituminous or black top road

Earth road and gravel roads are the one the team members generally see in village areas, this in built without and subgrade preparation and are generally washed out rainy season.

Soil stabilization means the improvement of the stability or bearing capacity of soil by the use of controlled compaction, proportioning and/ or additives.
Soil stabilization uses physical, and/ or chemical methods to make the soil suitable for construction purposes.

WBM road means water bound macadam road. The wearing surface of WBM

road consist of clean and crushed aggregates which are mechanically interlocked by rolling operation. The material is bound with filler material(which are also called asscreenings) and water, laid on prepared base course.

There are mainly 3 types of materials which are used in the construction of WBM road.

1- Course Aggregate
2- Screenings(filler material)
3- Binding Material

Bituminous roads are those which are painted with bituminous material satits surface. These are high-cost roads.

The main functions of providing a seal bituminous surface areas under:

1) To make the surface watertight.
2) To provide a more desirable surface texture.
3) To reduce thes lipperiness of the surface.
4) To obtain an existing dry or weather surface

Case study : Hyperloop

Hyperloop and the transportation of the future

Hyperloop project aims to develop a high-speed transport system that will connect the cities of Los Angeles and San Fran-cisco in less than 30 minutes. It will be faster than flying and cheaper than the train. To bring this concept closer to reality team of engineers needed to monitor the structural integrity of the tubes in the near vacuum conditions. These tubes are used to transport the electrically powered passenger cabins so it is crucial to notice any changes that could impact safety. This task was tackled by the USB3 high-speed cameras.

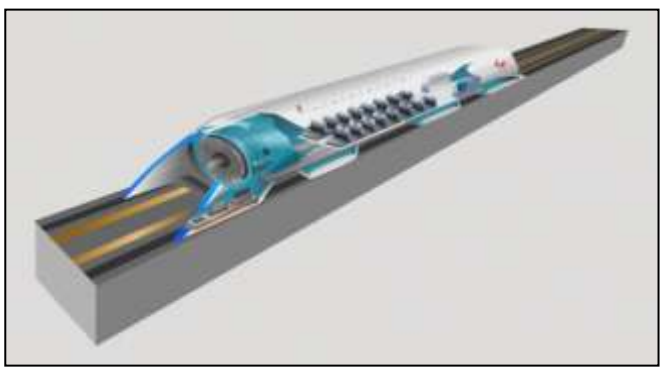


Fig. 26 Hyperloop concept – Picture: Camilo Sanchez

Into the loop

A team from Musk's space exploration company SpaceX devised the fundamental concept of Hyperloop - a multi-passenger pod or capsules speeding through a series of depressurized tubes.
Subsequent development involved participative approach with an open invitation to join, comparable to open source development method common in the software sector.
Applicants were encouraged to use existing technology to speed up the development cycle and keep down the costs.
Amongst various required technologies, SpaceX has expressed a need for a rail and sub-track visual observation system by which an operator could identify abnormalities or foreign object debris (FOD) on the track.

The RIT Imaging Hyperloop Team from the Imaging Science Center at the Rochester Institute of Technology is a USA-based research group specializing in imaging.
The 25-strong team submitted a bid as part of the Hyperloop process to implement the safety and maintenance system for the tunnel tubes.
With an automated camera system providing intelligent image analysis, at the beginning of 2016 the RIT team won the initial selection procedure and is now part of the Hyperloop testing program.
Team lead Kristina Carrucci said: "Our innovative approach was unique among the bidders. Thanks to fully automatic, totally imaging-based inspection we were able to win out against the competition. Other conventional methods, such as those normally used for inspection of oil pipelines, were not suitable for Hyperloop. We use structured light for 3D scanning of the pipe walls at high speed. This is normally used for reverse engineering or target/actual comparisons in industrial production and is commonly used to make 3D maps of stationary objects for scientific purposes, but has never been utilized at ultrasonic speeds."

Fig. 27 : Hyperloop test track under construction – Picture: Reuters

They feel the need ..

The team designs include a high-speed communications system and a sensor system detecting faults in the tube walls that could impede the motion of the pod.
Both are relatively new technologies applied in a higher speed environment.
The aim is to ensure rapid and precise monitoring of the surface condition of the inside of the tubes.
Any bulges, cracks, deformed weld seams or oxidation represent potential safety risks.

The structured light scanner is mounted on a robotic transportation system that shuttles the imaging solution down the rail.
The scanner is made up of a projector, which projects a grid of lines onto the tunnel walls, and 2 industrial high-speed cameras.
Based on the deformation of the projected pattern on the rail, the system can inspect the rails (without contact) for geometrical variations such as enlarged gaps between the tube sections (so called I-beam integrity scanning) and foreign object debris detection, even at the maximum travel speed of 1225 km/h.
In addition to visual inspection, the system provides the value for the width of the gap between every I-beam pair at a resolution of fewer than 0.05 inches and a graph indicating FOD as a function of displacement down the tube.

Preliminary system design - Pictures: RIT team

The need for speed

Dedicated software developed by RIT uses the data obtained to create a 3D model of the tubes, enabling defects in the material to be detected during operation.
This means that changes can be identified immediately and any repairs can be planned efficiently.
The use of existing image capturing technology and standard products available at any time make the development, integration, and operation of this inspection system particularly efficient and cost-effective.
Despite the efficiency, the requirements for the camera system to be used were extremely demanding.

The use of structured light calls for a very good image quality and exceptional camera and projector resolution.
In particular, the cameras must have an excellent signal-noise ratio and a high dynamic range.High speeds require high frame rates of 500 frames per second, and a corresponding camera interface with high bandwidth.
A compact construction, low purchase costs, and easy usability were further requirements for use in the Hyperloop project.

Rail sca from the top - Pictures: RIT team

5.1.5 Vertical Farming

Although vertical farms producing leafy greens are receiving most of the press coverage, there are a variety of other crops being being grown and innovative growers are finding these crops to be profitable. The main challenge is that even though they can produce a lot of leafy greens because they area able to stack the plants, there is abottle neck in terms of how fast they can produce the crops. The bottle neck is tied to the plant genetics. With the current plant genetics and cultivars that most vertical ferment repreneurs are using, it is very hard too ut perform the lettuce crops coming out of the field. This is especially the case if the field conditions are suitable to grow lettuces uchas in California and the southern part of Arizona during the winter. Order for the leafy green produce in vertical farm stoactually gain significant market share, the genetic shave to bec hanged in those plants," Hernandez said. "This can come through conventional breed in gorge need it in go through targeted breeding using molecular tools. A new set of cultivars is needed, a news at of genetics that Ares pacific or indoor farms. Right now we are using the genetics that are good for field production. These field cultivars have high plant uniformity in terms of growth under a large variability of environmental conditions. The field genetics enable plants to look the same even if there is a lot of variability in the environment.

Types of vertical farming

(1)Building-based vertical farms

Abandoned buildings are often reused for vertical farming. New builds are sometimes also constructed to house vertical farming systems.

(2)Shipping-container vertical farms

Recycled shipping containers are an increasingly popular option for housing vertical farming systems.By stacking the shipping containers, farms can save space further and achieve higher yield per square foot.

(3)Deep farms

They are built from refurbished underground tunnels or abandoned mind shafts. As temperature and humidity underground are generally temperate and constant, deep farms require less energy for heating.

Temperature and humidity in underground are usually consistent and mild, and so, deep farms require less energy for heating. They can also use groundwater (which is nearby) to further reduce the cost of water supply.

Advantages of vertical farming

1. Crop production throughout the year

There is no need to worry about frost, winds, sunny days. There is no need to worry about the seasons. All you need to do is generate a well-controlled environment and be able to supply your vertical farm with seeds, soil substitutes, and the necessary nutrients.

2. You will need less water

Some scientists and advocates of vertical agriculture say that only 10 to 30 percent of the water that would be needed using traditional horizontal

agriculture is needed. Good news, since water can be a problem for farmers in certain regions!

3. Future proof

Urbanization is growing and soon most people will live in cities. This means that people will have fewer options to get fresh produce regularly. Vertical agriculture solves this problem: farms can be built near cities, or even within them.

4. Weatherproof

As we have already mentioned, there is no need to worry about weather conditions (except for hurricanes and tornadoes, maybe!). Modern solutions will give farmers the ability to control air, light, humidity, temperature and other important factors for a healthy harvest.

5.1.6 Corrosion Mechanism, Prevention and Repair measures of RCC Structure

Corrosion Mechanism, Prevention & Repair Measures of RCC Structure Though concrete is quite strong mechanic allies, its highly susceptible too chemical attack and structure gets damage and even fail unless some preventive measures are adopted to counteract this and there by increasing the durability of structure. In the case of Reinforced concrete structure the ingress of moisture and air may lead to corrosion of steels, cracking and spelling of concrete covers there are reducing durability of concrete structure. Repair suggested as the protective solution for damaged structure due to corrosion.

Corrosion Mechanism, Prevention & Repair Measures of RCC Structure Abstract. Corrosion Mechanism, Prevention & Repair Measures of RCC Structure Though concrete is quite strong mechanically, it is highly susceptible to chemical attack and thus structure gets damaged and even fail unless some preventive measures are adopted to counteract this and thereby increasing the durability of structure.In the case of Reinforced concrete structure the ingress of moisture or air may lead to corrosion .

five approaches for repair, substitution and recovery. These were 1) Patch repairs and nascent anodes, 2) Impressed Current Cathodic Protection, 3) Galvanic Cathodic Protection, what's more, 4) Hydrophobic medications. The determination of the above research bundles depended on over a wide span of

time use by the development industry to repair, renovate and restore RC structures.

FIG. 28 : CORROSION EFFECT

FIG. 29 : PREVENTIVE MEASURES

5.1.7 Sewage treatment plant

Sewage Treatment Plant Process

1. What is Sewage and why sewage treatment is required ?

Sewage is water that is discharged after residences, institutions, hospitals, industrial and commercial use.

Sewage treatment refers to the process of removing contaminants, micro-organisms and other types of pollutants from wastewater influent. The main objective of sewage treatment is to produce an effluent (treated waste water) and a solid waste/sludge suitable for discharge into the natural environment.

For purpose sewage treatment is required?

Treatment of sewage or wastewater protects public health and prevents pollution, disease as well as hazards from sewage contaminants. Hence, sewage treatment is required.

2. What is sewage treatment plants and how they work ?

It is one type of wastewater treatment methods which is designed to hold polluted water in specially designed compartments. This plant goes through series of stages that involves extracting waste from the waste water influent.

Sewage/wastewater undergoes several stages in its treatment process and is shown below:

3. Sewage Treatment Process:

1. Preliminary Treatment: This is the first stage of sewage treatment plant process and its main objective is the removal of coarse solids and other large materials often found in raw wastewater. Preliminary treatment operations typically include large filtering screens, grit removal and, in some cases, breaking of large objects. Excess grit cause severe pump blockages thereby affecting a range of subsequent treatment pumps. Flow measurement devices, often standing-wave flumes, are always included at the preliminary treatment stage.

2. Primary Treatment: The main purpose of this treatment is to reduce any heavy solids (organic & inorganic) that settle to the bottom by sedimentation while oil, grease & lighter solids float to the surface by skimming. The settled and floating materials are removed and the remaining liquid may be discharged or subjected to the next stage i.e. secondary treatment. Primary treatment removes about 60% of suspended solids from wastewater.

3. Secondary Treatment: The prime objective is the further treatment of the effluent from primary treatment to remove dissolved and suspended biological matter. The biological solids removed during secondary sedimentation, called secondary or biological sludge, are normally combined with primary sludge for sludge processing. Secondary treatment may require a separation process to remove the micro-organisms from the treated water prior to discharge or tertiary treatment. Secondary treatment removes more than 90% of suspended solids.

4. Tertiary/Advanced Treatment: Tertiary treatment generally follows

secondary treatment and aids the removal of those wastewater constituents which cannot be removed in secondary treatment. Treated wastewater is sometimes disinfected chemically or physically (for example, by lagoons and microfiltration) prior its discharge into the receiving environment (sea, river, lake, wet lands, ground, etc.)

FIG. 30 SEWAGE TREATMENT PLANT

5.2 Concept (electrical)

5.2.1 Programmable Load Shedding

The project is designed to operate an electrical load multiple number of times as per the program. It overcomes the difficulties of switching the load ON/OFF manually. This proposed has an inbuilt real time clock (RTC) to keep tracking the time and thus to switch ON/OFF the load accordingly. Load shedding is what electric utilities do when there is a huge demand for electricity that exceeds the supply

5.2.2 Railway Security System using IoT

The Internet of Things (IoT) is a network of interconnected devices which are outfitted with sensors and Radio-Frequency Identification (RFID) devices. These devices are uniquely addressable and use standard communication protocols like Transmission Control Protocol (TCP), User Datagram Protocol (UDP) and Internet Control Message Protocol (ICMP) in a networking environment. Here devices are communicating with each other without human interaction. The objective of this work is to provide an Automatic Railway Gate Controller, which operates the railway gates without gatekeeper which makes it useful for operation at level crossings. This controller deals with the reduction of time of which the gate is being kept closed and provide the safety to the road users by reducing the accidents that usually occur due to carelessness of road users and the gatekeepers. In addition to this, one more additional module is implemented for the passengers convenience. Here, passenger needs to register their phone number via website to get destination arrival notification. This system is cost effective, real time and automatic.

Keywords: Sensor, IOT, Control

INTRODUCTION:

The railway system in India and other countries is the most commonly used transportation mode and it is also a one of the low cost transportation mode. At present, country like India is having worlds largest railway network in the world. There are thousands of rails running on track every day. In railway system, it is impossible to stop some of the critical situations or emergencies which are arising during the running of train. Every year, more than 40,000 people are dieing in the railway crossing accident. Current devices present at railway crossing are not safe, manually operating and difficulty to prevent accidents because railway crossing system using in many countries is not advanced. Therefore Train accidents having serious repercussion in terms of death of human life, injury, damage to railway property. These train accidents are mainly because of the fire in trains and Collisions of trains at railway

crossings. A level crossing or railway crossing is an intersection of a road and a railway line. It requires human co-ordination to open or close the gates, lack of this leads to accidents, which leads to loss of human life, injury and loss of properties. In order to avoid the human mistakes that could occur during the operation of gates, a new automatic railway gates control system using IoT is developed. The Internet of Things (IoT) is a world-wide network of interconnected objects which are outfitted with sensors, actuators and RFID devices. Present days, IoT is used in all most all areas such
Agriculture, industry, business, environmental parameter monitoring and also used in medical field to detect diseases like glaucoma and monitoring health parameters of the patient.

5.2.3 Management through Energy Harvesting Concept

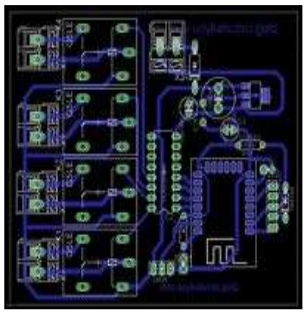
Power Management through Energy Harvesting Concept. The objective of the Power Management through Energy Harvesting Concept project work has been designed and implemented in the power management through energy harvesting concept which deals with the power saving and optimization. The overall control is based on sensors of light and temperature.

5.2.4 Moisture Monitoring System

Moisture Monitor Model M-607
Digital Indicator
The Moisture Monitor Model M-607 utilizes decades proven 1035G linear moisture interface based on the electrical resistance sensing technology to provide accurate and reliable indication of moisture levels to one-tenth percent. An easy-to-read red LED display provides the operator with a simple means to keep the process under control. Features include...

- Simple to install, simple to operate, simple to service.
- Linear moisture measurements over the entire residual moisture range.
- Utilizes various application-specific sensor configurations such as detector rolls, insulated full-span roll, plates, fingers, and bars for reliable and accurate moisture detection.
- Easy pushbutton access to calibration factor to display actual percent moisture for different materials, fibers and blends.
- Conntect an optional circular chart recorder to tell the moisture story for each 24-hour period.

5.2.5 Home Automation using IoT / Any other methodology



Wireless Home Automation system (WHAS)using IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy.

5.2.6 PC Based Electrical Load Control

The aim of this project is to control the electrical appliances through a personal computer (PC). For example, theatre lighting can be centrally controlled form the PC for better stage management.

The aim of this project is to control the electrical appliances through a personal computer (PC). For example, theatre lighting can be centrally controlled form the PC for better stage management. Presently, they are manually managed which makes it difficult to coordinate the lighting with the respective scene. With this system, one can control the electrical appliances ON/OFF by just being seated at one place using a PC.

This system is integrated with the electrical loads and also connected to the PC where centralized control takes place. It uses an RS-232 protocol from the microcontroller to communicate with the PC. To turn on/off the appliances, we use Hyper Terminal on PC. Once the connection is established with the PC, then the system starts working. The microcontroller used in this project belongs to 8051 family.

This project can be further enhanced by implementing a GUI based control panel on the PC with appropriate embedded software. The intensity control can also be incorporated using power electronics devices. Note: The project works only on operating systems having hyper terminal (E.g. Windows XP). The computer must have a RS232 serial port.

Electrical appliances can be controlled through a PC interfaced to a microcontroller. This interface is done through a level shifter IC. The loads are then controlled through the relays duly interfaced to the relay driver which in turn is connected to the microcontroller.

5.2.7 Electrical Parameters Measurements

The standard units of electrical measurement used for the expression of voltage, current and resistance are the Volt [V], Ampere [A] and Ohm [Ω] respectively.

These electrical units of measurement are based on the International (metric) System, also known as the SI System with other commonly used electrical units being derived from SI base units.

Sometimes in electrical or electronic circuits and systems it is necessary to use multiples or sub-multiples (fractions) of these standard electrical measuring units when the quantities being measured are very large or very small.

The following table gives a list of some of the standard electrical units of measure used in electrical formulas and component values.

Standard Electrical Units of Measure

Electrical Parameter	Measuring Unit	Symbol	Description
Voltage	Volt	V or E	Unit of Electrical Potential **V = I × R**
Current	Ampere	I or i	Unit of Electrical Current **I = V ÷ R**
Resistance	Ohm	R or Ω	Unit of DC Resistance **R = V ÷ I**
Conductance	Siemen	G or ʊ	Reciprocal of Resistance **G = 1 ÷ R**
Capacitance	Farad	C	Unit of Capacitance **C = Q ÷ V**
Charge	Coulomb	Q	Unit of Electrical Charge **Q = C × V**

Inductance	Henry	L or H	Unit of Inductance $\mathbf{V_L = -L(di/dt)}$
Power	Watts	W	Unit of Power $\mathbf{P = V \times I}$ or $\mathbf{I^2 \times R}$
Impedance	Ohm	Z	Unit of AC Resistance $\mathbf{Z^2 = R^2 + X^2}$
Frequency	Hertz	Hz	Unit of Frequency $\mathbf{f = 1 \div T}$

TABLE 5 : STANDARD ELECTRICAL UNIT

CHAPTER : 6

6 Swachh Bharat Abhiyan

6.1 Swatchhta needed in allocated village -Existing Situation with photograph

"Cleanliness is Godliness" is the mantra of Mahatma Gandhiji, Father of Nation. He demonstrated, propagated and insisted for individual and community cleanliness throughout his life. Following his footprints, Swachh bharat Mission campaign achieved encouraging results. This vision will be translated into action by bringing in community participation for clean toilets and integrated waste management to make Gujarat open defecation free, zero waste, dust free, plastic free and green. The objectives of the Swachh Bharat Mission are:

- To bring improvement in general quality of life in Urban and Rural areas.
- Encouraging sustainable sanitation facilities through creating awareness and health education, giving inspiration to communities and PanchayatiRaj Institutions.
- Encouraging affordable and proper technology for ecological life and sustainable sanitation.
- The schools which are not covered under Sarva Siksha Abhiyan be covered, to provide Anganwadi centers of rural area with proper sanitation and health facilities and provide active engagement about health education and sanitation facilities to students.
- Focusing on solid and liquid waste in Urban and Rural areas for entire cleanliness, develop environmental sanitation system being arranged by community.

When the team members visited the village first time, the team members observed the cleanliness and sanitation across the village, the level was quite satisfactory. The streets were clean and looked liked swept on daily basis . All the public buildings were clean, but some parts like a water body available in village was full of waste. The common plots of the village were not cleaned by anyone and they were used by villagers to dispose their house waste.The main locations like Gram Panchayat Building, Model School, Temples across village are totally clean. Headman of the Village is positive for village cleanliness and making efforts.

The team members also met teachers of the school and came to know that they are taking lot of initiative for cleanliness of village. All the villagers are taking care of their houses by themselves. No people are assigned by

administration for sweeping and cleaning activity. On the basis of our observation, the team members suggest that door to door waste collection and some more activities regarding cleanliness.

FIG. 31 : Existing Situation

6.2 Guidelines - Implementation in allocated village with Photograph

The general features of Swachh Bharat Mission are given below:

- Implementation and monitoring at State level by Swachh Bharat Mission.
- Phase-wise implementation of block wise programme from 2014-15 to 2018-19.
- Determination of "Zero waste" policy in the State.
- Formation and implementing of "Public Health Bye-Laws for all cities.
- Sanitation for all
- Formation of task force for supervision of programme for all cities at City Level.
- Free health check-up of sanitation and drainage employees twice in a year.
- Planning of eco-friendly crematorium in the Municipalities.
- Ratings of cities for cleanliness to inter cities, cleanliness competition and prizes.
- Financial / technical assistance to Local Self Government bodies, training and capacity building.
- Intensive sanitation drive for first 3 Months.
- Public awareness and public participation.
- Bring about an improvement in the general quality of life in the urban areas.
- Accelerate sanitation coverage in urban areas.
- Generate felt demand for sanitation facilities though awareness creation and health education.
- Cover schools/ Anganwasis in urban areas with sanitation facilities and promote hygiene education and sanitary habits among students.
- Encourage cost effective and appropriate technologies in sanitation.
- Eliminate open defection to minimize risk of contamination of drinking water sources and food.

FIG. 32 : AFTER GUIDELINES - IMPLEMENTATION

6.3 Activities Done by Students for allocated village with Photograph

Because of prevailing pandemic situations of COVID-19, the team members were unable to practice any activities in the allocated village, but the team has observed various points and can recommend following practices either to be initiated or continued to be carried forward by the villagers:

- Elimination of open defecation
- Eradication of Manual Scavenging
- Adoption of Modern and Scientific methods for Solid Waste Management
- Make people aware about behavioral change regarding healthy sanitation practices including for the cases of household toilets, public toilets and communal toilet facilities
- Spreading generate awareness about sanitation and its linkage with public health
- Capacity Augmentation for local bodies to create an enabling environment for private sectors (if any)
- Comprehensive Sanitation Planning, implementation and monitoring

CHAPTER : 7

7 Village condition due to Covid-19

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

The nation-wide lockdown imposed in India from March 25 to May 31, 2020 following the breakout of the COVID-19 pandemic affected rural India in diverse ways. This was only to be expected given the great variation in production systems and socio-economic conditions in villages across agro-ecological zones. However, the impact is differential across socio-economic classes and regions of the country, which are observed and narrated by the researchers T.S. Modak, S. Baksi and D. Johnson, which are presented below:

1. The impact on harvesting operations in the irrigated villages was limited, mainly because of the easy availability, and widespread use of combine harvesters in most of the surveyed villages. While it is too early to conclude, one can argue that the use of machines for various agricultural operations has received a thrust under the current crisis. In rainfed villages, being the lean agricultural season, the opportunities for farm employment were already restricted.

2. The major impact on agriculture, however, was in terms of access to marketing channels, and price received for the produce. In villages of Punjab and Kerala, there was active intervention by respective State governments to ensure procurement at fair prices. Such institutional mechanisms were absent in other States. The local market channel of sale through small traders and merchants had collapsed, and gravely impacted poor peasants for whom these traders were the main channel. Restricted mobility hindered access to regulated markets even for richer capitalist farmers. The disruption of the supply chain has led to a slump in the local farm harvest prices for most agricultural produce. Producers of perishable goods, particularly vegetables, were severely affected. Among them, the worst hit were poor peasants, without any access to storage facilities or procurement centers.

3. While agricultural operations were not affected much in the irrigated villages, a tendency seemingly encouraged by the lockdown is an expanded use of family labour among smaller landowners. The tendency to use family and exchange labour among poor peasants implies that the scope of agricultural wage work was lower for manual workers during the lockdown.

4. Non-agricultural work, which was crucial in the lean agricultural season, had completely collapsed. In the complete absence of non-farm employment, workers, and even artisans, were being forced to seek employment in agriculture. The reduced mobility due to the lockdown also implied that workers who otherwise regularly migrated for work were now competing for agricultural employment. As a consequence, a downward pressure on rural wage-rates was already beginning to be felt. The Covid-19 lockdown has broken down the complementary relationship between agricultural and non-agricultural work, where the surplus labour from the former was usually absorbed by the latter.

5. Despite income flows drying up for all socio-economic classes to varying degrees, the immediate impact was most severely felt by manual workers and poor peasants who did not have any savings. With merge cash in hand, no home produce for consumption, and lack of employment, the class of manual workers were certainly the worst affected. In addition, a major blow to the class of manual workers, and poor peasants has been the complete breakdown in receipt of remittances. The combination of low levels of income, ineffective public distribution systems, and negligible income-support had serious implications for subsistence of these households, leading to increased indebtedness especially from informal sources. The class of landlord and capitalist farmer was the least impacted by the lockdown. Better access to storage facilities and regulated markets implied that their farm incomes were relatively protected. Also, they had sufficient cash in hand and food stocks for daily household consumption.

To sum up, the Covid-19 lockdown has worsened the already prevalent distress in the Indian countryside especially for manual worker and poor peasant households. There is also a fear that if the lockdown restrictions are prolonged, crop production in the kharif season will be severely affected. Government intervention is critical to maintain a basic level of household consumption and to resume normal agricultural production.

The allocated village for the team has not been proven as a difference maker

than the other and in context of above mentioned situations.

Below are the steps taken in the allocated village:

In our Bambhaniya village many difficulties face during lockdown. because of the no awerness in village area. and this is the big problem of the our village. so village headman is decide to implement the swaymsevak in village.job of the swaymsevak is to ensure the rules are followed by the people of covid guideline.

In village bambhaniya sarpach shri takes action is (1) social distance are followed by the villager (2) spray of the bleaching in entire village area (3) 14 days home quarantine those for coming in village

FIG. 33 : IMPLEMANTATION OF COVID-19 GUIDLINE

7.2 Activities Done by Students for allocated village with Photograph

Because of prevailing pandemic situations of COVID-19, the team members were unable to practice any activities in the allocated village, but the team has observed various points and can recommend following practices either to be initiated or continued to be carried forward by the villagers to fight against COVID-19:

- Making the villagers aware about initial preparedness through following common and specific guidelines levied by Central and State Governments time by time.

- Identifying the possibilities of development of screening facilities either at village entrance or common entrance point of either Taluka or nearby region.
- Tracing the contacts or migrants in the village.
- Testing to treatment facilities and centers in the village.
- Identifying manpower augmentation and training
- Suggesting various locations for temporary shelter homes either for isolation or for quarantine.
- Analysing post COVID-19 effects on agriculture, industry, employment and per capita income at village level.
- Simplifying administration, health-care and other local mercantile / industrial processes and strategies.
- Encouraging health workers, school teachers and aanganwadi people.

7.3 Any other steps taken by the students / villagers

activities or steps because of COVID-19 Pandemic situation, but based on the village visit, following points can be suggested either as simultaneous or parallel to points suggested in above topic no. 7.2:

- Continuous contact between Gram Panchayat and District Level Control Room or Task Force for getting latest guidelines, practices and steps taken for fighting against COVID-19 Pandemic situations.
- Continuing the practice of social distancing, wearing masks and consulting health care units without shying.
- Distribution of food, fruit, dairy products, grain, vegetables, oils, petroleum products, etc. should be observed so that neither scarcity nor rush can be observed.
- Inter-village and intra-village active cases movements as well as rural to urban to and fro migration should be observed and recorded so that contact tracing can be practiced effectively.
- Awareness to governance through social media and digital platform should be practiced, which may lead less movement for various purposes.
- Making villagers aware and educated have become must, even if they are vaccinated in nearby future.

CHAPTER : 8

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

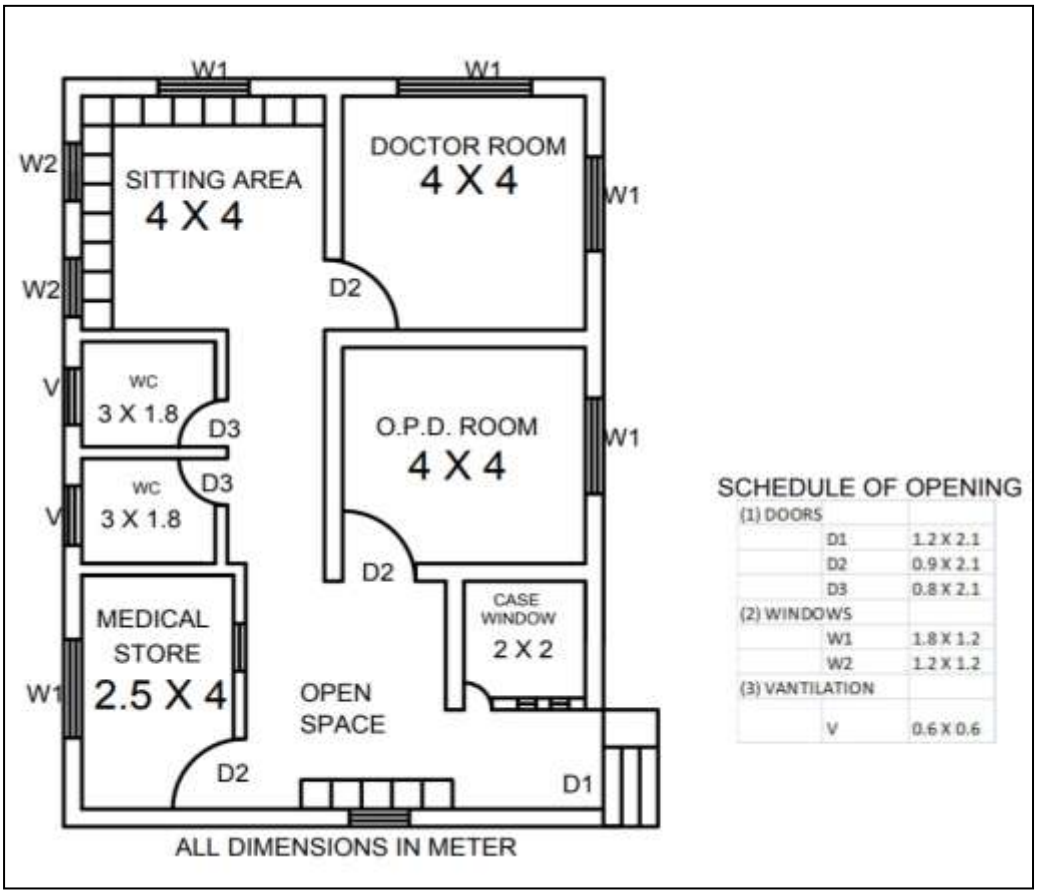
8.1 Design Proposal

There are some design proposals given from the sarpanch and talati:

- PHC
- Community hall
- Street light
- Drainage system
- Elevated service reservoir
- RCC road

8.1.1 Sustainable Design

Public health center



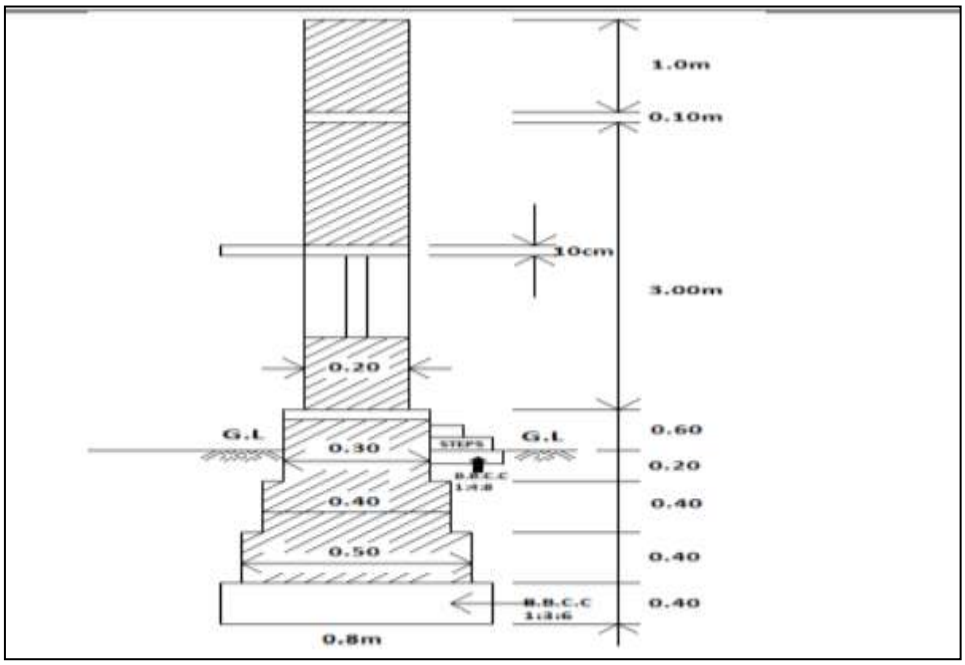


Fig. : section of PHC

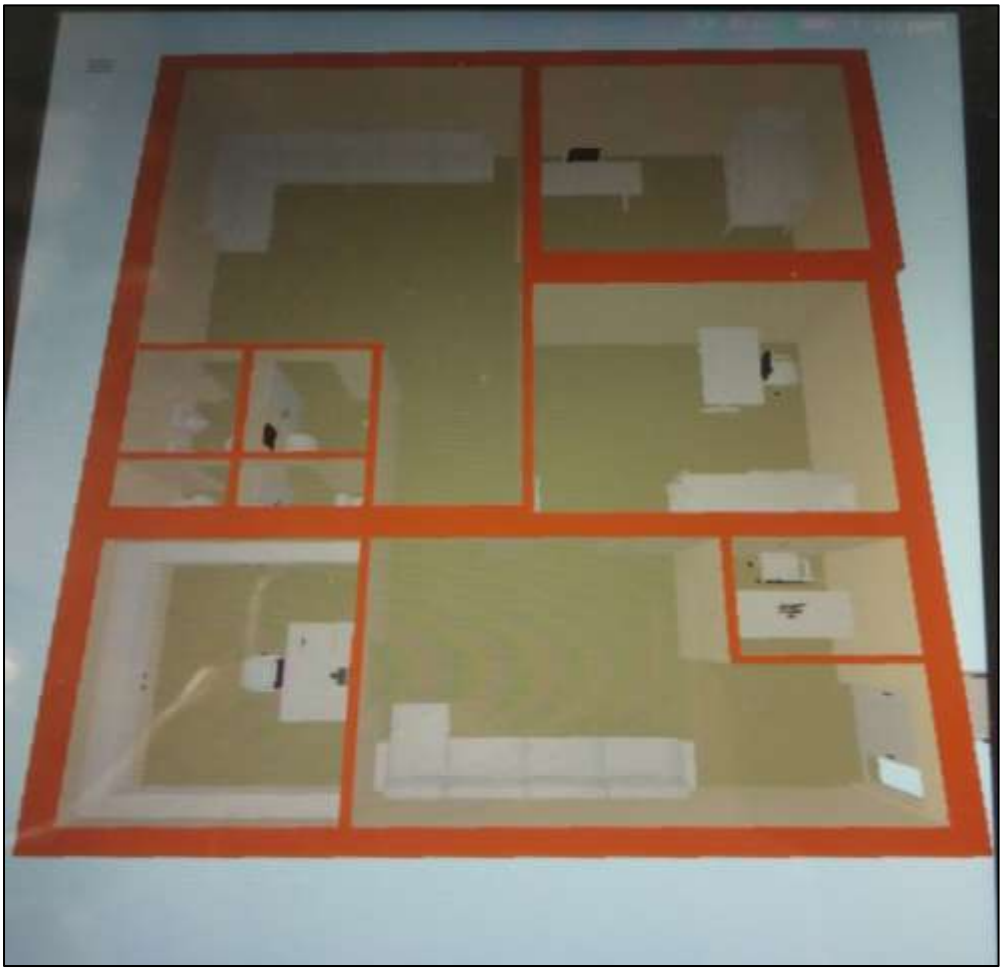


Fig. : 3D view of PHC

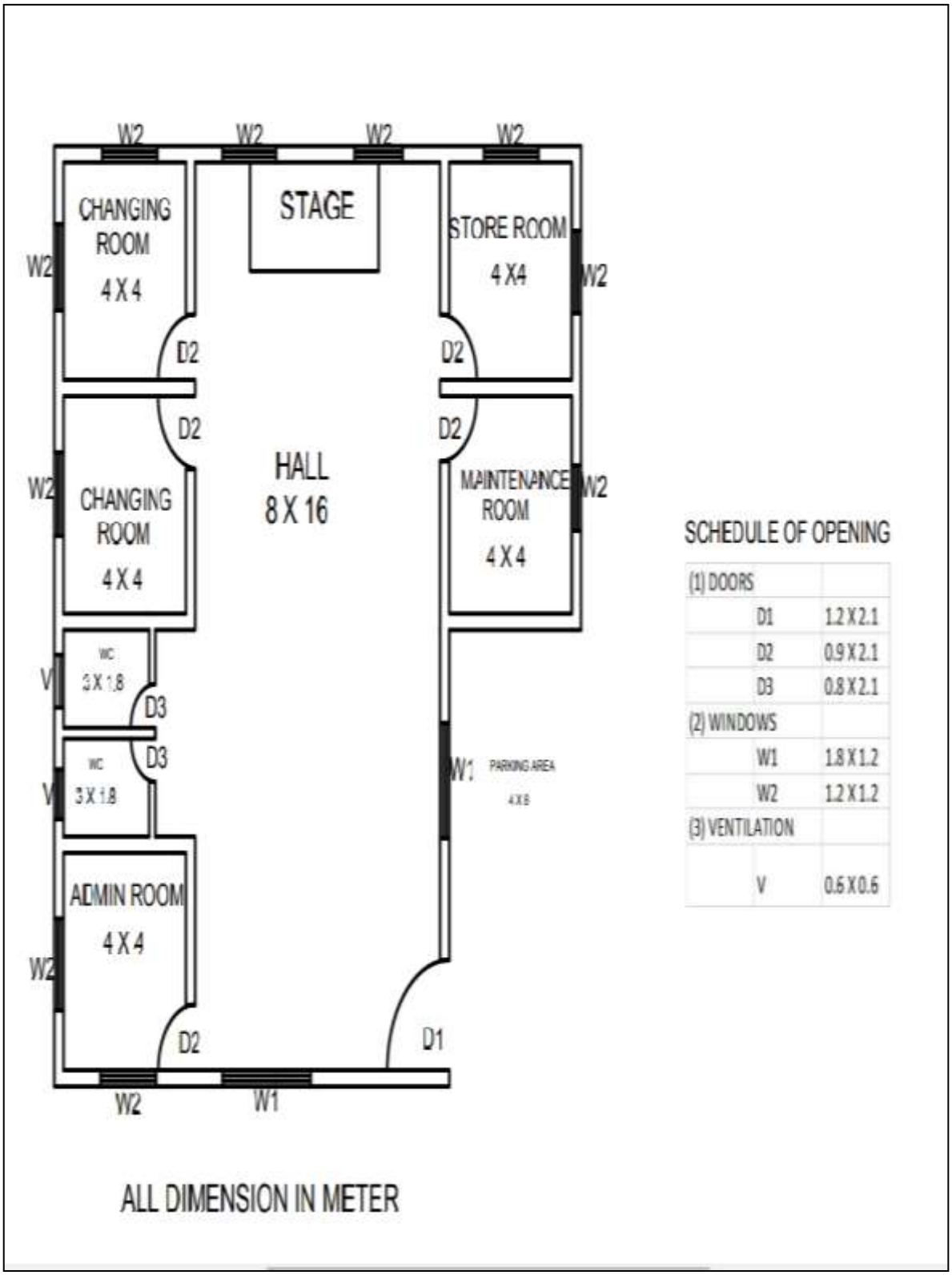
Sr no	Item of work	No	L m	B m	D/H m	QUANTITY	RATE Rs.	AMOUNT Rs.
1	Excavation in foundation for columns	1	82	0.9	0.7	51.66	110	5682.6
2	BBLC work in foundation	1	82	0.9	0.2	14.76	2850	42066
3	Masonry work							
	1 st footing	1	82.5	0.8	0.2	13.2		
	2 nd footing	1	83.0	0.7	0.2	11.62		
	3 rd footing	1	83.5	0.6	0.1	5.01		
						29.83	3500	104405
4	Masonry work in super Structure	1	85	0.2	3	51	4000	204000
5	RCC work for all Columns	12	0.4	0.6	3	8.64	5200	44928
6	External plaster	1	44.2		3	132.6	200	26520
7	Internal plaster	1	160.3		3	318.9	200	63780

8	RCC slab	1	26.4	17.4	0.15	70.488	9000	634392
9	Parapet wall		44.2	0.2	1.0	8.84	4000	35360
						Total	=	1161133.6
						Add 10%	=	116113.36
						Grand Total	=	1277246.96

TABLE 6 : COST ESTIMATION OF PHC

8.1.2 Physical design

Community hall



SCHEDULE OF OPENING

(1) DOORS		
	D1	1.2 X 2.1
	D2	0.9 X 2.1
	D3	0.8 X 2.1
(2) WINDOWS		
	W1	1.8 X 1.2
	W2	1.2 X 1.2
(3) VENTILATION		
	V	0.6 X 0.6

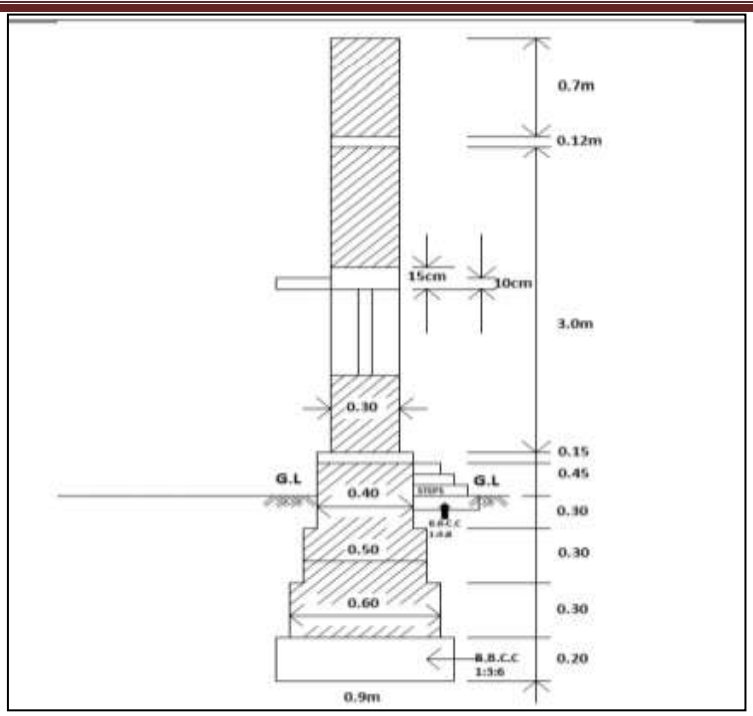


Fig. : section of community hall

Fig.:3D view of community hall

Sr no	Item of work	no	L m	B m	D/H m	QUANTITY	RATE Rs.	AMOUNT Rs.
1	Excavation in foundation for columns	1	208.45	0.9	0.7	131.32	110	14445.585
2	BBLC work in foundation	1	208.45	0.9	0.2	37.521	2850	106934.85
3	Masonry work							
	1 st footing	1	209.10	0.8	0.2	33.445		
	2 nd footing	1	209.75	0.7	0.2	29.365		
	3 rd footing	1	210.40	0.6	0.1	12.624		
	TOTAL					75.434	3500	264019
4	Masonry work in super structure	1	212.35	0.2	3	127.41	4000	509640
5	RCC work for all columns	25	0.4	0.6	3	18	5200	93600
6	External plaster	1	78		3	234	200	46800

7	Internal plaster	1	173		3	519	200	103800
8	Rcc slab	1	17.2	17.6	0.15	45.408	9000	408672
10	Parapet wall	1	69.6	0.2	1	13.92	4000	55680
						Total	=	1603591.435
						Add 10%	=	160359.1435
						Grand total	=	1763951

TABLE 7 : COST ESTIMATION OF COMMUNITY HALL

8.1.3 Social design

DRAINAGE SYSTEM :

In Bambhaniya plot are there Is no drainage system is provided. So it caused many problem related to sanitation and health and aesthetic appearance. So good drainage system is needed to bed level in the village of good sanitation.

Main 3 advantages of drainage system are……
Prevents Water Accumulation:

Drainage system scan prevent water accumulation that can lead to flooding by directing the water away from your home. Water that over-accumulates in your yard may kill plants. Drainage systems also prevent the accumulation of stagnant water, which can encourage mosquitoes to breed:
Reduces Soil Erosion:

Overtime, stagnant water accumulated can makes oil muddy, which in turn can cause soil to erode. Drainage systems maintain balanced moisture in your garden to reduce soil
erosion .
Removes Toxic Materials and Disease Organisms:

Continuous, heavy rains may cause the water to rise ,which can lead to flashfloods, especially when you live near a big body of water. Often these flash floods bring contaminatedwaterintoyoursoil.Drainagesystemscanremovethesetoxicmaterials by draining them away from your yard.

As per NBC code in rural area 70 to 100 lpcd are supplied for various purpose. Now the team members assume 70% total wastewater generated from supplied water.
The team members assumed average 5 household per house. Total number of house hold at outlet is 200. Total populatio no fit =200×5=1000.
Now the team members predict the future population by geometric increase method…. Growth rate =17.28
P2031 = 1000(1+17.28/100)

=1175

Now take extra5% for commercial shops and other common facilities like schools, hospitaletc.
Total population=1175+59=1232.

Now take 100lpcd supply in the village as per NBC code. And total 70% of it is generated as wastewater.
Amount of water =1232*70=86240 lpcd

= 0.0119 M3 /S

Assume velocity=0.7 M/S Q=VA A=0.0119/0.7=0.017072 M2
D=15 cm for circular pipe.

15cm diameter for main pipes. 10cm diameter for internal pipes. Length of pipes 3m**.**

* Estimation of total cost of project is given below :

Sr No	Item of work	No	L M	B M	H/D M	Quantity	Rate Rs.	Amount Rs.
1	Excavation for pipes	1	1121	0.2	0.5	112.1	205	22980.5
2	15 cm diameter pipe	253	3				350	88550
3	10 cm diameter pipe	128	3				330	42240
4	Worker	25					400	10000
						Total	=	163770.5
						Add 10%	=	16377.05
						Grand total	=	180150

TABLE 8 : COST OF DRAINAGE SYSTEM

- Plan of drainage line

FIG. 34 : LOCATION OF DARAINAGE LINE

8.1.4 Socio-Cultural design

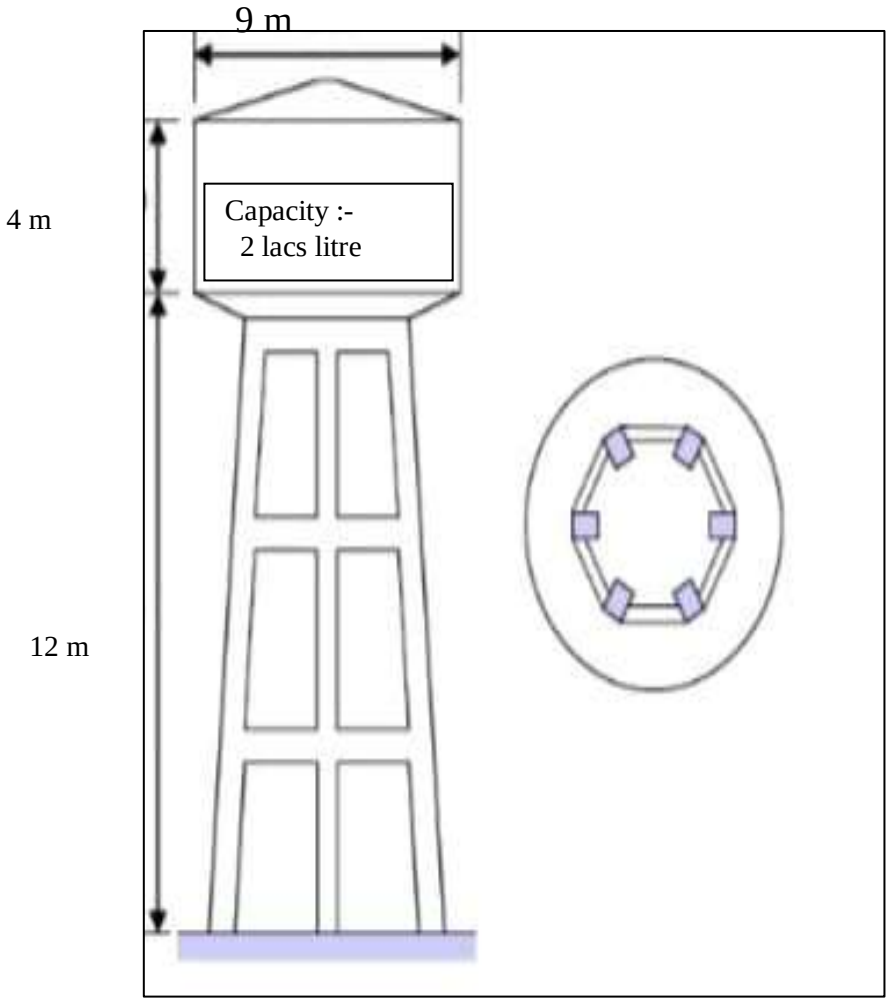


FIG 35 : FRONT VIEW OF ESR

Q-1

Capacity of tank = 2 lacs litre
= 200 m^3

Assume diameter of tank,
D = 9 m

Volume $V = \frac{\pi}{4} \times D^2 \times H$

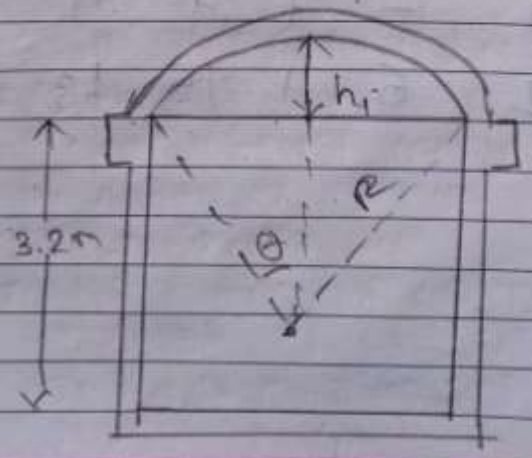
$200 = \frac{\pi}{4} \times (81) \times H$

H = 3.2 m

Let Assume diameter of bottom ring beam = 0.75 D
= 0.75 (9) = 6.75 m

D = 9m , D_1 = 6.75 m H = 3.2 m

(1) Design of top Dome
Assume $h_1 = 0.2\,D$
$h_1 = 0.2\,(9) = 1.8$ m



$(2R - h_1) \times h_1 = \frac{D}{2} \times \frac{D}{2}$

$(2R - 1.8) \times 1.8 = \frac{9}{2} \times \frac{9}{2}$

$R = 6.53\ m$

$\sin\theta = \frac{4.5}{6.53} = 0.68$

$\theta = 43.56 \quad \therefore \cos\theta = 0.724$

→ Assume thickness of dome = 100 mm

Self weight of dome = $0.10 \times 25 = 2.5$

Live load = $1.5\ KN/M^2$

$W = 4\ KN/m^2$

meridional force,

$T_1 = \frac{WR}{1 + \cos\theta}$

$T_1 = \frac{4 \times 8.7}{1 + 0.724} = 20.18\ KN/m$

meridional stress = $\frac{20.18}{100} = 0.157\ KN/M$

Permissible stress in concrete direct compression for M-30 concrete,

$= 8\ N/mm^2$

$0.151\ N/mm^2 < 8\ N/mm^2$ .... Safe

Hoop force,

$$T_2 = WR\left[\cos\theta + \frac{-1}{1+\cos\theta}\right]$$

$$= 1 \times 6.53\left[0.724 - \frac{1}{1+0.724}\right]$$

$T_2 = 3.76\ KN/M$

Hoop stress, $= \frac{5 \times 10^3}{100 \times 1000} = 0.05 < 8\ N/mm^2$

... safe

Provide min. Reinforcement @ 0.24%.

$$A_{st} = \frac{0.24}{100} \times 1000 \times 100$$

$$= 240\ mm^2$$

Provide 8 mm ϕ 200 mm c/c ($A_{st} = 257\ mm^2$) in radial & circumferential direction.

(2) Design of top ring beam:

$D = 12\ m$

Meridional thrust metre length beam at base,

$T_1 = 20.18\ KN/m$

Horizontal component of T_1

$= T_1 \cos\theta$

$= 15.15 \cos(43.60^\circ)$

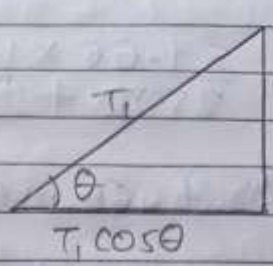
$W = 10.97\ KN/m$

Total hoop tension in ring beam

$= W \cdot \frac{D}{2}$

$= 10.97 \times \frac{9}{2}$

$= 49.365$ KN



Steel required for hoop tension

$= \frac{49.365 \times 10^3}{130}$

$A_{st} = 379.73\ mm^2$

permissible stress in steel $= 130\ N/mm^2$

∴ Provide 4nos – 12 mm dia bars ($452\ mm^2$)

Let width of beam = 250 mm

Transformed Area of section = 250 mm

$A_T = A_g + (m-1) A_{st}$

$= b.D + (m-1) A_{st}$

$= 250D + (9.33 - 1) \times 452$

$A_T = 250D + 3765.16$

$\sigma_{cbc} = 10\ N/mm^2$

m = Modular ratio

$= \frac{280}{3\sigma_{cbc}} = 9.33$

IS : 456 – 2000, P-50

Tensile stress in concrete < 1.5 N/mm²

$\therefore \frac{87.66 \times 10^3}{250D + 3765.16} \leq 1.5$

87.66 mm $< D$ [Table – 3.4, M-30 concrete]

$\therefore$ provide depth of beam = 300 mm
size of top sing beam · 250mm × 300 mm

Provide Min. shear reinforcement
Use 8 mm ϕ – 2 legged vertical stirrups

$\therefore A_{st} = 2 \times \frac{\pi}{4} \times (8)^2 = 100.53$ mm²

$\therefore S_v = \frac{0.87 f_y . A_{sv}}{0.4b}$

$S_v = \frac{0.87 \times 415 \times 100.53}{0.4 \times 250} = 362.96$ mm

spacing limits
(i) $0.75D = 0.75 \times 300 = 225$ mm
(ii) 300 mm

$\therefore$ provide 8 mm ϕ stirrups @ 225 mm/cc

(3) Design of tank wall:
Depth of water tank = 3.2 m
Dia of tank = 9 m

maximum hoop tension at base of wall due to water pressure,

$$T = \frac{\gamma_w \cdot H \cdot D}{2}$$

$$T = \frac{10 \times H \times 9}{2} = 45H \text{ KN/M}$$

$$A_{st} = \frac{T}{130} = \frac{45H}{130} = 346.15H \text{ mm}^2$$

Horizontal reinforcement:

The reinforcement required and provide at various depths top is tabuled below.

Depth from Top (H)	Area req. Ast (mm^2)	Area of each face	Reinforcement provided
1	346.15	173.1	8 ϕ – 290 mm c/c
2	692.3	346.15	10 ϕ – 220 mm c/c
3.2	1107.68	553.84	12 ϕ – 220 mm c/c

- Maximum hoop tension at base H = 3.2m

T = 45 H KN per metre length

$T = 45 \times 3.2 = 144$ KN

$A_T = A_g + (m-1)A_{st}$

$= 1000t + (9.33 - 1) \times (2 \times 565.5)$

$A_T = 1000t + 9421.23$

∴ Tensile stress < 1.5 N/mm²

$j = 1 - k/3 = 1 - \frac{0.418}{3} = 0.861$

$A_{st} = \frac{M}{\sigma_{st} \cdot j \cdot d} = \frac{11.84 \times 10^6}{130 \times 0.861 \times 125}$

$A_{st} = 846.24 \text{ mm}^2$

Minimum steel required in vertical direction.

$A_{st\ min} = \frac{0.24}{100} \times 1000 \times 175 = 420 \text{ mm}^2$

∴ Provide 10mm ϕ @ 150 mm c/c (524 mm^2) in vertical direction 1.3 m height on inner face.

(4) Base slab:

Total load from dome = $T_1 \sin\theta \times 2\pi \times D/2$

$= 20.18 \sin 43.60^\circ \times 2\pi \times 9/2$

$= 295.41 \text{ KN}$

weight of ring beam = $(0.25 \times 0.30) \times \pi \times 9 \times 25$

$= 53.01 \text{ KN}$

weight of wall = $0.175 \times (3.2 - 0.3) \times \pi \times 9.175 \times 25$

$= 365.71 \text{ KN}$

Total weight = $295.41 + 53.01 + 365.71$

$= 714.12 \text{ KN}$

Total weight of water $= \left(\frac{\pi}{4} D^2 \times H\right) \gamma_w$

$= \left(\frac{\pi}{4} \times 8.1 \times 7.2\right) \times 10$

$= 2035.75$ KN

Assume slab thickness,

$t = \frac{D}{35} = \frac{9}{35} = 0.257$ say 260 MM

∴ Self weight of slab $= 0.35 \times 25$

$= 8.75$ KN/m²

slab diameter $= 9 \times 2 \times 0.2 = 9.4$ m

Total weight of slab $= \left(\frac{\pi}{4} \times 9^2\right) \times 8.75$

$= 607.23$ KN

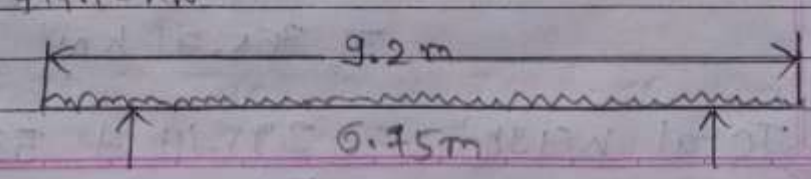
Finishing load $= \left(\frac{\pi}{4} \times 9^2\right) \times 0.6 = 38.17$ KN

Load on slab $= 2681.25$ KN

Total upward force from sing beam,

$= 714.12 + 2681.15$

$= 3395.27$ KN



→ There is two cases

I. circular slab simply supported at outer periphery by walls and subjected to water pressure plus self weight of slab.

II. circular slab simply supported at outer periphery by walls and subjected to upward ring load.

- For case I

$$M_r = \frac{3}{16} q (a^2 - x^2)$$

q = uniformly distributed downward load

$$= \frac{5648.42}{\frac{\pi}{4} \times (12.2)^2} = 48.32 \text{ KN/m}^2$$

a = radius of slab

$$= \frac{9.2}{2} = 4.6$$

x = radial distance where required.

M_x and M_θ at critical point required.

x in metre	0	1.5	2.3	4.6
M_x (KN.m)	160	150	120.1	0
M_θ (KN.m)	160	156.67	146.67	106.67

- For case II loading

b = radius at ring beam

$$= \frac{7}{2} = 3.375 \text{ m}$$

For $s \leq 3.375$ m

$$M_s = M_\theta = \frac{W}{8\pi}\left[2\log\frac{a}{b} + 1 - \left(\frac{b}{a}\right)^2\right]$$

For $s > 3.375$ m

$$M_s = \frac{W}{8\pi}\left[2\log\frac{a}{s} - \left(\frac{b}{a}\right)^2 + \left(\frac{b}{s}\right)^2\right]$$

$$M_\theta = \frac{W}{8\pi}\left[2\log\frac{a}{s} - \left(\frac{b}{s}\right)^2 + 2 - \left(\frac{b}{a}\right)^2\right]$$

$a = 6.6$ m $b = 3.375$ m

Total upward ring load = 6863 KN

s in metre	0	1.15	2.3	4.6
M_s (KN.m)	-98.47	-98.47	-98.47	0
M_θ (KN.m)	-98.47	-98.47	-98.47	-124.74

- Net moment in slab are calculated

s in metre	0	1.15	2.3	4.6
M_s (KN.m)	61.53	51.53	21.63	0
M_θ (KN.m)	61.53	58.2	48.2	-18.07

∴ Design Moment = 61.53 KN.m

Now, $M = Q \cdot bd^2$

$$Q = \frac{1}{2}\sigma_{cbc} \cdot k \cdot j = 1.80$$

$61.53 \times 10^6 = 1.80 \times 1000 \times d^2$

$d = 184.5x$ mm

Provide $d = 200$ mm

$D = 200 + 50$ (eff. cover)

$= 250$ mm

$$A_{st} = \frac{M}{\sigma_{st} \cdot j \cdot d} = \frac{61.53 \times 10^6}{130 \times 0.861 \times 800}$$

$= 2748.59$ mm^2

∴ Provide 25 mm ϕ bars @ 110 mm c/c

Ast sing beam $M_\theta = 79.34$ KN.m

$$\therefore A_{st} = \frac{79.34}{130 \times 0.861 \times 800} = 2153.13 \text{ mm}^2$$

Nominal steel @ 0.24% $= \frac{0.24}{100} \times 1000 \times 35$

$= 840$ mm^2

(5) Design of bottom sing:

Radius of bottom sing beam = 3.375 m

Total load on sing beam = 3393.27 KN

∴ Load on beam per metre length

$$= \frac{3395.27}{\pi \times 6.75} = 160 \text{ KN/m}$$

The beam curved in plan

Let us Assume it supported on 6 equally spaced column.

The beam will subjected to torsion.

Let width of beam = 350 MM
Taking depth appropriate 1/15 of dia
$= \frac{1}{15} \times 6.75 = 0.45$ m

self weight of beam = $(0.25 \times 0.45) \times 25$
$= 2.84$ say 3 KN/m

Total load on ring beam = 160 + 3 + 1
= 164

n = no. of column = 6

$2\theta = \frac{360^\circ}{6} \Rightarrow \theta = 30^\circ = \pi/6$

At support $\phi = 0$

Maximum shear = $f\phi = WR(\theta - \phi)$
$= 164 \times 3.375 (\pi/6 - 0)$
$= 289.81$ KN/m

At support $\phi = 0$
Bending moment,
$M\theta = WR^2 (\theta \cdot \sin\phi + \theta \cdot \cot\theta \cdot \cos\phi - 1)$
$= 164 (3.375)^2 [\pi/6 \cot 30^\circ \cos 0 - 1]$

$= -173.9$ KN.m hogging.---

mid span moment, $\phi = \theta = 30^\circ = \pi/6$

$M = WR^2 (\theta \sin\phi + \theta \cdot \cot\theta \cdot \cos\phi - 1)$
$= 164 \times (3.375)^2 \left(\frac{\pi}{6} \sin 30^\circ + \frac{\pi}{6} \cot 30^\circ \cos 0 - 1\right)$

$M = 88.1$ KN.m

Maximum torsional moment,

$T\phi = \tau \, a R^2 2\theta$

$= 0.009 \times 164 \times (3.375)^2 \times 2 \times (\pi/6)$

$= 17.61$ KN.m

Now, let us design the beam by limit state method as a doubly R.C. beam

$M_u = 1.5 \times 289.81 = 434.715$

$V_u = 1.5 \times (-173.92) = 260.88$ (hogging)

Assume size of beam is 250 mm × 500 mm

Let effective cover = 50 mm

$d = 500 - 50 = 450$ mm

$d' = 50$ mm

$\frac{d'}{d} = \frac{50}{450} = 0.11$

$\frac{M_u}{bd^2} = \frac{260.88 \times 10^6}{250 \times 450^2} = 5.15$

$P_t = 2.1\%$

$P_c = 0.7\%$

SP-16, table 52 P-88

$A_{st} = \frac{2.1}{100} \times 250 \times 450 = 2362.5 \text{ mm}^2$

Provide 8 nos - 20ϕ bars tension of steel at top near support.

$A_{sc} = \frac{0.7}{100} \times 450 \times 250 = 787.5\ mm^2$

At mid span moment = 88.1 KN.m
$M_u = 1.5 \times 88.1 = 132.15$ KN.m (saggin
this moment is almost half of that at support

$M_{u\lim} = 0.138\ f_{ck}\ bd^2$
$= 0.138 \times 20 \times 250 \times 450^2$
$= 209.58$ KN.m

$M_u = 132.15$ KN.m $< M_{u\lim} = 209.58$ KN.m
At mid span design the beam as singly R.C. beam

$\frac{M_u}{bd^2} = \frac{132.58 \times 10^6}{250 \times 450^2} = 2.61$

$P_t = 0.87$

$A_{st} = \frac{0.87}{100} \times 250 \times 450 = 978.75\ mm^2$

Provide 4 nos - 20 MM ϕ bar at bottom at mid span.

shear reinforcement :
maximum shear at support,
$V = 289.81$ KN
$V_u = 1.5 \times 289.81 = 434.715$ KN

$\tau_v = \frac{V_u \cdot d}{bd} = \frac{434.715}{250 \times 450} = 3.86\ N/mm^2$

But 3.86 N/mm^2 > 3.5 N/mm^2

Increase the section
as per 300 mm x 600 mm

$$\tau_v = \frac{434.15}{300 \times 550} = 2.63 \ N/mm^2$$

At support P_t = 2.205%.

τ_c = 0.87 N/mm^2

[IS : 456-2000, P-73 table-19]

$$V_{us} = 434.15 \times 10^3 - 0.87 \times 300 \times 550$$
$$= 290,000 \ N$$

Using 10 mm ϕ – 4 legged vertical stirrups

$$A_{sv} = 4 \times \frac{\pi}{4} \times 10^2 = 314.15 \ mm^2$$

$$S_v = \frac{0.87 f_y . A_{sv} . d}{V_{us}} =$$

$$= \frac{0.87 \times 415 \times 314.15 \times 590}{290600}$$

S_v = 214.67

Provide 10MM ϕ – 4 legged vertical stirrups 200 mm c/c.

- **QUANTITIES OF ESR**
- RCC volume of water tank (Wall)

$$V = \pi D^2 - \pi(D1)^2$$

$= 3.14*9.4^2 - 3.14*9^2$

$= 23.11\ m^3$ (wet)

D= OUTER DIAMETER OF TANK

D_1= INTERNAL DIAMETER OF TANK

- Dry volume = 1.5*23.11

  = 34.665

- **RCC VOLUME OF TANK SLAB**

$V = (\pi*D^{2*}t)/4$

$= 10.14\ m^3$ (wet)

t=THICKNESS OF TANK SLAB

- Dry volume = 1.5*10.14*2

  = 30.42

- **RCC VOLUME OF FOUNDATION**

$V = (\pi*D^2*B)/4$

$=20.808\ m^3$(WET)

- Dry volume = 1.5*20808

  $= 31.3\ m^3$

➢ RCC VOLUME OF SHAFT :

V = 0.6*0.6*10*4

$= 14.4\ m^3$ (WET)

- Dry volume = 1.5*14.4

  $= 21.6\ m^3$

➢ RCC VOLUME OF BEAM :

V = 0.4*0.4*6*4

$= 3.84\ m^3$(WET)

- Dry volume = 1.5*3.84

  $= 5.76\ m^3$

SR NO.	DESCRIPTION	L m	B m	H m	QUANTITY M^3	RATE Rs.	AMOUNT Rs.
1	EXCAVATION IN FOUNDATION	29.516	1	1	29.516	100	2951.6
2	RCC VOLUME OF TANK WALL	-	-	-	34.665	9540	3307041.1
3	RCC VOLUME OF TANK SLAB	-	-	-	30.42	9540	2902068
4	RCC VOLUME OF FOUNDATION	-	-	-	31.32	9540	298792.8
5	RCC VOLUME OF SHAFT	-	-	-	21.6	9540	206064
6	RCC VOLUME OF BEAM	-	-	-	5.76	9540	54950.4
	TOTAL					=	1183526.6
	@ 10% PROFIT					=	118352.66
	GRAND TOTAL					=	1301880.00

TABLE 9 : COST OF ESR

8.1.5 Smart Village Design

ITEM NO.	ITEM DESCRIPTION	NO.	LENGTH (m)	BREADTH (m)	HEIGHT (m)	QUANTITY	REMARK
1	Sub grade preparation and dressing	1	500	3	_	1500	
2	Sub base material	1	500	3	0.3	450	**H=O.2+0.2/2**
3	Labour for spreading and consolidation of sub-base materials	1	500	3	0.3	450	**H=0.2+0.1**
4	Base layer material	1	500	2.6	0.15	195	**H=0.10+0.1./2**
5	**Labour for spreading and consolidation of sub base**	**1**	**500**	**2.6**	**0.15**	**195**	**H=0.10+0.1./2**

	materials						

*ABSTRACT COST OF CONSTRUCTION :

NO	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
1	Preparation, consolidation And dressing of sub-grade	1500	M^2	50	**75000**
2	Supplying sub-base material and stack in gat road sides	450	M^3	320	**144000**
3	Labour for spreading and consolidation of sub base materials	450	M^3	300	**135000**
4	Supplying base material and stacking at road Sides	195	M^3	280	**54600**
5	Labour for spreading and consolidation of base materials	195	M^3	250	**48750**
6	**Total amount**				**457350**

TABLE 10 : COST ESTIMATION OF RCC ROAD

Proposed site of RCC road

Fig 23 : Length of RCC road

8.1.7 Electrical Design 1

Street light

Street lighting Street lighting provides a number of important benefits. It can be used to promote security in urban areas and to increase the quality of life by artificially extending the hours in which it is light so that activity can take place. Street lighting also improves safety for drivers, riders, and pedestrians.

The rate of highway accidents and facilities that occur during night driving is considerably higher than during day driving. Poor night visibility is one of the main causes of accident during nights. Highway lighting is particularly more important at intersections, bridge site, level crossings and place where there is restriction of traffic to movements.

advantages of streetlight

- Reduce accidental at night
- pedestrian facilitate 3 to 6.75 times more likely in the dark night
- reduced night crime
- It is a major source of beautification ofprojects.
- It gives a pleasant atmosphere duringnight.

LED lamp :

Features

Type :	Led street light
Emitting Colour:	Cool day white
Color Temperature :	3000K-6500K
Material :	Aluminum
Rated Power :	24W
Price :	1000 per picce

Pole :

We assumed the space between two poles is 18 m.
Total length is 2.5 km where street lighat is provided .
Than the total LED lamps is required is 315.

SR NO.	DESCRIPTION	NO	L	B	H	QUANTITY	RATE	AMOUNT
1	EXCAVATION	315	1.2	0.3	0.3	34.02	100	3402
2	P.C.C.	315	1.2	0.3	0.3	34.02	3500	119070
3	STREET LIGHT POLES	315	-	-	-	-	2000	630000
4	LAMP	315	-	-	-	-	1000	315000
5	WORKER	70	-	-	-	-	500	35000
	TOTAL							**1102472**
	@10% PROFIT							**110247.2**
	GRAND TOTAL							**1212720**

TABLE 13 : COST OF STREET LIGHT

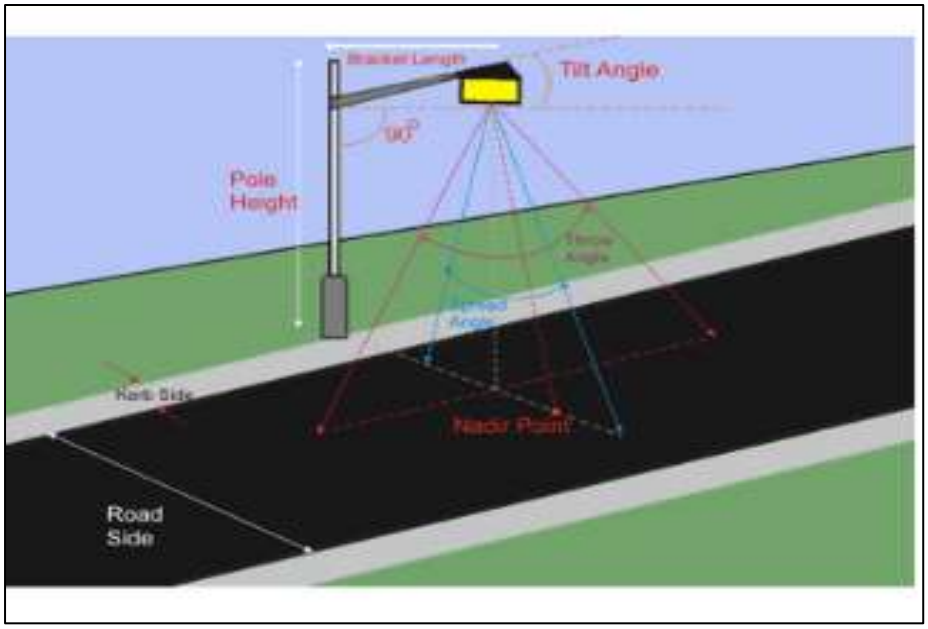


FIG 37 : STREET LIGHT

8.2 Reason for Students Recommending this Design

- ❖ we have recommend design on basis of gap analysis
- ❖ this all are design is very useful for village
- ❖ this are design design recommended by sarpanch and talatimantri
- ❖ This all are facility not available in village
- ❖ This are useful for future
- ❖ All over development of village

8.3 About designs Suggestions / Benefit of the villager

Villagers shall be highly benefitized with the scheme. The mentioned points summarized the benefits availed by the villagers.

Social gathering and functions needs to be well organized in the villages.
Social gathering and roaming is also required. For that the parks and public gardens are been proposed to be constructed.

we have design a ESR.which is very useful for villager.water is stored in the ESR and than water distribute in villge.this is very beneficial for villager for the purpose of the driking water.

CHAPTER : 9

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

(1) Bus station
(2) Bank
(3) secondary school
(4) Vegetable market
(5) Recreation centre
(6) post office

In this part of project, we have proposed some basic facelites through our sustainable, physicale and smart village designs in our allocated village after commpleating all surveys and site visites we have proposed our best designs in this part. In Part-II of this project we are going to inprove some of basic aminites in villave that is at precent is not good or not inugh efficient or not useful to current scenario of village. By this Part-I designs now we have oure more wide prespective to devlope the village in acoarding to make it smart village by providing missing infrastructures.

According to UDPFI norms we are going to provide some facelites that is at precent is not available in Kalatalav village like, Physicaleinfrastuctre including Solid waste Mangement, Water supply in village etc. and in Social infrastructure including some Community Hall, Recrational club, socio cultural center etc. in Recreational Facilites we can design Joggers park, Redevlopment of existing pond of kalatalav village. In future scope we would be study other different urban amenities that would be sustainable in rural areas of bhavnagar.

The village is now on the path of becoming smart village by oure given designs but the villagers have to maintain the given fcilites by them self. To make this possible we are going to give them smart design and smatre technology to maintain infrastructers, by this we are closer to give them good living standerds. And make it good model village for its surrounding villages. By performing this project we are able to reduce the pressure on the urban area. As well as this amenities are very much helpful for overall development of the village.

CHAPTER :- 10

Conclusion of the Entire Village Activities of the Project

The project work started with the basic data collection, survey work and it progressed through meeting with headman, Talati-cum-Mantrishri and Principal of the existing school. The gap analysis was later framed and 6 various design problems were identified. The proposed solutions are framed in such a way that the village can enhance the overall physical, social and educational conditions of villagers and can promise the sustainable growth of the village in context to the Bhavnagar City, in which the village falls.

The concluding remarks of the project in the form of team details, problem definition and designed solutions are as follows:

Village and Team Details					
Village name:	**Team details :**	**(1) Enrollment No.:**	170210106010	**(1) Name**	DABHI AKASHBHAI JIVANBHAI
Bambhaniya		**(2) Enrollment No.:**	170210106054	**(2) Name**	SAVANI VISHALBHAI PRAVINBHAI

Probelm Definition and Design Details			
Sr. No.	**Problem Definition**	**Capacity (mention unit)**	**Estimated cost (in Rs.)**
Design - 1	Public Health Center	117.48 m²	1277250
Design - 2	Community Hall	309.75 m²	1763960
Design - 3	Street Light	2.5 km	1212720
Design - 4	Drainage system	200 household	243470
Design - 5	Elevated Service Reservoir	2 lacs litre	1301880
Design - 6	RCC Road	502 m	457400

TABLE 12 : CONCLUSION OF THE ENTIRE VILLAGE

It is truly believed by the project team that if the above mentioned design solutions are implemented then the village can replicate the basic facilities of nearby city and be able to lessen the migration from the village to nearest or

CHAPTER :- 11

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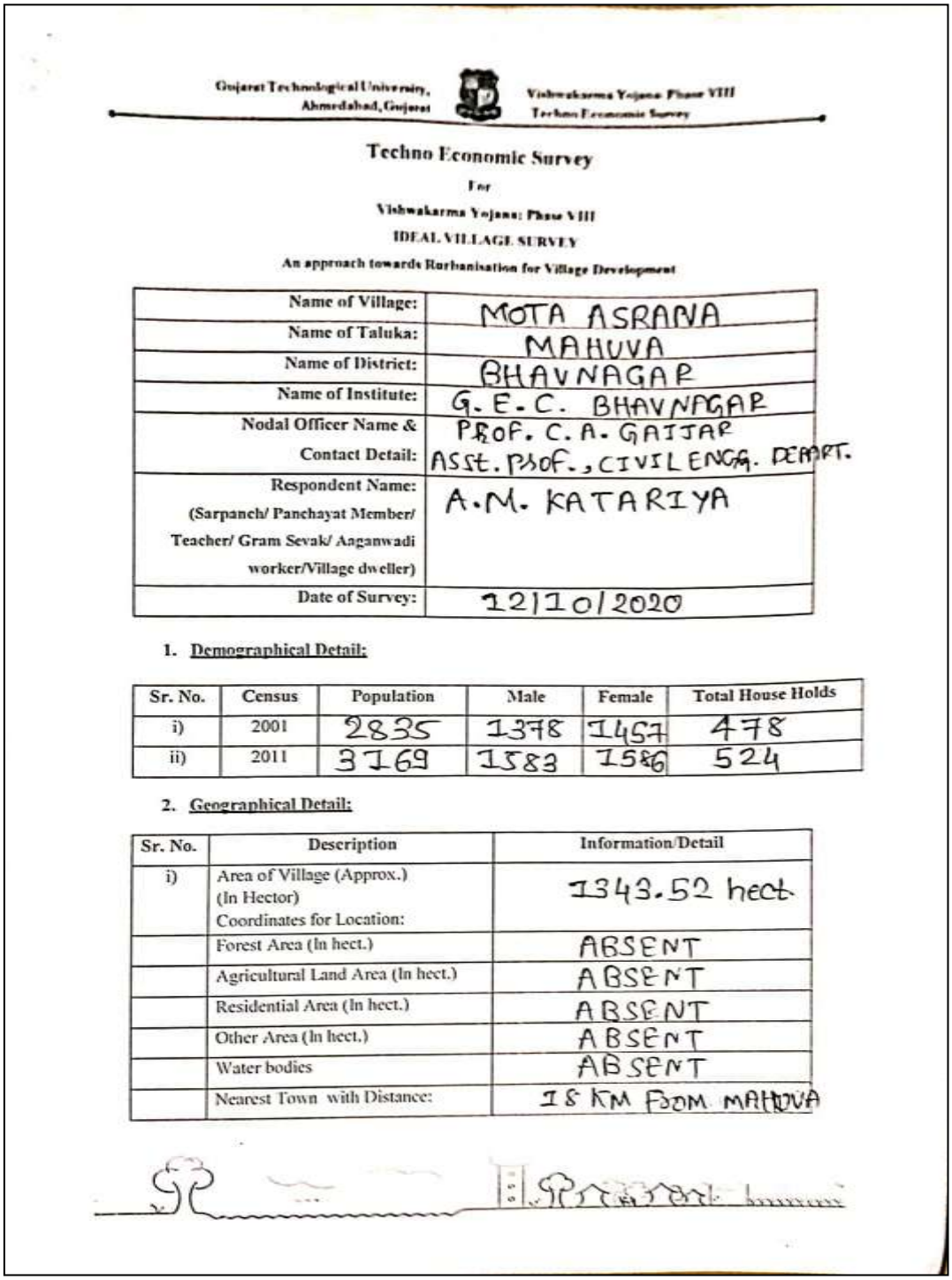
CHAPTER : 12

12.1 Survey form of Ideal Village Scanned copy attachment in the Report



Gujarat Technological University, Ahmedabad, Gujarat

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:	MOTA ASRANA
Name of Taluka:	MAHUVA
Name of District:	BHAVNAGAR
Name of Institute:	G.E.C. BHAVNAGAR
Nodal Officer Name & Contact Detail:	PROF. C.A. GAJJAR ASST. PROF., CIVIL ENGG. DEPART.
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	A.M. KATARIYA
Date of Survey:	12/10/2020

1. Demographical Detail:

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	2835	1378	1457	478
ii)	2011	3169	1583	1586	524

2. Geographical Detail:

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	1343.52 hect.
	Forest Area (In hect.)	ABSENT
	Agricultural Land Area (In hect.)	ABSENT
	Residential Area (In hect.)	ABSENT
	Other Area (In hect.)	ABSENT
	Water bodies	ABSENT
	Nearest Town with Distance:	18 KM FROM MAHUVA

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

3. Occupational Details:

Name of Three Major Occupation groups in Village	1. FARMING 2. DAIRY WORK 3. LABOUR WORK

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	YES YES YES YES		 NO NO
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	YES		3-5 L/tiseldey
	Underground Sump	Capacity:			NO
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				ABSENT
	Whether drain water is discharged directly in to Water bodies/ Sewer plants	WATER BODIES			
Suggestions if any:					

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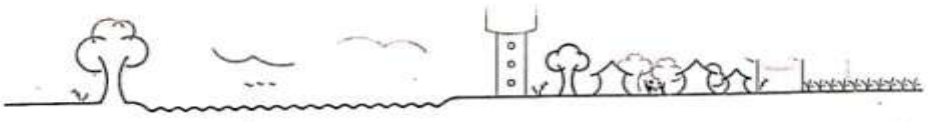
Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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



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Techno Economic Survey

K.	**Health Facilities:**				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	Sub CENTRE			
	Private Clinic/Private Hospital/ Nursing Home		YES		
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					
L.	**Education Facilities:**				
	Aaganwadi/ Play group		YES		
	Primary School		YES		
	Secondary school		YES		
	Higher sec. School		YES		
	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: 24..kms.				
Suggestions if any:					
M.	**Socio- Culture Facilities**				
	Community Hall (With or without TV) Location:				NO

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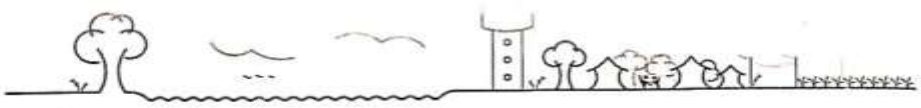
	Condition:				NO
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	GOOD	YES		
	Public Garden Location: Condition:				NO
	Village Pond Location: Condition:		YES		
	Recreation Center Location: Condition:				NO
	Cinema/ Video Hall Location: Condition:				NO
	Assembly Polling Station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



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

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

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
O.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	BIO GAS PLANT	YES		
P.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System		YES YES 		 NO
Q.	Any Other				

7. **Data Collection From Village**

Village Base Map Available: Hard Copy/Soft Copy	YES

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Repair & Maintenance of Existing Public Infrastructure facilities, School Building Health Center Panchayat Building Public Toilets & any other	YES	REPAIRING REQUIRED
2.	Additional Information/ Requirement	HIGHER school	
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?	NO NO	

IX. Smart Village / Heritage Details

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

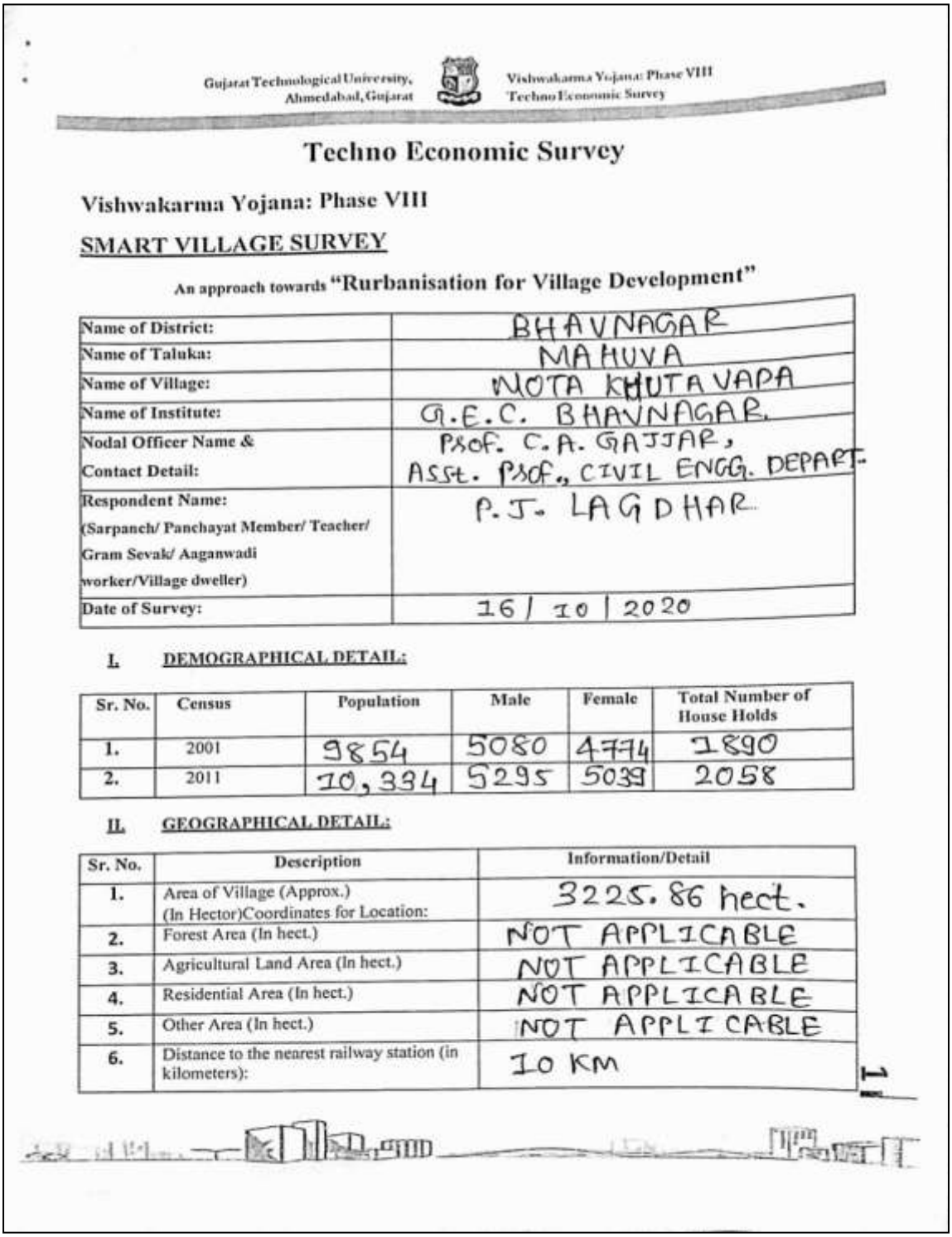
Note: Photographs/ Video/ Drawings of all existing Infrastructure facilities & conditions should be taken by students of respective villages for their record and information.

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

(જે. એમ. ડાભી)
સરપંચ
બાંભણીયા ગામ પંચાયત

9

12.2 Survey form of Smart Village Scanned copy attachment in the report



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Techno Economic Survey

Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

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

Name of District:	BHAVNAGAR
Name of Taluka:	MAHUVA
Name of Village:	NOTA KHUTAVAPA
Name of Institute:	G.E.C. BHAVNAGAR.
Nodal Officer Name & Contact Detail:	Prof. C.A. GAJJAR, Asst. Prof., CIVIL ENGG. DEPART.
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	P.J. LAGDHAR
Date of Survey:	16/10/2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	9854	5080	4774	1890
2.	2011	10,334	5295	5039	2058

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	3225.86 hect.
2.	Forest Area (In hect.)	NOT APPLICABLE
3.	Agricultural Land Area (In hect.)	NOT APPLICABLE
4.	Residential Area (In hect.)	NOT APPLICABLE
5.	Other Area (In hect.)	NOT APPLICABLE
6.	Distance to the nearest railway station (in kilometers):	10 KM

7.	Name of Nearest Town with Distance:	100 KM (BHAVNAGAR)
8.	Distance to the nearest bus station (in kilometers):	AVAILABLE IN VILLAGE
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.	SMALL SCALE INDUSTRY
	3.	LABOUR WORK

Major crops grown in the village:	1.	GROUND NUT
	2.	COTTON
	3.	WHEAT

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

2

Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	YES		10L litres
	Underground Sump	Capacity:			NO
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1 2 B. OPEN WITH OUTLET C. OPEN WITHOUT OUTLET		YES		
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	PUCCA	YES		
	Main road	PUCCA	YES		
	Internal streets	PUCCA	YES		
	Nearest NH/SH/MDR/ODR Dist. in kms.	1KM	YES		
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	20 KM FROM MAHUVA			NO
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)		YES		
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Auto/ chhakda	YES		
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	More than 6 hrs.	YES		

3

	Power supply for Domestic Use		YES		
	Power supply for Agricultural Use		YES		
	Power supply for Commercial Use		YES		
	Road/ Street Lights		YES		
	Electrification in Government Buildings/ Schools/ Hospitals		YES		
	Renewable Energy Source Facilities (Y/ N)		/	YES	
	LED Facilities		YES		
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.		YES		
	Location Condition				
	Community Toilet (With bath/ without bath facilities)		YES		
	Solid & liquid waste Disposal system available		YES		
	Any facility for Waste collection from road	Truck	YES		
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL OTHER (SPECIFY)		YES		
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	1/3	YES		

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)		YES		
	Sub-Centre		YES		
	PHC		YES		
	BLOCK PHC				NO
	CHC/RH				NO
	District/ Govt. Hospital		YES		
	Govt. Dispensary		YES		
	Private Clinic		YES		
	Private Hospital/ Nursing Home		YES		
	AYUSH Health Facility		YES		
	sonography /ultrasound facility				NO
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group		YES		
	Primary School		YES		
	Secondary school		YES		
	Higher sec. School		YES		
	ITI college/ vocational Training Center				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: ..20...kms.				

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Suggestions if any:

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

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

Suggestions if any:

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

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Vishwakarma Yojana: Phase VIII
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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	SMALL SCALE INDUSTRY	YES		
	Other Facility				

Suggestions if any:

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

VII. DATA COLLECTION FROM VILLAGE

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Village Base Map Available: Hard Copy/Soft Copy		YES		
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

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

IX. Smart Village / Heritage Details

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

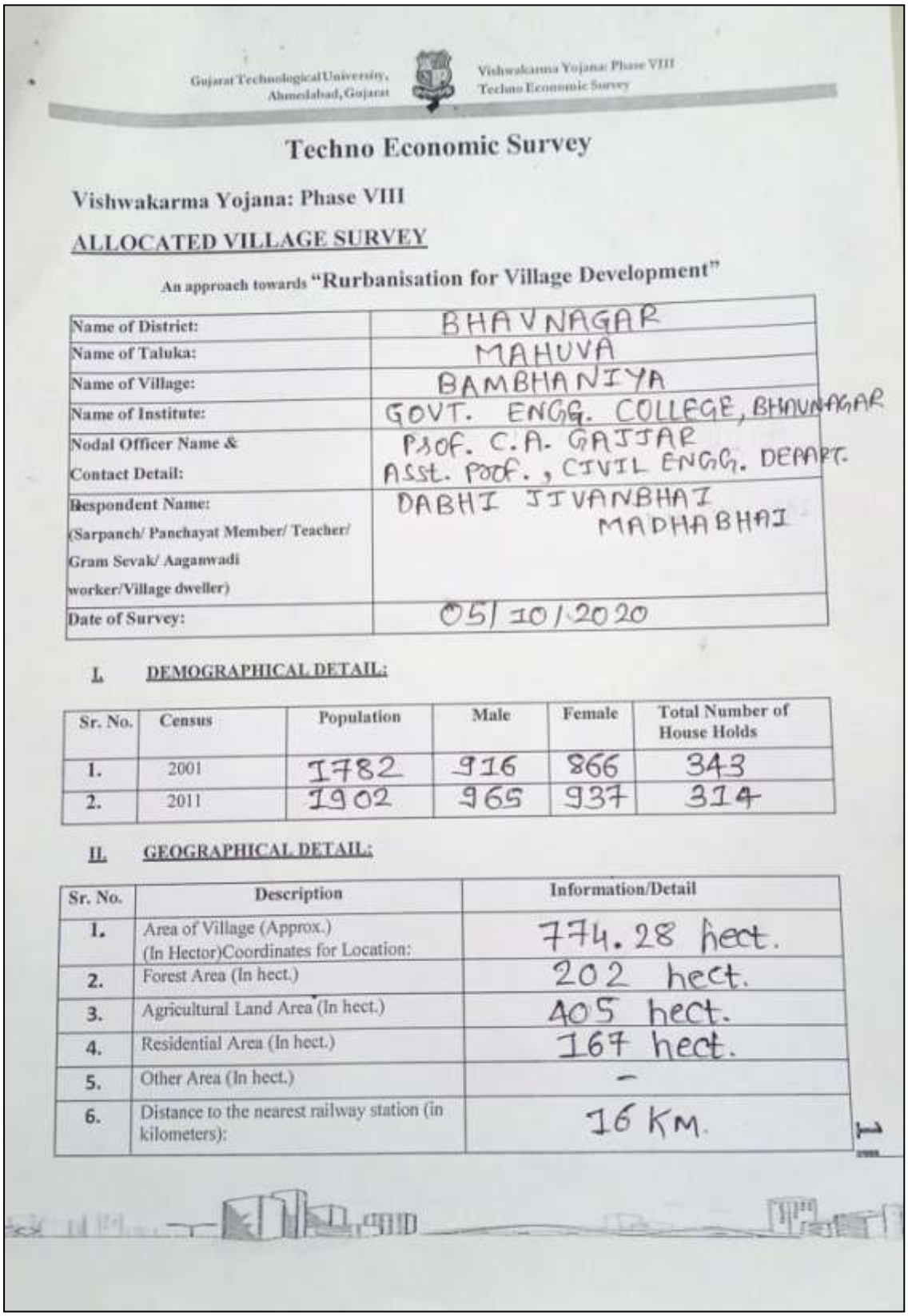
Note: Photographs/ Video/ Drawings of all existing Infrastructure facilities & conditions should be taken by students of respective villages for their record and information.

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

(શ્રીમતિ પાર્વતીબેન હકાભાઈ ગલાણીયા)
સરપંચ
શ્રી મોટા ખૂંટવડા ગ્રામ પંચાયત

9

12.3 Survey form of Allocated Village Scanned copy attachment In the report



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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:	BHAVNAGAR
Name of Taluka:	MAHUVA
Name of Village:	BAMBHANIYA
Name of Institute:	GOVT. ENGG. COLLEGE, BHAVNAGAR
Nodal Officer Name & Contact Detail:	PROF. C.A. GAJJAR ASST. PROF., CIVIL ENGG. DEPART.
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	DABHI JIVANBHAI MADHABHAI
Date of Survey:	05/10/2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	1782	916	866	343
2.	2011	1902	965	937	314

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	774.28 hect.
2.	Forest Area (In hect.)	202 hect.
3.	Agricultural Land Area (In hect.)	405 hect.
4.	Residential Area (In hect.)	167 hect.
5.	Other Area (In hect.)	-
6.	Distance to the nearest railway station (in kilometers):	16 KM.

7.	Name of Nearest Town with Distance:	MAHUVA
8.	Distance to the nearest bus station (in kilometers):	15 km
9.	Whether village is connected to all road for the any facility or town or City?	YES

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1.	FARMING
	2.	DAIRY WORKER
	3.	LABOUR WORKER

Major crops grown in the village:	1.	GROUND NUT
	2.	COTTON
	3.	WHEAT

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

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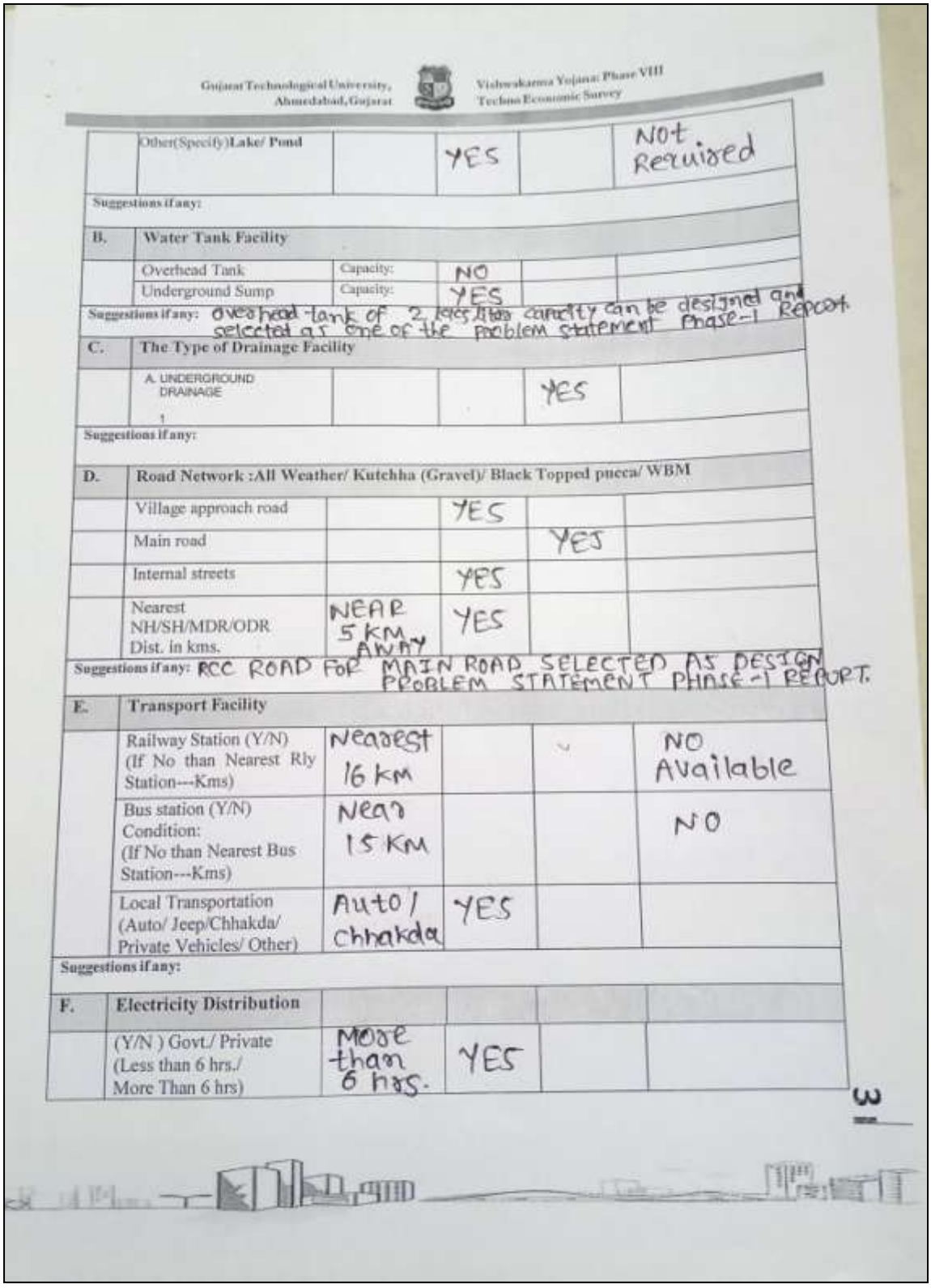


Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Other(Specify)Lake/ Pond		YES		Not Required

Suggestions if any:

B.	Water Tank Facility				
	Overhead Tank	Capacity:	NO		
	Underground Sump	Capacity:	YES		

Suggestions if any: overhead tank of 2 lacs ltrs capacity can be designed and selected as one of the problem statement Phase-I Report.

C.	The Type of Drainage Facility				
	A. UNDERGROUND DRAINAGE			YES	

Suggestions if any:

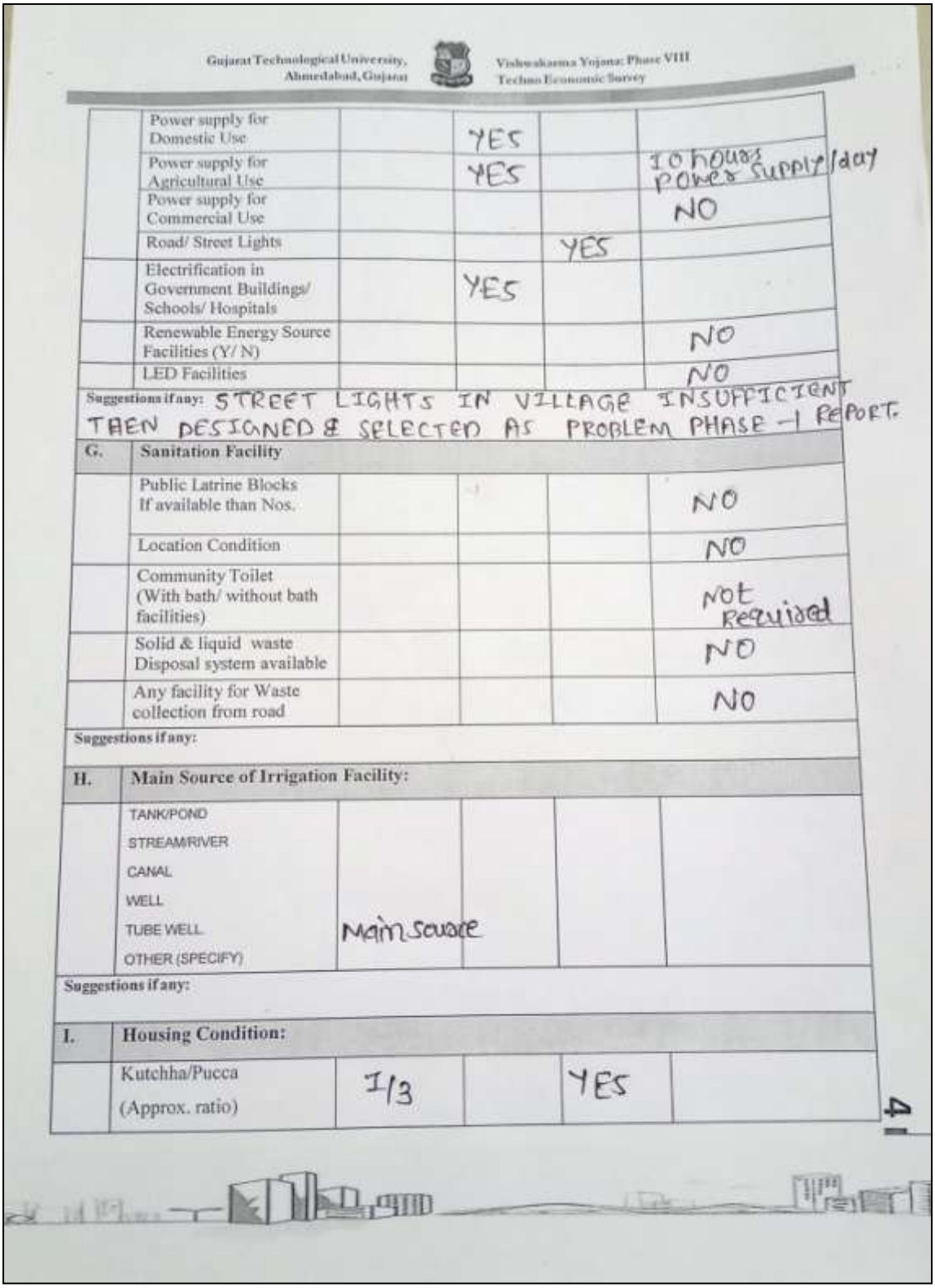
D.	Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM				
	Village approach road		YES		
	Main road			YES	
	Internal streets		YES		
	Nearest NH/SH/MDR/ODR Dist. in kms.	NEAR 5 KM AWAY	YES		

Suggestions if any: RCC ROAD FOR MAIN ROAD SELECTED AS DESIGN PROBLEM STATEMENT PHASE-I REPORT.

E.	Transport Facility				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	Nearest 16 km			NO Available
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Near 15 KM			NO
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Auto / chhakda	YES		

Suggestions if any:

F.	Electricity Distribution				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	More than 6 hrs.	YES		



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	Power supply for Domestic Use		YES		
	Power supply for Agricultural Use		YES		10 hours power supply/day
	Power supply for Commercial Use				NO
	Road/ Street Lights			YES	
	Electrification in Government Buildings/ Schools/ Hospitals		YES		
	Renewable Energy Source Facilities (Y/ N)				NO
	LED Facilities				NO

Suggestions if any: STREET LIGHTS IN VILLAGE INSUFFICIENT THEN DESIGNED & SELECTED AS PROBLEM PHASE-I REPORT.

G.	Sanitation Facility				
	Public Latrine Blocks If available than Nos.				NO
	Location Condition				NO
	Community Toilet (With bath/ without bath facilities)				Not Required
	Solid & liquid waste Disposal system available				NO
	Any facility for Waste collection from road				NO

Suggestions if any:

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

Suggestions if any:

I.	Housing Condition:				
	Kutchha/Pucca (Approx. ratio)	1/3		YES	

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

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

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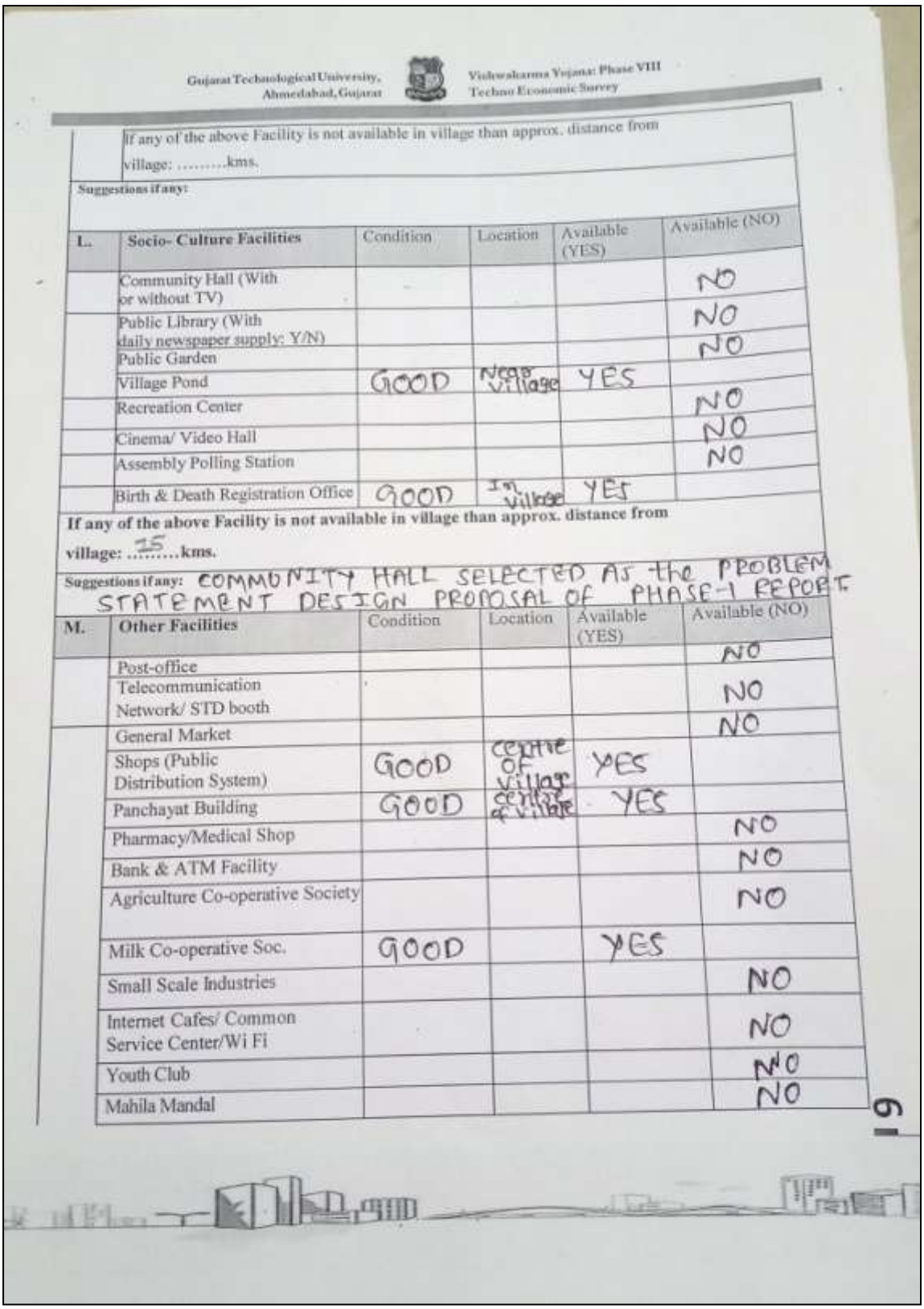

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If any of the above Facility is not available in village than approx. distance from village: .....kms.

Suggestions if any:

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

If any of the above Facility is not available in village than approx. distance from village: 15 kms.

Suggestions if any: COMMUNITY HALL SELECTED AS the PROBLEM STATEMENT DESIGN PROPOSAL OF PHASE-1 REPORT

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

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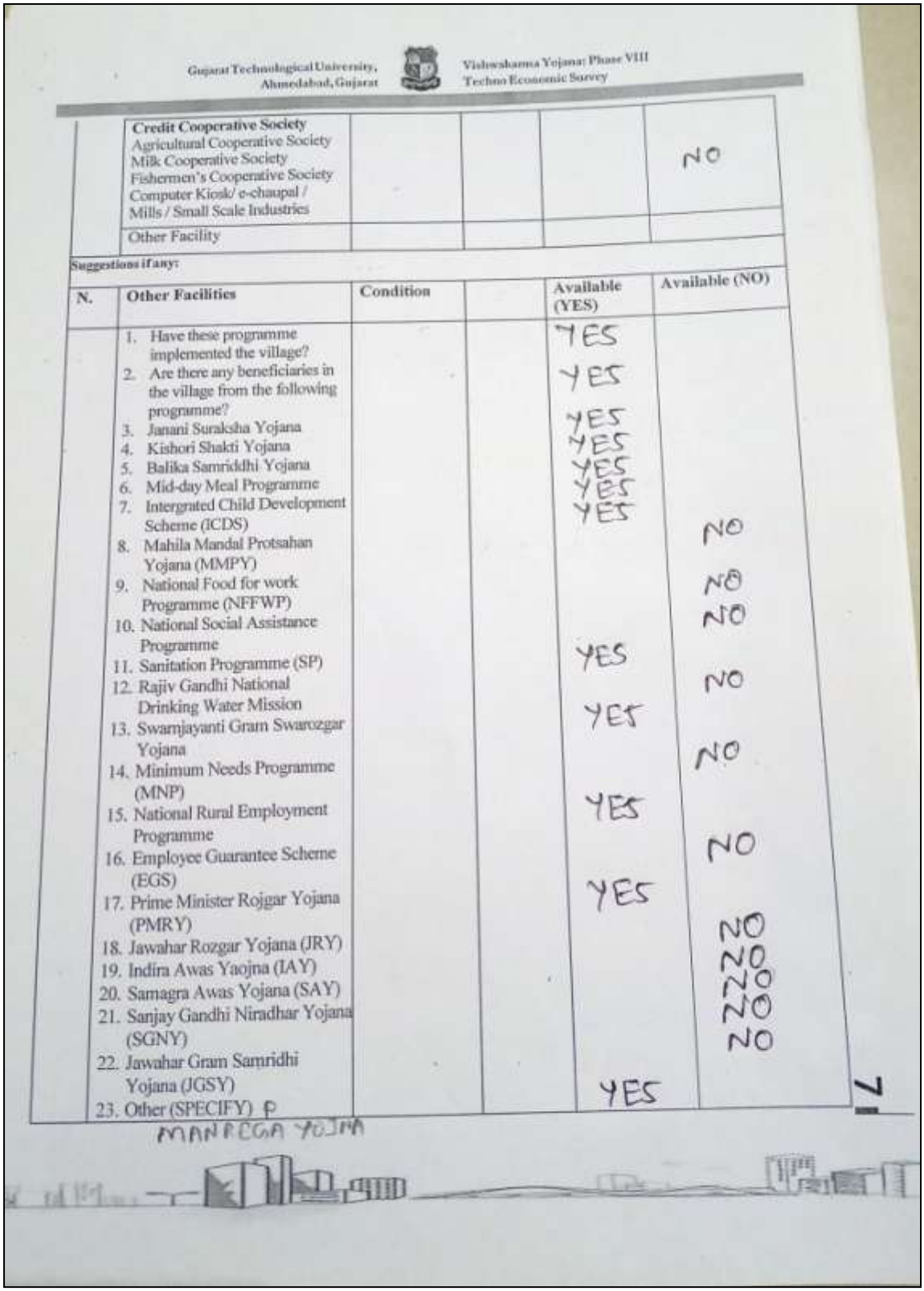

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	Credit Cooperative Society Agricultural Cooperative Society Milk Cooperative Society Fishermen's Cooperative Society Computer Kiosk/ e-chaupal / Mills / Small Scale Industries				NO
	Other Facility				

Suggestions if any:

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

MANREGA YOJNA

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VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

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

VII. DATA COLLECTION FROM VILLAGE

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Village Base Map Available: Hard Copy/Soft Copy	GOOGLE	YES		
2.	Recent Projects going on for Development of Village		YES		YES
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	REPAIRING REQUIRED
2.	Additional Information/ Requirement	HIGHER school	
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?	NO NO	

IX. Smart Village / Heritage Details

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

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

(જે. એમ. ડાભી)
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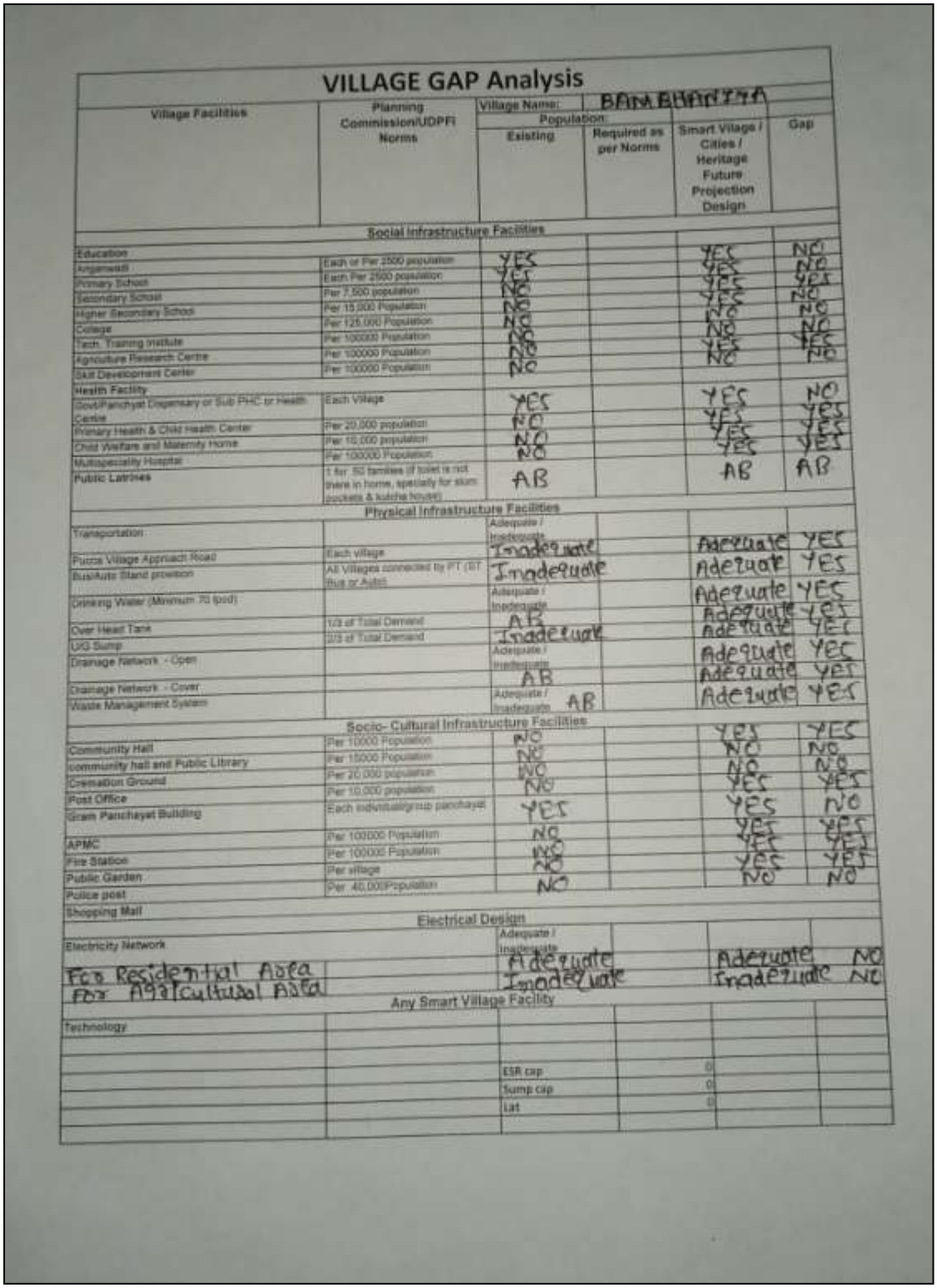
12.4 Gap Analysis of the Allocated Village



VILLAGE GAP Analysis

Village Name: BAMBHANIYA
Population:

Village Facilities	Planning Commission/UDPFI Norms	Existing	Required as per Norms	Smart Village / Cities / Heritage Future Projection Design	Gap
Social Infrastructure Facilities					
Education					
Anganwadi	Each or Per 2500 population	YES		YES	NO
Primary School	Each Per 2500 population	YES		YES	NO
Secondary School	Per 7,500 population	NO		YES	YES
Higher Secondary School	Per 15,000 Population	NO		YES	NO
College	Per 125,000 Population	NO		NO	NO
Tech. Training Institute	Per 100000 Population	NO		NO	NO
Agriculture Research Centre	Per 100000 Population	NO		YES	YES
Skill Development Center	Per 100000 Population	NO		NO	NO
Health Facility					
Govt/Panchyat Dispensary or Sub PHC or Health Centre	Each Village	YES		YES	NO
Primary Health & Child Health Center	Per 20,000 population	NO		YES	YES
Child Welfare and Maternity Home	Per 10,000 population	NO		YES	YES
Multispecialty Hospital	Per 100000 Population	NO		YES	YES
Public Latrines	1 for 50 families (if toilet is not there in home, specially for slum pockets & katcha houses)	AB		AB	AB
Physical Infrastructure Facilities					
Transportation		Adequate / Inadequate			
Pucca Village Approach Road	Each village	Inadequate		Adequate	YES
Bus/Auto Stand provision	All Villages connected by PT (ST Bus or Auto)	Inadequate		Adequate	YES
Drinking Water (Minimum 70 lpcd)		Adequate / Inadequate		Adequate	YES
Over Head Tank	1/3 of Total Demand	AB		Adequate	YES
U/G Sump	2/3 of Total Demand	Inadequate		Adequate	YES
Drainage Network - Open		Adequate / Inadequate		Adequate	YES
Drainage Network - Cover		AB		Adequate	YES
Waste Management System		Adequate / Inadequate AB		Adequate	YES
Socio- Cultural Infrastructure Facilities					
Community Hall	Per 10000 Population	NO		YES	YES
community hall and Public Library	Per 15000 Population	NO		NO	NO
Cremation Ground	Per 20,000 population	NO		NO	NO
Post Office	Per 10,000 population	NO		YES	YES
Gram Panchayat Building	Each individual/group panchayat	YES		YES	NO
APMC	Per 100000 Population	NO		YES	YES
Fire Station	Per 100000 Population	NO		YES	YES
Public Garden	Per village	NO		YES	YES
Police post	Per 40,000Population	NO		NO	NO
Shopping Mall					
Electrical Design					
Electricity Network		Adequate / Inadequate			
For Residential Area		Adequate		Adequate	NO
For Agricultural Area		Inadequate		Inadequate	NO
Any Smart Village Facility					
Technology					
		ESR cap	0		
		Sump cap	0		
		Lat	0		

12.5 Summary Details of All the Villages Designs in Table forPart-I

Sr. no.	Village Name	Discipline	Phase - I	Phase - II
1.	Shampara	Civil	Rain Water Harvesting System	**Village Bank**
			Septic tank	**Washing Ghat with Circulatory tank**
			Primary Health Centre	**Agricultural Product Market Building**
			Community hall	**Library**
			Vegetable Market	**Skill Training Institute**
			Recreational Centre	**Lake front for tourism development point**
2.	Songadh	Civil	College Building	**Secondary School Building**
			Design of Septic Tank	**Recreation center**
			Design of Sports Complex	**Rainwater harvesting system**
			Bus Stand	**Public Toilets & Baths**
			Design of Shelter Home	**Defence training center**
			Agriculture Market Building	**Science center/Museum/Similar building**
3.	Valukad	Civil	Public Library	**Vegetable Market building**
			Public Bath & Toilet	**RCC road**
			Public Bus-Stand	**Street Light network expantion**
			Public Storage Building	**Sports complex**
			Public Hostel	**Community hall**
			Public Shelter Home	**Lake front for tourism development point**
4.	Kalatalav	Civil	Public Toilets & Baths	**Rain water harvesting system**
			Anganwadi	**Under ground water sump**
			Primary & Secondary School	**Elevated storage resorvoire**

			Vegetable Market	**Water supply distribution system**
			Bank	**Slill training institure**
			Street Light	**Zinga production and storage building**
5.	**Dharuka**	Civil	Sustainable Design RCC Road	**Post office**
			Storage Building	**Retaining & flood protection wall**
			Rainwater Harvesting	**Bituminous road**
			Water Supply Storage and Distribution	**Washing Ghat with Circulatory tank**
			Sewerage System in Mafanagar of Dharuka	**Primery health center**
			Recreation Centre	**Defence training center**
6.	**Bambhaniya**	Civil	Public Health Center	**Bus stop**
			Community Hall	**Village Bank**
			Street Light	**Secondary School Building**
			Drainage system	**Vegetable Market building**
			Elevated Service Reservoir	**Recreation center**
			RCC Road	**Post office**
7.	**Morchand**	Civil	Anganwadi Building	**Bus stop**
			Agricultural Product Market Building	**RCC road**
			Secondary School Building	**Street Light network expantion**
			Hostel Building	**Sports complex**
			Bank Building	**Public Toilets & Baths**
			Library Building	**Community hall**

TABLE 11 : SUMMARY DETAIL OF VILLAGE DESIGN

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

ENTARANCE GATE

PHC

POLICE STATION

AGANWADI

PRIMARY SCHOOL

MEETING WITH SARPANCH

SCHOOL BUILDING

SCHOOL BUILDING

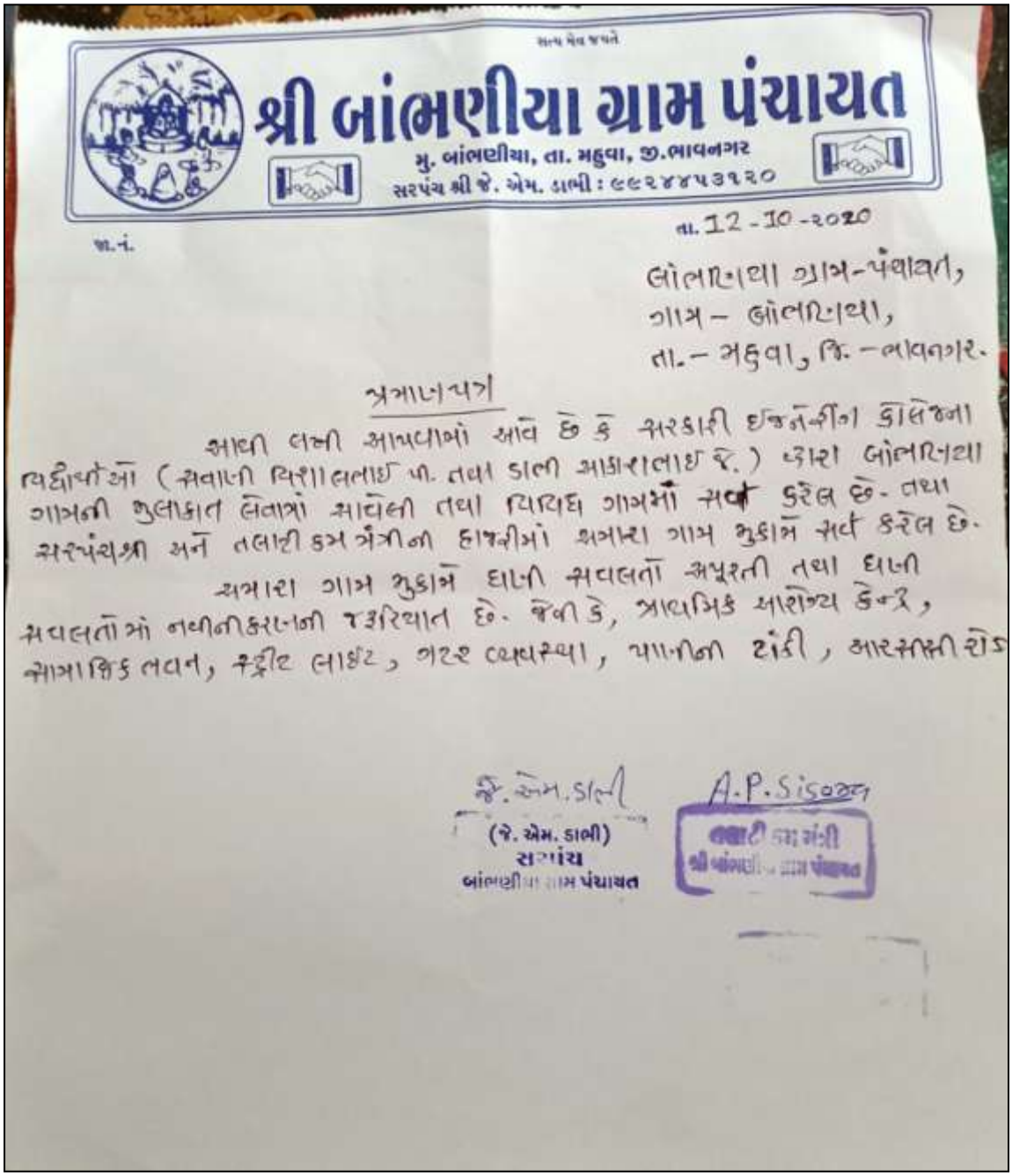
TEMPLE

PUBLIC TOILET

AGANWADI

NEW AGANWADI

12.9 Sarpanch latter



સત્ય મેવ જયતે

શ્રી બાંભણીયા ગ્રામ પંચાયત

મુ. બાંભણીયા, તા. મહુવા, જી.ભાવનગર
સરપંચ શ્રી જે. એમ. ડાભી : ૯૯૨૪૪૫૩૧૨૦

જા.નં.

તા. 12-10-2020

બોલાણીયા ગ્રામ-પંચાયત,
ગામ – બોલાણીયા,
તા.– મહુવા, જિ. –ભાવનગર.

પ્રમાણપત્ર

આથી લખી આપવામાં આવે છે કે સરકારી ઇજનેરીના કોલેજના વિદ્યાર્થીઓ (સવાણી વિશાલભાઈ પી. તથા ડાભી આકાશભાઈ જે.) દ્વારા બોલાણીયા ગામની મુલાકાત લેવામાં આવેલી તથા વિવિધ ગામમાં સર્વે કરેલ છે. તથા સરપંચશ્રી અને તલાટી કમ મંત્રીની હાજરીમાં અમારા ગામ મુકામે સર્વે કરેલ છે.

અમારા ગામ મુકામે ઘણી સવલતો અપૂરતી તથા ઘણી સવલતોમાં નવીનીકરણની જરૂરિયાત છે. જેવી કે, પ્રાથમિક આરોગ્ય કેન્દ્ર, સામાજિક ભવન, સ્ટ્રીટ લાઈટ, ગટર વ્યવસ્થા, પાણીની ટાંકી, આરસીસી રોડ

જે. એમ. ડાભી
(જે. એમ. ડાભી)
સરપંચ
બાંભણીયા ગ્રામ પંચાયત

A.P. Sisodra
તલાટી કમ મંત્રી
શ્રી બાંભણીયા ગ્રામ પંચાયત

CHAPTER :- 13

13.1 Design Proposals

13.1.1 Civil Design 1

Secondary school building

Measurement sheet						
Sr. no.	Description	no.	Length (m)	Width (m)	Height (m)	Quantity (m^3)
1	Excavation	1	186.9	0.9	1.2	201.85
2	p.c.c in foundation	1	186.9	0.9	0.3	50.46
3	Brick masonry in foundation					
	1^{st} step	1	190.1	0.5	0.3	28.61
	2^{nd} step	1	190.9	0.4	0.3	22.91
	3^{rd} step	1	191.7	0.3	0.85	48.88
					Total	100.60
4	Brick masonry above plinth level	1	191.7	0.3	3	172.53
5	Deduction for opening					
	D_1	9	1.1	0.3	2.1	6.231
	D_2	3	0.9	0.3	2.1	1.701
	W_1	2	1.8	0.3	1.4	1.510
	W_2	19	1.2	0.3	1.4	9.570
	V	4	0.6	0.15	0.2	0.200
					Total	19.30
	Deduction for lintel					
	D_1	9	1.4	0.3	0.15	0.57
	D_2	3	1.2	0.3	0.15	0.162
	W_1	2	2.1	0.3	0.15	0.19
	W_2	19	1.5	0.3	0.15	1.28
	V	4	0.9	0.2	0.15	0.108
					Total	2.31
6	Total brick masonry work					150.92

	above plinth level					
7	Plaster work					
	1 unit	4	5		3	210
	2 unit	4	6		3	252
	3 unit	2	3		3	18
	4 unit	2	4		3	24
	5 unit	2	3		3	18
	6 unit	2	4		3	24
	7 unit	4	3		3	36
	8 unit	2	3		3	18
	9 unit	2	2		3	12
					Total	612
	Deduction in plaster					
	D_1	2.5	1.1		2.1	5.78
	D_2	2	0.9		2.1	3.78
	W_1	2	1.8		1.4	5.04
	W_2	0.5	1.2		1.4	1.05
	V	0.5	0.6		0.6	0.18
					Total	15.83
	Total quantity of plaster					596.17
8	RCC work in column	23	0.4	0.6	3	16.56
9	RCC work in slab	1	44	53	0.15	349.8

TABLE 12 :- MEASUREMET SHEET OF SECONDARY SCHOOL BUILDING

Abstract sheet					
Sr. No.	Description	Quantity	Rate	Per	Total Amount
1	Earth excavation	201.85	600	M^3	121110
2	P.C.C	50.46	3000	M^3	151380
3	Brick masonry upto plinth	100.60	3500	M^3	352100
4	Brick masonry for super structure	150.92	4000	M^3	603680
5	R.C.C. work	366.360	6000	M^3	3396366

6	Internal plaster	596.17	700	M^2	417319
	Total				5382463
	Add 10% contractor profit				538246.3
	Add 4% contingencies				215298.52
	Add 3% labour charge				161473.89
	Add 2% water charge				107649.26
	Total net amount				6405132

TABLE 13 :- ABSTARCT SHEET OF SECONDARY SCHOOL BUILDING

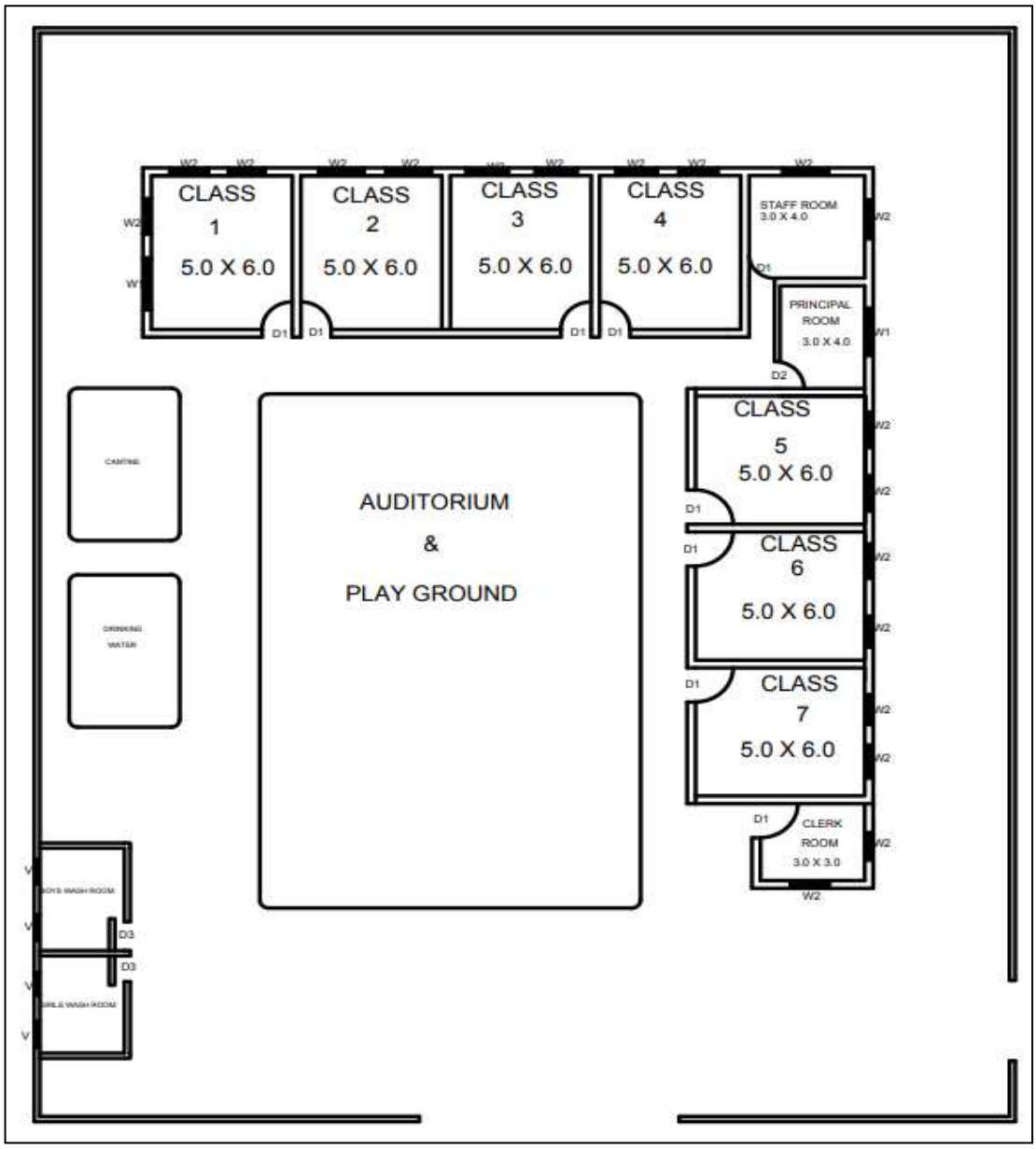


FIG. 41 :- PLAN OF SECONDARY BUILDING

13.1.2 Civil Design 2

Vegetable market

Measurement sheet						
Sr. no.	Description	no.	Length (m)	Width (m)	Height (m)	Quantity (m^3)
1	Excavation	1	92	0.9	1.2	99.36
2	p.c.c in foundation	1	92	0.9	0.3	24.84
3	Brick masonry in foundation					
	1^{st} step	1	92.25	0.5	0.3	13.83
	2^{nd} step	1	92.60	0.4	0.3	11.11
	3^{rd} step	1	92.95	0.3	0.85	23.70
4	Brick masonry above plinth level	1	92.95	0.3	3	83.65
5	Deduction for opening					
	D	3	1.5	0.3	2.5	3.375
6	Total brick masonry work above plinth level					80.275
7	Plaster work					
	1 unit	1	5		3	15
	2 unit	1	6		3	18
	3 unit	1	5		3	15
	4 unit	1	3		3	9
	5 unit	1	4		3	12
	6 unit	1	5		3	15
	7 unit	2	3		3	18
	8 unit	2	2		3	12
8	RCC work in column	10	0.4	0.3	3	3.6
9	RCC work in slab	1	14.2	5.6	0.15	11.93

TABLE 14 :- MEASUREMENT SHEET OF VEGETABLE MARKET

Abstract sheet					
Sr. No.	Description	Quantity	Rate	Per	Total Amount
1	Earth excavation	99.36	600	M3	59616
2	P.C.C	24.84	3000	M^3	74520
3	Brick masonry upto plinth	48.89	3500	M^3	171115
4	Brick masonry for super structure	80.275	4000	M^3	321100
5	R.C.C. work	15.53	9000	M^3	139770
6	Internal plaster	114	700	M^3	79800
	Total				925721
	Add 10% contractor profit				92572.1
	Add 4% contingencies				37029
	Add 3% labour charge				27772
	Add 2% water charge				18515
	Total net amount				1101610

TABLE 15 :- ABSTACT SHEET OF VEGETABLE MARKET

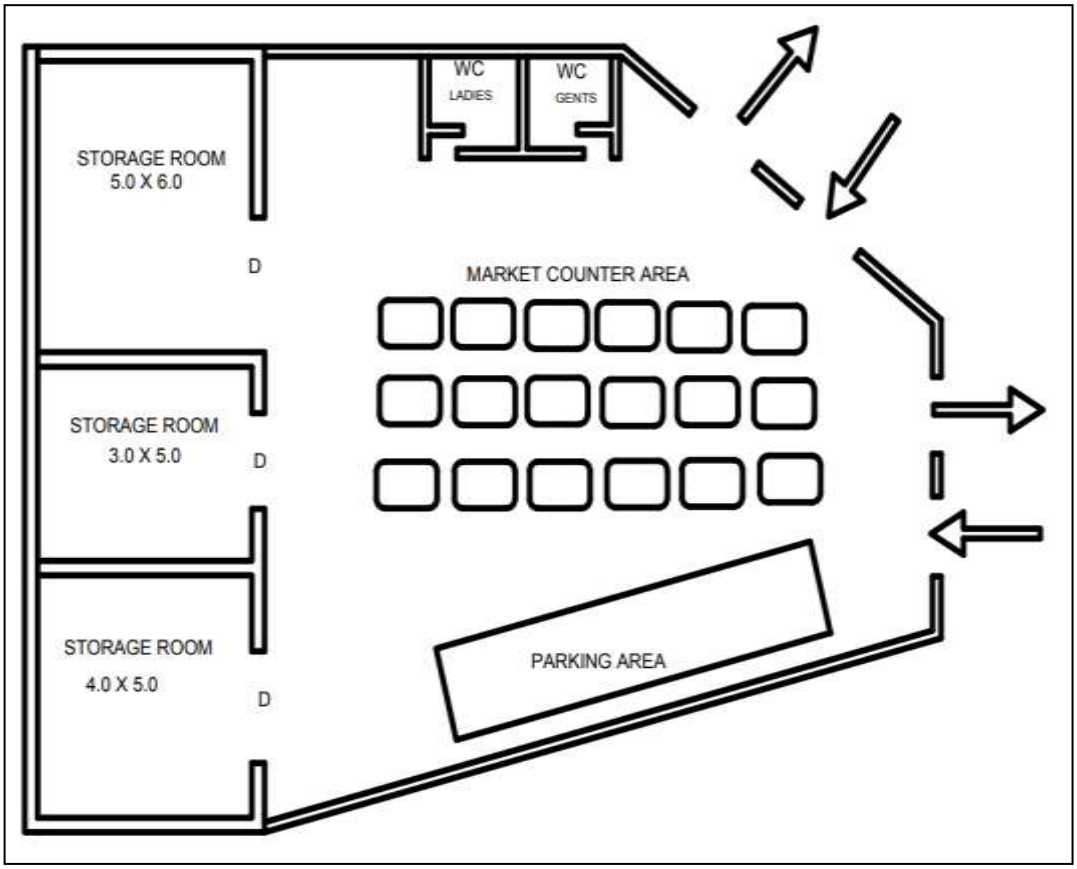


FIG. 42 :- PLAN OF VEGETABLE MARKET

13.1.3 Civil Design 3

Bus stand

Measurement sheet						
Sr. no.	Description	no.	Length (m)	Width (m)	Height (m)	Quantity (m^3)
1	Excavation	1	96.5	0.9	0.9	78.165
2	p.c.c in foundation	1	96.5	0.9	0.3	26.05
3	Brick masonry in foundation					
	1^{st} step	1	98.15	0.6	0.3	17.66
	2^{nd} step	1	99.8	0.5	0.3	14.97
	3^{rd} step	1	101.45	0.4	0.6	24.34
4	Earth filling work	1	4	2	0.45	3.6
		1	4	2	0.45	3.7
		1	3	3	0.45	4.05
		1	3	3	0.45	4.05
		1	3	4	0.45	5.4
		1	3	2	0.45	2.7
		2	5	8.17	0.45	19.2
		2	1.5	4	0.45	0.14
		1	1	4	0.45	2.80
		1	1.2	2	0.45	1.08
	Total					55.77
5	Brick masonry work in	1	99.35	0.3	3	89.41
	Super structure					
	Deduction for door and					
	Window					
	Door	6	1.2	0.3	1.2	4.536
	Window—w	4	1.2	0.3	1.8	2.592
	Window –w1	1	0.9	0.3	1.8	1.62
	Ventilator	10	0.6	0.3	0.6	1.08
	Deduction for lintel	1	99.35	0.3	0.6	8.18

	Total					77.462
6	Lintel work as per above	1	99.35	0.3	0.6	8.18
7	Total plaster work	1	96.5	3		248.4
8	White wash as per above	1				248.4
9	Total flooring work	1				96.9
10	R.C.C work for slab					
	L=20.7	1	20.7	7.5	0.15	21.26
	B=7.5					
	H=0.15					

TABLE 16 :- MEASUREMENT SHEET OF BUS STAND

Abstract sheet					
Sr. No.	Description	Quantity	Rate	Per	Total Amount
1	Earth excavation	78.165	155	M^3	12115
2	P.C.C	26.055	3000	M^3	78165
3	Brick masonry upto plinth	56.97	3200	M^3	182300
4	Brick masonry for super structure	77.462	3500	M^3	271117
5	R.C.C. work	21.26	4900	M^3	104175
6	Internal plaster	248.4	150	m^2	37260
7	Flooring	96.9	855	m^2	82849
8	painting	248.4	25	m^2	6210
	Total				784191
	Add 10% contractor profit				78420
	Add 4% contingencies				39210
	Add 3% labour charge				16865

	Add 2% water charge				15683
	Total net amount				920000

TABLE 17 :- ABSTACT SHEET OF BUS STAND

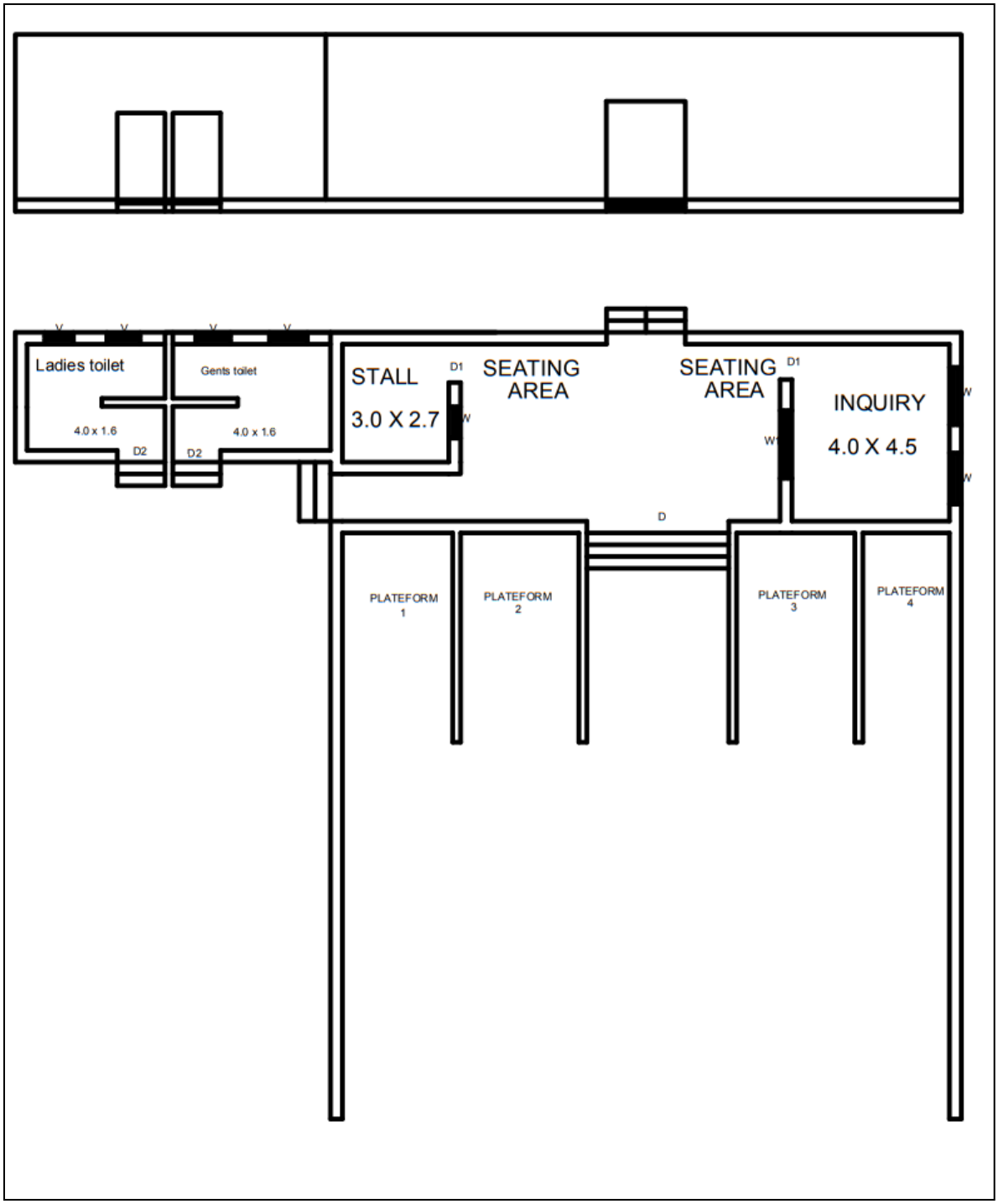


FIG. 43 :- PLAN OF BUS STAND

13.1.4 civil design-4

Post office

Sr. no.	Description	no.	Length	Width	Height	Quantity
1	earth excavation					
	for wall	1	34.05	0.9	1.11	**34.016**
	for step	1	4	1	0.1	**0.4**
2	P.C.C.					
	for Foundation	1	34.05	0.9	0.2	**6.129**
	for step	1	4	1	0.1	**0.4**
3	2nd class masonry					
	0.6 mm thick wall	1	34.35	0.6	0.2	**4.122**
	0.4 mm thick wall	1	34.55	0.4	0.2	**2.764**
	0.3 mm thick wall	1	34.65	0.3	1.46	**15.177**
4	DPC	1	34.65	0.3		**10.39**
5	1st class brick masonry for super structure	1	34.72	0.23	3	**23.95**
	Partition wall	1	6.72	0.12	3	**2.42**
	Parapet wall	1	27.88	0.12	1.15	**3.85**
						30.22
	Deduction					
	O	1	2.6	0.23	3	**1.794**
	R.S.	1	2	0.23	2.1	**0.966**
	D	1	0.9	0.12	2.1	**0.223**
	D1	1	0.76	0.12	2.1	**0.192**
	W	3	0.9	0.23	1.2	**0.745**
	V	1	0.6	0.23	0.6	**0.0828**
	Lintel					
	R.S.	1	2.3	0.23	0.15	**0.079**
	D	1	1.2	0.12	0.15	**0.0216**
	D1	1	0.6	0.12	0.15	**0.0191**
	W	3	1.2	0.23	0.15	**0.124**

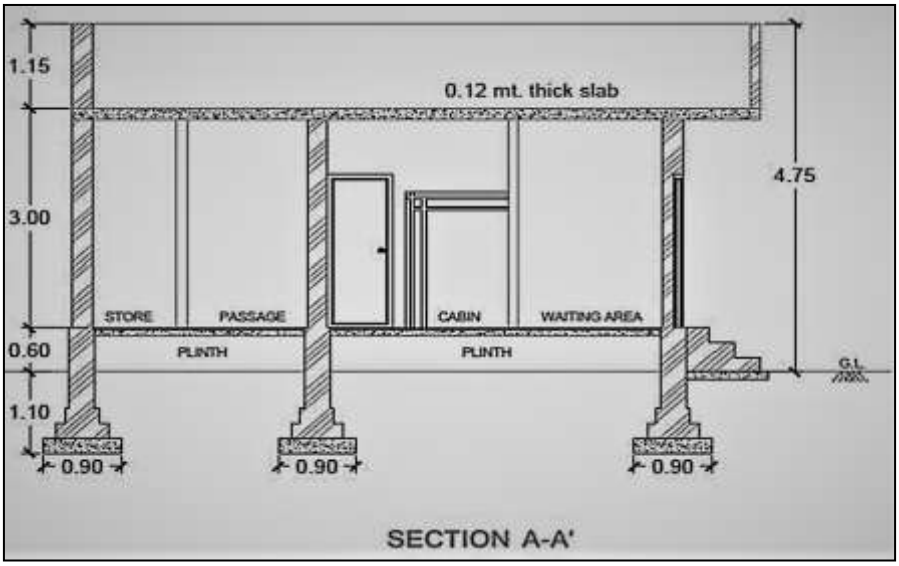
	V	**1**	**0.9**	**0.23**	**0.15**	**0.031**
						4.276
6	**R.C.C. work**					
	Lintel					
	R.S.	1	2.3	0.23	0.15	**0.079**
	D	1	1.2	0.12	0.15	**0.0216**
	D1	1	0.6	0.12	0.15	**0.0191**
	W	3	1.2	0.23	0.15	**0.124**
	V	1	0.9	0.23	0.15	**0.031**
						0.2747
	Slab	1	7.3	7.1	0.1	**5.183**
7	**Steel**					
	1% of R.C.C.					**428.53**
8	**wood work**					
	D	1	0.9		2.1	**1.89**
	D1	1	0.76		2.1	**1.59**
	W	3	0.9		1.2	**3.24**
9	**Internal plaster**					
	ceiling front area	1	6.83	3.91		**26.705**
	manager cabin	1	2	2.5		**5**
	store room	1	3.1	0.99		**3.069**
	W.C.	1	1.5	0.99		**1.485**
	Passage	1	4.72	1.4		**6.608**
	Wall					
	Front area	2	6.83		3	**40.98**
		2	3.91		3	**23.476**
	manager cabin	2	2		3	**12**
		2	2.5		3	**15**
	store room	2	3.1		3	**18.6**
		2	0.99		3	**5.94**
	W.C.	2	1.5		3	**9**
		2	0.99		3	**5.94**
	Passage	2	4.72		3	**28.32**
		2	1.4		3	**8.9**
						211

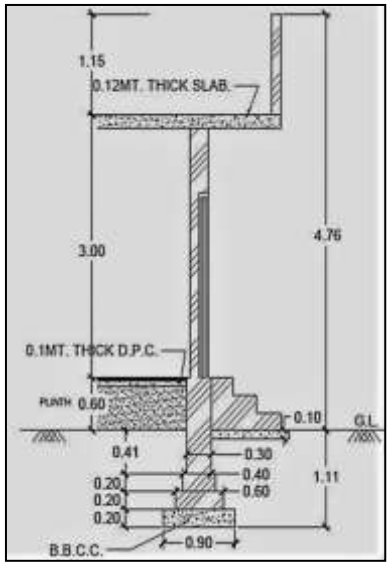
	Deduction					
	O	1	2.6		3	**4.2**
	R.S.	1	2		2.1	**7.8**
	D	1	0.9		2.1	**1.89**
	D1	1	0.76		2.1	**1.596**
	W	3	0.9		1.2	**3.24**
	V	1	0.6		0.6	**0.36**
						19.086
10	**Outer plaster**					
	Wall	2	7.3		4.75	**69.35**
		2	7.1		4.75	**67.45**
	parapet top	2	7.3	0.12		**1.752**
		2	7.1	0.12		**1.704**
	parapet inside	2	7.06		1.15	**16.238**
		2	6.86		1.15	**15.778**
						172.272
	Deduction					**7.8**
11	**Flooring**	1				**42.86**
12	**Skirting**					
	Front area	2	6.83			**13.66**
		2	3.91			**7.82**
	manager cabin	2	2			**4**
		2	2.5			**5**
	store room	2	3.1			**6.2**
		2	0.99			**1.98**
	W.C.	2	1.5			**3**
		2	0.99			**1.98**
	Passage	2	4.72			**9.44**
		2	1.4			**2.8**
						55.88
	Deduction					
	D	1	0.9			**0.9**
	D1	1	0.76			**0.76**
	R.S.	1	2			**2**
	O	1	2.6			**2.6**
						6.26

TABLE 18 :- MEASUREMENT SHEET OF POST OFFICE

ABSTRACT SHEET					
Sr. no.	Quantity	Description	Rate	Per	**Amount**
			Rs.		**Rs.**
1	34.42	Earth excavation	150	m3	**5163**
2	6.53	P.C.C.	3900	m3	**25467**
3	22.063	Brick masonry upto plinth	5200	m3	**114728**
4	10.39	DPC	120	m2	**1247**
5	25.94	Brick masonry for super structure	4900	m3	**127106**
6	5.458	R.C.C. work	4300	m3	**23470**
7	428.53	Steel	60	Kg	**25712**
8	65	wood work	2000	m2	**130000**
9	191.91	Internal plaster	260	m2	**49897**
10	164.49	Outer plaster	310	m2	**50992**
11	42.86	Flooring	450	m2	**19287**
12	49.62	Skirting	50	m	**2481**
					575550
		ADD 3% CONTIGENCIES			**17267**
		ADD 2% LABOUR CHARGES			**11511**
					604328
Total					**605000**

TABLE 19 :- ABSTACT SHEET OF POST OFFICE





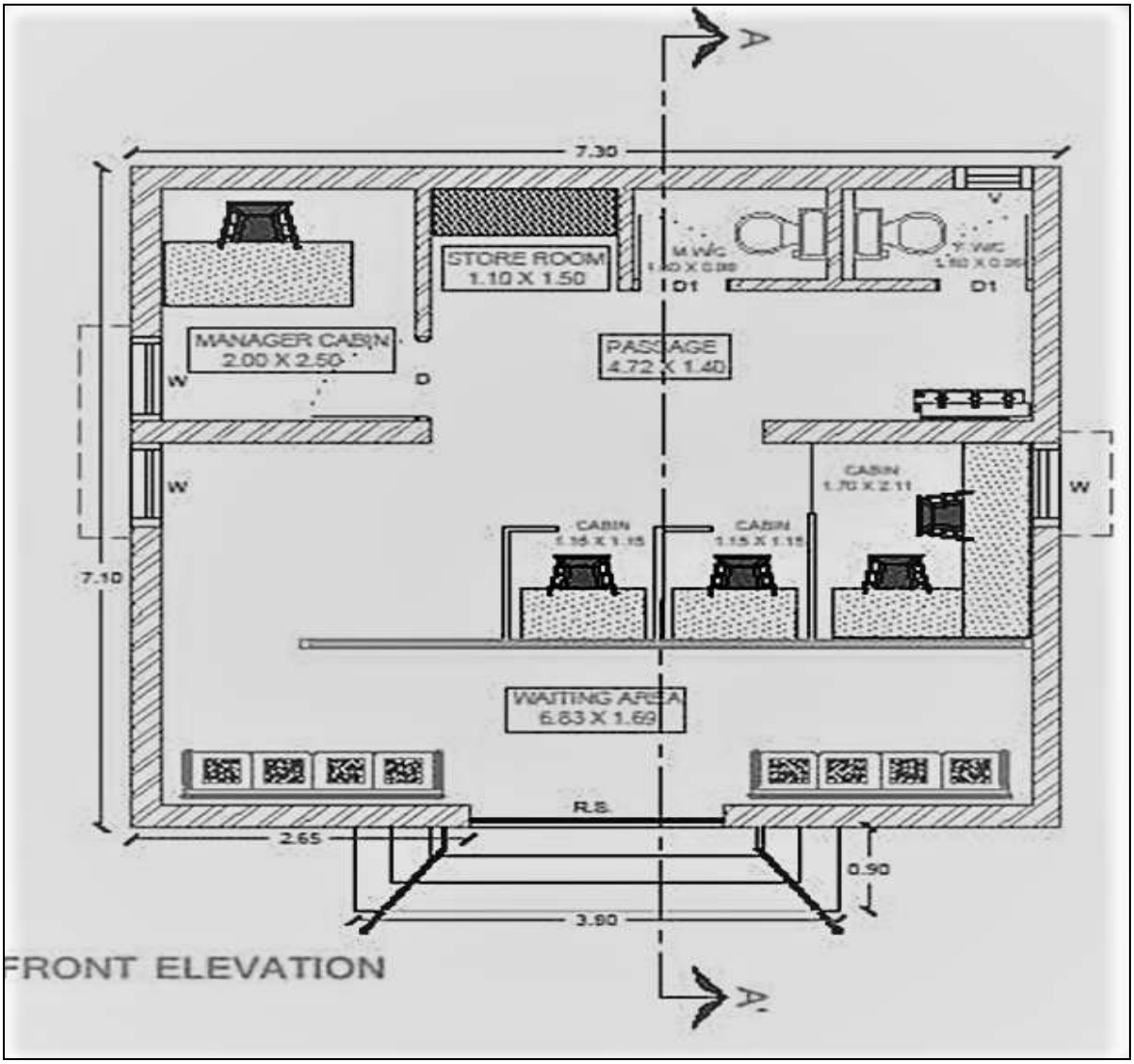


FIG. 44 :- PLAN OF POST OFFICE

13.1.5 civil design 5

Bank

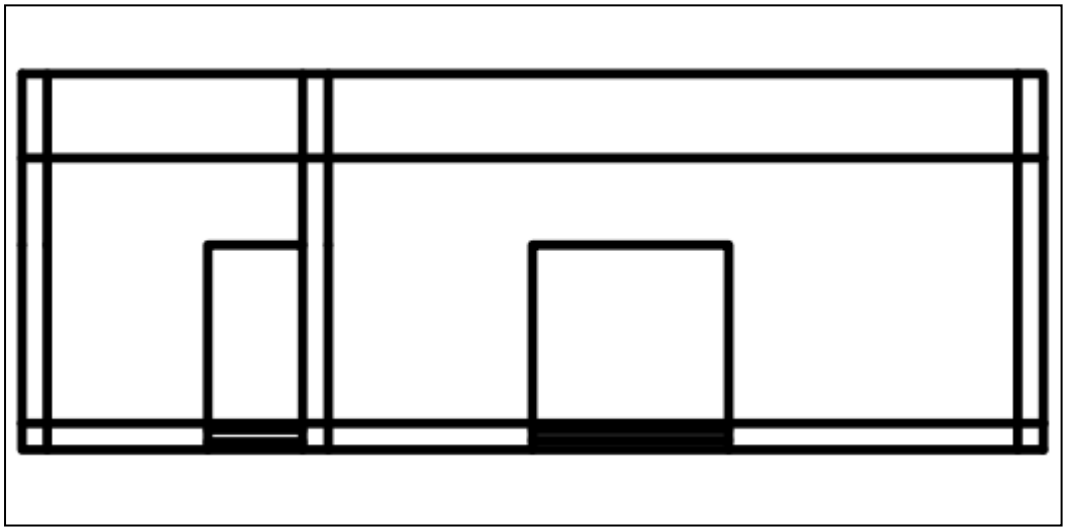
Measurement sheet						
Sr. no.	Description	no.	Length (m)	Width (m)	Height (m)	Quantity (m^3)
1	Excavation	1	76	0.9	1.2	82.08
2	p.c.c in foundation	1	76	0.9	0.3	20.52
3	Brick masonry in foundation					
	1^{st} step	1	76.02	0.8	0.2	12
	2^{nd} step	1	75.03	0.7	0.2	10.50
	3^{rd} step	1	75.04	0.6	0.1	4.50
	total					27.0
4	Earth filling work	1	4	2	0.45	3.6
		1	4	2	0.45	3.7
		1	3	3	0.45	4.05
		1	3	3	0.45	4.05
		1	3	4	0.45	5.4
		1	3	2	0.45	2.7
		2	5	8.17	0.45	19.2
		2	1.5	4	0.45	0.14
		1	1	4	0.45	2.80
		1	1.2	2	0.45	1.08
	Total					
5	Brick masonry work in	1	79	0.2	3	47.4
	Super structure					
6	Lintel work as per above	1	0.4	0.6	3	14.4
7	Total plaster work	1	110		3	330

8	White wash as per above	1	88		3	264
9	Total flooring work	1				
10	R.C.C work for slab		8.3	12.3	0.15	15.31
	L=20.7	1				
	B=7.5					
	H=0.15					

TABLE 20 :- MEASUREMENT SHEET OF BANK

Abstract sheet					
Sr. No.	Description	Quantity	Rate	Per	Total Amount
1	Earth excavation	82.0	200	M^3	20520
2	P.C.C	20.52	3000	M^3	78165
3	Brick masonry upto plinth	56.97	3200	M^3	182300
4	Brick masonry for super structure	77.462	3500	M^3	271117
5	R.C.C. work	21.26	4900	M^3	104175
6	Internal plaster	248.4	700	m^2	37260
7	Flooring	96.9	855	m^2	82849
8	painting	248.4	25	m^2	6210
	Total				1288728
	Add 10% contractor profit				128873
	Add 4% contingencies				47578
	Add 3% labour charge				37542
	Add 2% water charge				2542
	Total net amount				1676880

TABLE 21 :- ABSTACT SHEET OF BANK



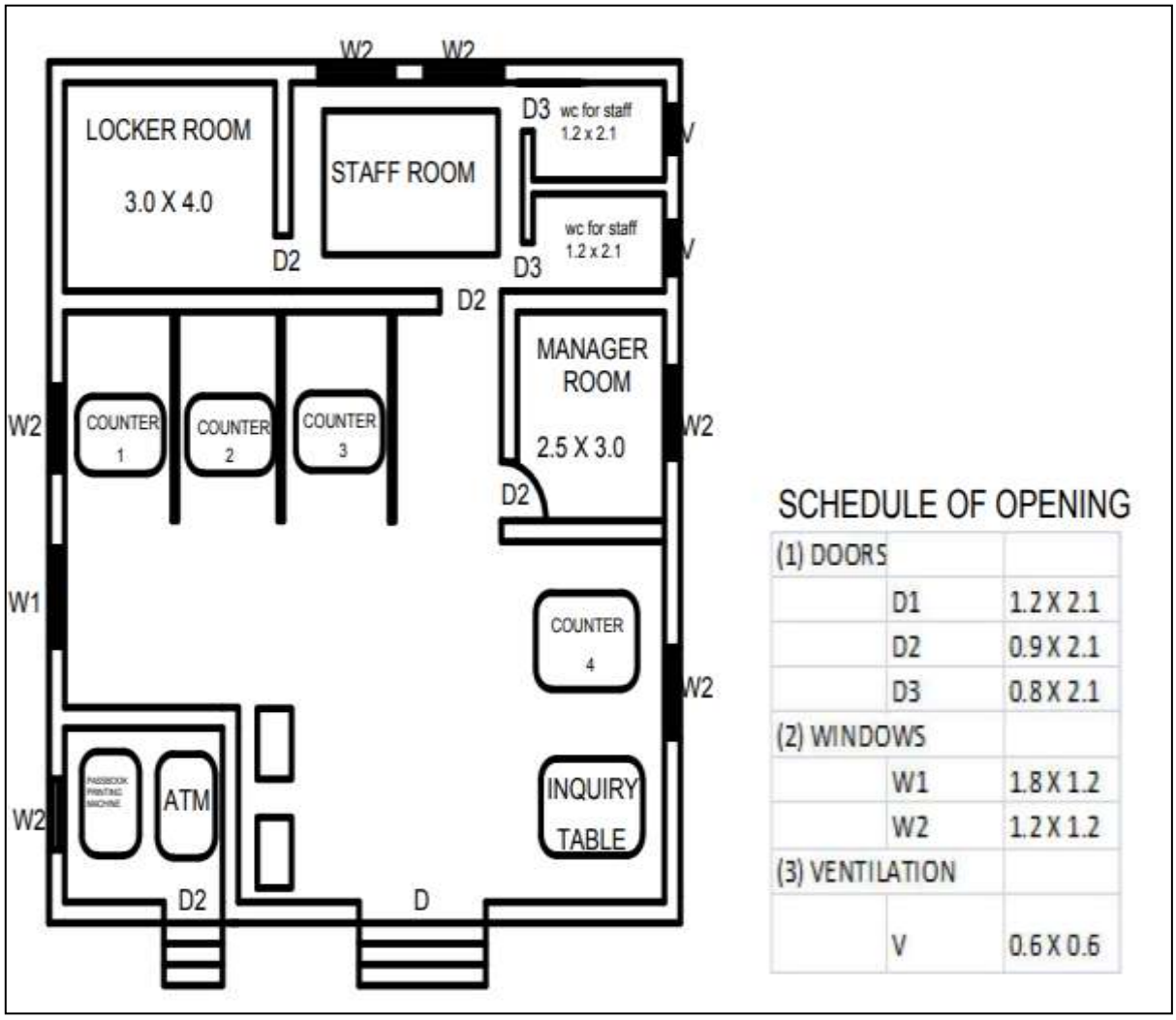


FIG. 45 :- PLAN OF BANK

13.1.5 Civil design 6

Recreation centre

Sr. no.	Description	No.	Length	Width	Hight	Quantity
1	Earth excvation	12	1.3	1.3	2.19	44.4
2	P.C.C. work	12	1.3	1.3	0.1	2.02
3	Footing	12	1	1	0.3	3.6
4	R.C.C. column	12	0.46	0.23	1.79	2.272584
5						
						2.33818
9	R.C.C. slab					
	L = 4.40m , W =4m	1	4.4	4	0.15	2.64
	L = 4.7m , W =3.3m	2	4.7	3.3	0.15	4.653
	L = 2.68m , W =1.22m	2	2.68	1.22	0.15	0.98088
	L = 3.86m , W =1.32m	1	3.86	1.32	0.15	0.76428
						9.03816
	Deduction					
	Beam 1 ,L=4.32m	2	4.32	0.23	0.15	0.29808
	Beam 2,L=3.48m	1	3.48	0.23	0.15	0.12006
	Beam 3,L=3.19m	2	3.19	0.23	0.15	0.22011
	Beam 4,L=3.23m	2	3.23	0.23	0.15	0.22287
	Beam 5,L=3.86m	1	3.86	0.23	0.15	0.13317
	Beam 6,L=3.03m	2	3.03	0.23	0.15	0.20907
	Beam 7,L=2.68m	2	2.68	0.23	0.15	0.18492
	Beam 8,L=0.99m	4	0.99	0.23	0.15	0.13662
						1.5249
10	Earth Filling upto plinth					
	L = 4.40m , W =4m	1	4.4	4	0.6	10.56
	L = 4.7m , W =3.3m	2	4.7	3.3	0.6	18.612
	L = 2.68m , W =1.22m	2	2.68	1.22	0.6	3.92352

	L = 3.86m , W =1.32m	1	3.86	1.32	0.6	3.05712
12	Brick wall masonry for super structure					
	wall-1	2	4.32	0.23	3	5.9616
	wall-2	1	3.48	0.23	3	2.4012
	wall-3	2	3.19	0.12	3	2.2968
	wall-4	2	3.23	0.12	3	2.3256
	wall-5	1	3.86	0.12	3	1.3896
	wall-6	2	3.03	0.12	3	2.1816
	wall-7	2	2.68	0.12	3	1.9296
	wall-8	4	0.99	0.12	3	1.4256
						19.9116
	Deduction					
	R.S.	1	2.5	0.23	2.3	1.3225
	R.S.1	1	1.8	0.23	2.3	0.9522
	D	1	0.91	0.23	2.1	0.43953
	D1	1	0.76	0.12	2.1	0.19152
	W	1	1.2	0.23	1.2	0.3312
	W2	2	1	0.23	1.2	0.552
	V	1	0.6	0.23	0.6	0.0828
						3.87
13	Parapet wall					
		1	4.4	0.23	1.15	1.1638
		2	4.7	0.23	1.15	2.4863
		2	2.68	0.23	1.15	1.41772
		1	3.86	0.23	1.15	1.02097
14	Steel	1	1	1	1	1836
	1% of total R.C.C.					
15	Wood work					
	D	1	0.91		2.1	1.911
	D1	1	0.76		2.1	1.596
	W	1	1.2		1.2	1.44
	W2	2	1		1.2	2.4
16	Internal Plaster					
	Ceiling	2	4.83	3.65		35.259

		1	4.4	3.65		16.06
	Wall	1	19.911		3	59.733
	Deduction					
	R.S.	1	2.5		2.3	5.75
	R.S.1	1	1.8		2.3	4.14
	D	1	0.91		2.1	1.911
	D1	1	0.76		2.1	1.596
	W	1	1.2		1.2	1.44
	W1	2	1		1.2	2.4
	V	1	0.6		0.6	0.36
						17.597
17	Outer Plaster					
	Wall	1	16.53		4.75	78.5175
	Parapet top	1	16.53	0.23		3.8019
	Parapet inside	1	14.86		1.15	17.089
	Deduction					16.06
18	Flooring					
		2	4.83	3.65		35.259
		1	4.4	3.65		16.06
19	Skirting	1	19.911			

TABLE 22 :- MEASUREMENT OF RECREATION CENTER

Sr. no.	Description	Quantity	Rate	Per	Amount
			Rs.		**Rs.**
1	Earth excvation	44.4	150	cu.m	**6660**
2	P.C.C. work	2.02	3900	cu.m	**7878**
3	Footing	3.6	4300	cu.m	**15480**
4	R.C.C. column	2.27	4300	cu.m	**9761**
5	R.C.C. Beam G.B.	2.338	4300	cu.m	**10053.4**
6	DPC	10.166	120	cu.m	**1219.92**
7	R.C.C. column for super structure	5.332	4300	cu.m	**22927.6**
8	R.C.C. Beam at slab level	2.338	4300	cu.m	**10053.4**

9	R.C.C. slab	7.51	4300	cu.m	**32293**
10	Earth Filling upto plinth	32.39	150	cu.m	**4858.5**
11	Brick work GL to PL	3.761	4900	cu.m	**18428.9**
12	Brick wall masonry for super structure	16.04	4900	cu.m	**78596**
13	Parapet wall	6.088	4900	cu.m	**29831.2**
14	Steel	1836	60	cu.m	**110160**
15	Wood work	7.347	2000	sq.m	**14694**
16	Internal Plaster	93.455	260	sq.m	**24298.3**
17	Outer Plaster	83.34	310	sq.m	**25835.4**
18	Flooring	51.32	450	sq.m	**23094**
19	Skirting	19.91	50	m	**995.5**
					218209.72
	ADD 3% CONTIGENCIES				**17267**
	ADD 2% LABOUR CHARGES				**11511**
					246987.72

TABLE 23 :- ABSTARCT SHEET OF RECREATION CENTRE

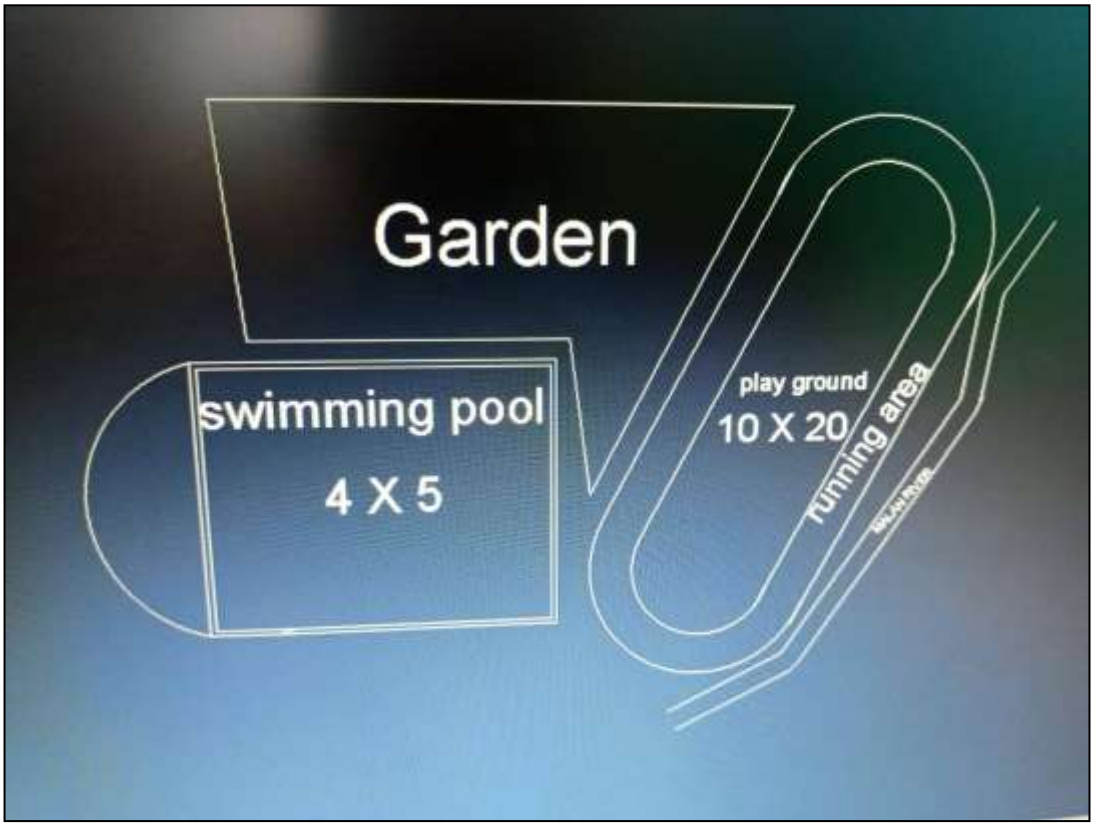


FIG. 46 :- PLAN OF RECREATION CENTRE

13.2 Reason for Students Recommending this Design

Reason for the recommending this design are given below :-

- this all are facilities not available in village
- this are all are design are important to progress the village
- due to this design migration of villager is reduced
- all over development of village
- increase in living standard of villager
- basic facilities is improved in village
- this all design are according to sustainable development of village

13.3 About designs Suggestions / Benefit of the villagers

Benefit of the villagers is given below :-

- all are basic facilities is available in village
- all over development of village
- Social gathering and functions needs to be well organized in the villages
- Social gathering and roaming is also required. For that the parks and public gardens are been proposed to be constructed.

CHAPTER :- 14

14 Technical Options with Case Studies

14.1 Civil Engineering

14.1.1 Advanced Earthquake Resistant

The science of structural and Earthquake Engineering helps enhance the seismic flexibility of civil structures and critical infrastructure through advanced engineering and management tools. While natural forces are extremely useful to mankind, natural disasters can wreak a havoc with hurricanes, earthquakes, tsunamis posing threat to life and infrastructure worth billions of dollars.

Techniques For Earthquake Resistant Design of Structures :-

There are many known and practiced measures to protect against seismic threats. Let's take a look at some of the earthquake resistant techniques used by the engineers world over to minimize the damage to structures due to earthquakes:

(1) Floating Foundation:

The levitating or floating foundation separates the substructure of a building from its superstructure.

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

In Japan this base isolation system works at a whole new level. Their design allows buildings to float mid-air. The system levitates, keeping the building on a cushion of air. The system has in-built sensors for detection of seismic activity and these sensors communicate with the air compressor that creates the layer of air between the building and its base.

(2) Shock Absorption:

Similar to the shock absorbers used in vehicles, buildings also makes use of this technology. This earthquake resistant technology helps buildings slow down and reduce the magnitude of vibratory motions. Ideally shock absorbers should be placed at each level of the building – one end attached to the beam and the other end to the column. Each comprises a piston head that moves inside a

cylinder full of silicone oil. During earthquakes, the horizontal motion of building will make the piston push against the oil, transforming mechanical energy from the quake to heat.

(3) Rocking Core-Wall:

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

(4) Pendulum Power:

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

(5) Symmetry, Diaphragms And Cross-Bracing:

Generally one common criterion for seismic designs is symmetry. Seismic risks of asymmetrical designs are higher. L-Shaped, T-Shaped and split-level structures may be more visually appealing but they are also prone to torsion. Thus engineers design symmetrical structures to keep the forces equally distributed through the structure and limit ornamental elements like cornices, cantilever projections etc.

An earthquake has a significant lateral force. Seismic designing counteracts these forces in both horizontal and vertical structural systems. Diaphragms are integral to horizontal structures – such as floors of a building or roof. Engineers design each diaphragm on its own deck and strengthen it horizontally so it can distribute sideways forces with vertical structure parts.

With vertical structures, engineers have several approaches. Braced frames are often used in building walls. Braced frames rely on trusses for resisting sideways motion. Cross-bracing is a technique that uses two diagonal members

in an X-shape to build wall trusses and it is a popular technique to build earthquake resistant structures**.**

Conclusion

Seismic Engineering is a very complex and constantly evolving. Seismic structural assessment is a powerful tool in Earthquake Engineering that uses detailed modeling of the structure in conjunction with structural analysis to get a better understanding of the building's resistance. Retrofitting older structures with enhanced designs or materials is as important as rebuilding new structures from scratch. The ultimate goal of Earthquake Civil Engineering is to save lives so that the buildings don't collapse and allow inhabitants to escape in a timely manner.

14.1.2 Seismic Retrofitting of Buildings

Seismic Retrofitting Techniques for Concrete Structures:

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

1. Introduction to Seismic Retrofitting Techniques:

- Earthquake creates great devastation in terms of life, money and failures of structures.
- Upgrading of certain building systems (existing structures) to make them more resistant to seismic activity (earthquake resistance) is really of more importance.
- Structures can be (a) Earthquake damaged, (b) Earthquake vulnerable
- Retrofitting proves to be a better economic consideration and immediate shelter to problems rather than replacement of building.

Seismic Retrofitting of Concrete Structures:

Definition: It is the modification of existing structures to make them more

resistant to seismic activity, ground motion, or soil failure due to earthquakes. The retrofit techniques are also applicable for other natural hazards such as tropical cyclones, tornadoes, and severe winds from thunderstorms.

Need for Seismic Retrofitting:

- To ensure the safety and security of a building, employees, structure functionality, machinery and inventory
- Essential to reduce hazard and losses from non-structural elements.
- predominantly concerned with structural improvement to reduce seismic hazard.
- Important buildings must be strengthened whose services are assumed to be essential just after an earthquake like hospitals.

Problems faced by Structural Engineers are:

Lack of standards for retrofitting methods – Effectiveness of each methods varies a lot depending upon parameters like type of structures, material condition, amount of damage etc.,

Basic Concept of Retrofitting:

The aim is at:

- Upgradation of lateral strength of the structure
- Increase in the ductility of the structure
- Increase in strength and ductility

2. Classification of Retrofitting Techniques:

Global	Local
(1) Adding shear wall	(1) Jacketting of beams
(2) Adding infill wall	(2) Jacketting of columns
(3) Adding bracing	(3) Jacketting of beams column joint
(4) Adding wing wall	(4) Strengthenings of individuals columns
(5) Wall thickening	
(6) Mass reduction	
(7) Base isolation	
(8) Mass dampers	

Adding New Shear Walls:

- Frequently used for retrofitting of non ductile reinforced concrete frame buildings.
- The added elements can be either cast?in?place or precast concrete elements.
- New elements preferably be placed at the exterior of the building.
- Not preferred in the interior of the structure to avoid interior mouldings.

Fig 47: Additional Shear Wall

Adding Steel Bracings

- An effective solution when large openings are required.
- Potential advantages due to higher strength and stiffness, opening for natural light can be provided, amount of work is less since foundation cost may be minimized and adds much less weight to the existing structure.

Adding STEEL Bracings:

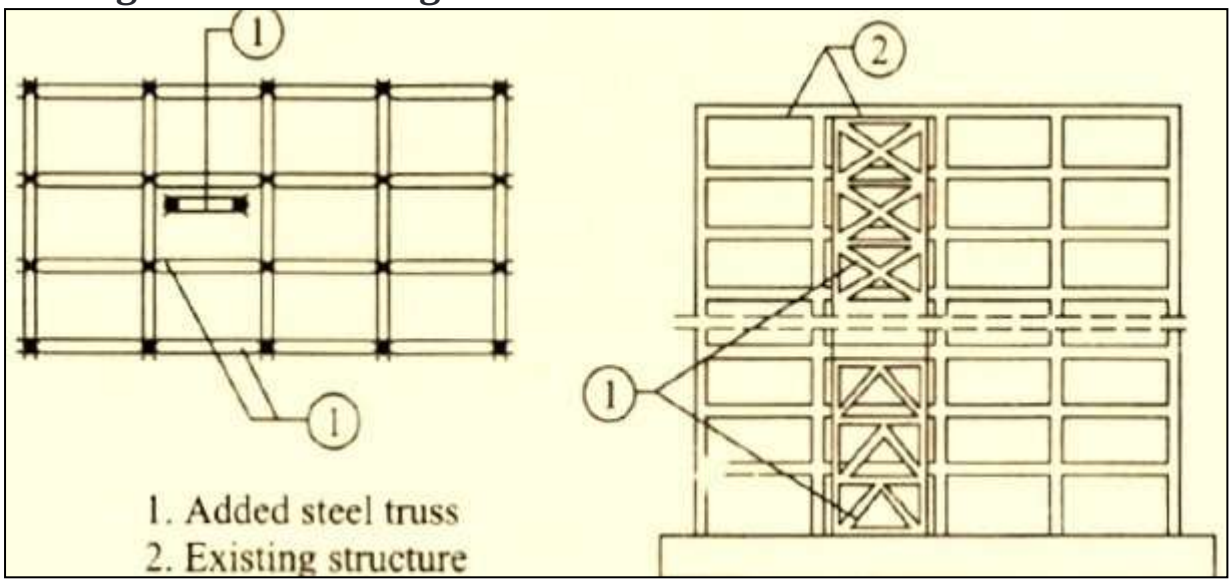


Fig 48 : RC Building retrofitted by steel bracing

Jacketing (Local Retrofitting Technique):

This is the most popular method for strengthening of building columns.

Types of Jacketing :

1. Steel jacket,
2. Reinforced Concrete jacket,
3. Fibre Reinforced Polymer Composite (FRPC) jacket

Purpose for jacketing:

- To increase concrete confinement
- To increase shear strength
- To increase flexural strength

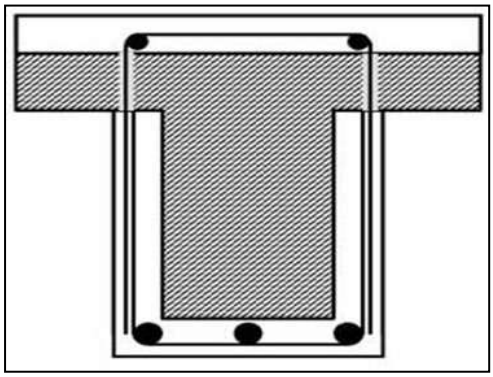


Fig 49 : Beam Jacketing

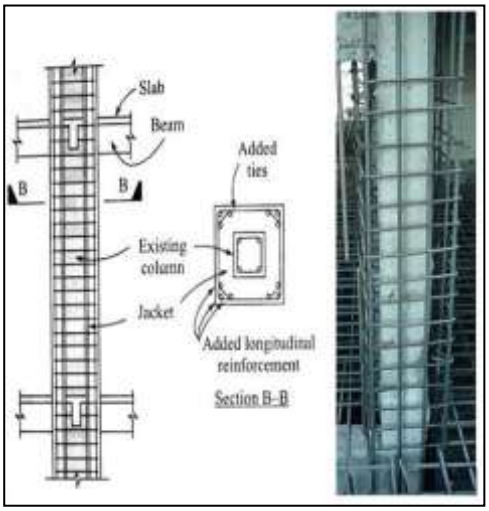


Fig 50 : Column Jacketing

Base Isolation (or Seismic Isolation) :

Isolation of superstructure from the foundation is known as base isolation. It is the most powerful tool for passive structural vibration control technique.

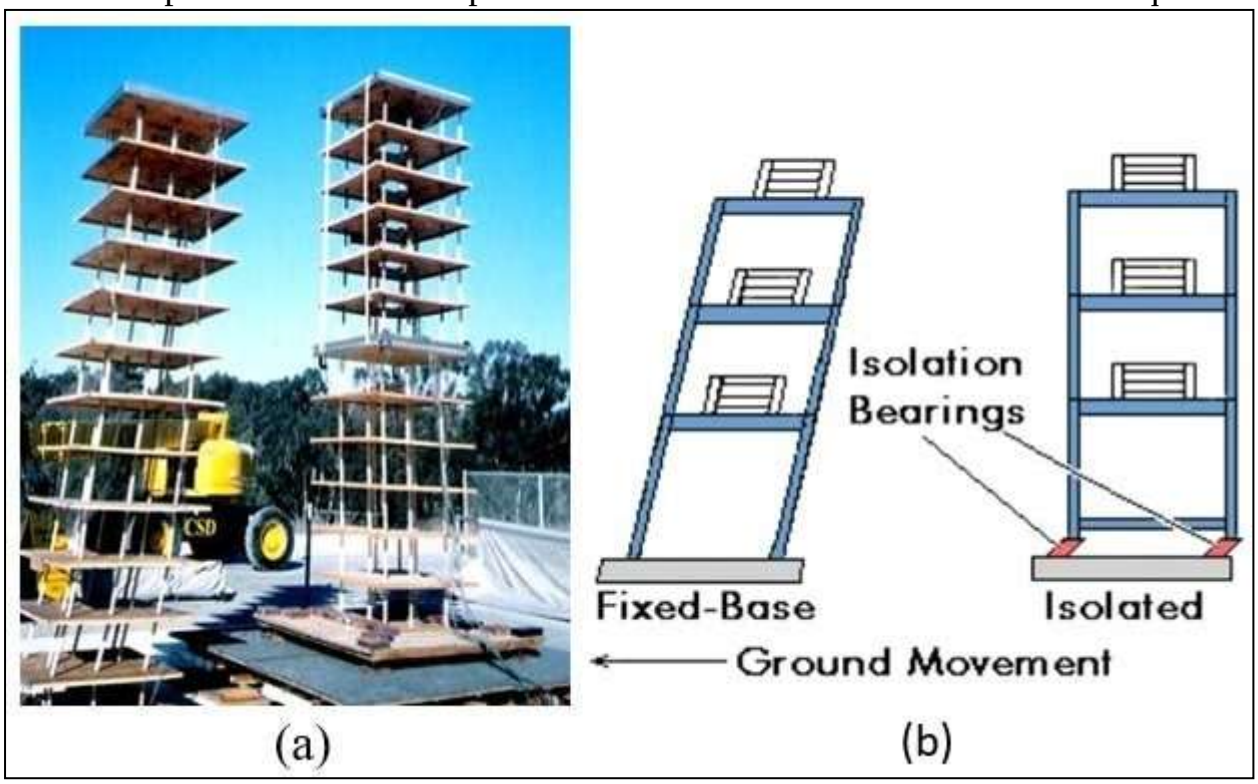


Fig51 : Base Isolated Structures (a) Model Under Test, (b) Diagrammatical Representation

Advantages of Base Isolation

- Isolates Building from ground motion – Lesser seismic loads, hence lesser damage to the structure, -Minimal repair of superstructure.
- Building can remain serviceable throughout construction.
- Does not involve major intrusion upon existing superstructure

Disadvantages of Base Isolation

- Expensive
- Cannot be applied partially to structures unlike other retrofitting
- Challenging to implement in an efficient manner

Mass Reduction Technique of Retrofitting:

This may be achieved, for instance, by removal of one or more storey's as shown in Figure. In this case it is evident that the removal of the mass will lead to a decrease in the period, which will lead to an increase in the required strength.

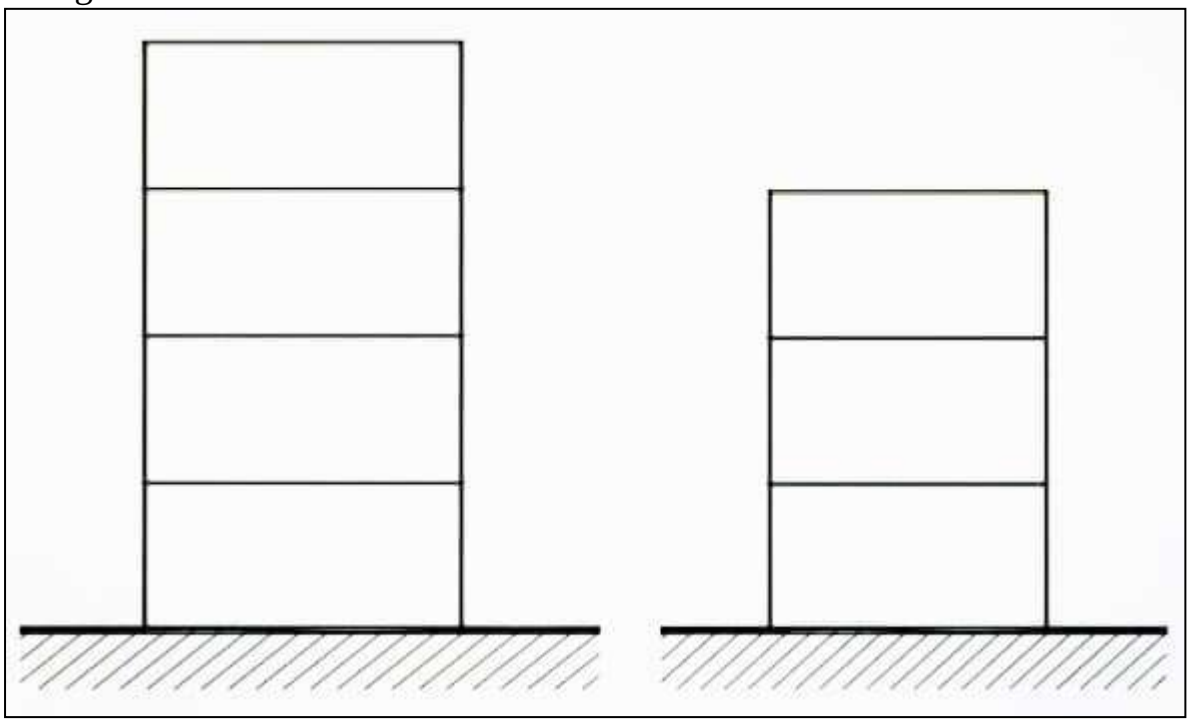


Fig 52 : Seismic Retrofitting by Mass reduction (removal of Storey)

Wall Thickening Technique of Retrofitting :

The existing walls of a building are added certain thickness by adding bricks, concrete and steel aligned at certain places as reinforcement, such that the weight of wall increases and it can bear more vertical and horizontal loads, and also its designed under special conditions that the transverse loads does not cause sudden failure of the wall.

3. Indian Standard Codes for Earthquake Design of Structures:

- IS: 1893-2002 (part-1) Criteria for Earthquake Resistant Design of Structures (Part 1 : General Provision and Buildings) - Code of Practice
- IS: 4326-1993 Earthquake Resistant Design and Construction of Buildings – Code of Practice
- IS: 13920-1993 Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces – Code of Practice

- IS: 13935-1993 Repair and Seismic Strengthening of Buildings – Guidelines
- IS: 13828-1993 Improving Earthquake Resistance of Low Strength Masonry Buildings – Guidelines
- IS: 13827-1993 Improving Earthquake Resistance of Earthen Buildings – Guidelines

4. Conclusion – Seismic Retrofitting Techniques for concrete structures:

- Seismic Retrofitting is a suitable technology for protection of a variety of structures.
- It has matured in the recent years to a highly reliable technology.
- But, the expertise needed is not available in the basic level.
- The main challenge is to achieve a desired performance level at a minimum cost, which can be achieved through a detailed nonlinear analysis.
- Optimization techniques are needed to know the most efficient retrofit for a particular structure.
- Proper Design Codes are needed to be published as code of practice for professionals related to this field.

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

India is witnessing construction of very interesting projects in all sectors of Infrastructure. High rise structures, under construction, include residential/commercial blocks up to a height of 320 m and RC chimneys for thermal power stations extending upwards up to 275m. Majority of the structures are in structural concrete. The functional demands of such high rise structures include the use of durable materials. High Strength Concrete, Self–compacting Concrete are gaining widespread acceptance. Apart from the basic structural materials, modern projects require a variety of secondary materials for a variety of purposes such as construction chemicals, waterproofing materials, durability aids etc. The paper highlights some of the recent developments.

Some modern material used in construction field are discuss below :-

Durable Concrete

Concrete Design and Construction Practices today are strength driven. Concrete grades up to M80 are now being used for highrise buildings in India. However, due to escalation in the repair and replacement costs, more attention is now being paid to durability issues. There are compelling reasons why the concrete construction practice during the next decades should be driven by durability in addition to strength.

A large number of flyovers and some elevated roads extending up to 20km in length are being realized in different parts of the country and involve huge outlay of public money. However, the concrete durability is suspect. Many of the structures built during the period from 1970 have suffered premature deterioration. Concrete bridge decks built during the period now require extensive repairs and renovations, costing more than the original cost of the project. Multi-storied buildings in urban areas require major repairs every 20 years, involving guniting, shotcreting etc.

A holistic view needs to be taken about concrete durability. In this context, there are a large number of materials in the market which facilitate durable construction. Apart from the materials, the construction processes have also undergone changes with a view to improving the durability of the finished structure

.

High Performance Concrete

In the United States, in response to widespread cracking of concrete bridge decks, the construction process moved towards the use of High Performance Concrete (HPC) mixes. Four types of HPC were developed[1]:

- Very High Early Strength Concrete – 17.5 mPa in 6 hours
- High Early Strength Concrete – 42.5 mPa in 24 hours
- A Very High Strength – 86 mPa in 28 days
- High Early Strength with Fiber Reinforcement
- High Performance Concrete was introduced in India initially for the reconstruction of the pre-stressed concrete dome of the Kaiga Atomic Power Project, followed for parts of the Reactors at Tarapur and Rajasthan. Subsequently, a number of bridges and flyovers have introduced HPC up to M75 grade in different parts of India.

Self–compacting Concrete (SCC)

SCC was developed by the Japanese initially as a Quality Assurance measure, but now is being widely used for concrete structures worldwide. In India, one of the earliest uses of SCC was for some components of structures at Kaiga Atomic Power Project. Many components of the structures were very heavily reinforced and the field engineers found it difficult to place and compact normal concrete without honeycombs and weaker concrete. SCC was successfully used.

SCC leaving the batching plant is in a semi-fluid state and is placed into the formwork without the use of vibrators. Due to its fluidity, SCC is able to find its way into the formwork and in between the reinforcement and gets self-compacted in the process. SCC is particularly useful for components of structures which are heavily reinforced. The fluidity is realized by modifying the normal mix components. In addition to cement, coarse and fine aggregates, water, special new generation polymer based admixtures are used to increase the fluidity of the concrete without increasing the water content.

Due to its high fluidity, the traditional method of measuring workability by slump does not work. The fluidity is such that any concrete fed to the slump cone falls flat on raising the slump cone; the diameter of the spread of concrete is measured as an indication of workability of SCC. This is called Slump Flow and is in the range of 600 – 800 mm.

Apart from the use of superior grade chemical admixtures, the physical composition of the concrete for SCC has undergone changes. The concrete is required to have more of fine aggregates and compulsorily any of the mineral admixtures – fly ash, ground granulated blast furnace slag (GGBFS), silica fume, metakaolin, rice husk ash etc. Fly ash is abundantly available as a waste product at all the thermal power stations and the Government has encouraged use of fly ash by offering them practically free at the thermal power stations. GGBFS is again a by-product of the steel mills. During the production of steel, a molten steel is poured from blast furnaces and travels in special channels, leaving the impurities on top of the stream. The waste material, being lighter moves on top and easily diverted away from the usable steel.

The diverted slag is quenched and forms small nodules. These nodules are crushed and granulated into very fine product, with particle size smaller than that of cement. The product is marketed in 50 kg bags and available economically in the regions around steel mills with blast furnaces. In other regions, additional transport cost of this bulk material is involved but its use is justified because of contribution to durability of concrete. For the concrete

components of the structure for Bandra and Worli sewage outfalls in Mumbai, the German prime contractor insisted on compulsory use of GGBFS for the M40 concrete in order to improve the durability of concrete. GGBFS had to be transported from Vizag in the eastern part of India, in spite of heavy transportation cost. Since then GGBFS is finding widespread use in different parts of India for ensuring durable concrete.

The Use of Mineral Admixtures

After realization of the need for durable concrete structures, the composition of concrete has undergone changes. From being a product made of three or four materials (cement, aggregates, water), today a typical durable concrete consists of six or more materials. The use of low water cement ratio enables a reduction in the volume and size of capillary voids in concrete; this alone is not sufficient to reduce the cement based content of concrete which is the source of micro-cracking from thermal shrinkage and drying shrinkage.

To reduce the cement based content, both the water content and cement content must be reduced as much as possible. Concrete mixes with fewer micro cracks can be produced by blending the cement with mineral admixtures either in the batching plant or in the cement plant. This enhances the service life of concrete structures in a cost-effective manner.

Fly Ash

Thermal power stations are left with an undesirable by-product, fly ash, in large quantities which is not able to effectively utilize or dispose of. Currently, (2009) more than 120 million tonne of fly ash are generated annually and the storage and disposal has been costing the power stations substantial unproductive expenditure. Unfortunately, all the fly ash available at the power stations is not fit for use as mineral admixture directly. Fly ash as a mineral admixture should conform to IS: 3812. Such a material is available in the finer streams of Electro Static Precipitators fitted to the power generation system.

The coarser materials are required to be processed (generally with the help of Cyclones) before being considered for use as mineral admixture for concrete. There are only a few processing units in India, including the one as Nashik Thermal Power Station. As per the Euro Code for Concrete, only processed fly ash can be permitted as mineral admixture in concrete. The code limits the use of fly ash. About 35% of cement may be replaced by fly ash; the actual percentage replacement depending on the outcome of trial mixes.

High Volume Fly Ash Concrete (HVFA)

The high volume fly ash concrete (HVFA) represents an emerging technology for highly durable and resource efficient concrete structures. Laboratory and field experience have shown that fly ash from modern coal-fired thermal power plants, when used in large volume (typically 50 - 60% by mass of the total cementitious materials content, is able to impart excellent workability in fresh concrete at a water content that is 15 – 20% less than without fly ash. To obtain adequate strength at early age, further reductions in the mixing water content can be achieved with better aggregate grading and use of super-plasticizers.

HVFA concrete has now been successfully used in a few sporadic projects in India. All SCC in India use HVFA, to the extent of 50% cement replacement. Some concrete roads being built by NHAI have also used HVFA concrete, including the Four-Laning of Satara – Kolhapur National Highway.

Ground Granulated Blast Furnace Slag (GGBFS)

The problems associated with the quality of fly ash do not exist in the case of Ground Granulated Blast Furnace Slag GGBFS, as the produce is necessarily the outcome of grinding to the required particle size. Thus the use of GGBFS as a mineral admixture should be preferred, despite long leads for end users in certain parts of India far from the steel plants. GGBFS sold in India is of uniform quality and particle size gradation. For many landmark structures such as the Burj Dubai (the tallest building in the world in 2009) GGBFS has been extensively used as a mineral admixture, even though the material is imported from other countries, resulting in the landed cost being more than that of cement. This was a conscious decision with a view to obtaining a more durable concrete structure.

In India the use of GGBFS has been fairly limited, in spite of all the technical advantages. The Indian Concrete Code permits up to 70% of cement replacement where GGBFS is used. Technically, the use of GGBFS is more effective only at replacement levels of 50% or more. For a number of structures in a port in Andhra Pradesh, typically the M40 concrete mix contained 100 kg of cement and 300 kg of GGBFS.

Portland Slag Cement (PSC) is also available and useful for ensuring durability of concrete structures. Due to the proximity to steel mills, PSC is generally produced in locations close to steel plants. Here again due to the bulky nature of the product, the transportation cost predominate. Another issue concerning quality of the PSC is the actual percentage replacement while making PSC; this information is not normally displayed on the bags, leaving the user at a

disadvantage. In developed countries, information regarding the percentage of slag utilized in making PSC is generally printed on each bag of cement.

Condensed Silica Fume (CSF)

CSF is a by-product of Ferro-Silicon industry and at present an imported product, easily available in the Indian market. The particle size is very small, about 100 times smaller than that of cement. It can occupy the voids in between cement particles in a concrete mix, reduce the water demand and thus contribute to a very dense concrete of high durability. Normally, 5 - 10% of cement can be replaced by CSF in order to produce durable concrete. The product is expensive and is used in developed countries only for very high strength concrete (above 75 mPa). Indiscriminate use of CSF for lower grades, barring exceptions, only increases the project cost without corresponding technical benefits. Even when used, the percentage replacement should be based on trial mixes in each case, which may vary from one to 10%. CSF may also be used for High Performance Concrete of lower grades.

Ternary Blends

Ternary blends of mineral admixtures are now recommended for improving the durability of important concrete structures. An outstanding example is the Reconstruction of the New I-35 W St. Anthony Falls Bridge crossing the Mississippi River in Minneapolis, US. The new bridge has been opened to traffic in September 2008, less than 14 months after the collapse. HPC has been used for reconstruction with a target 100 year life span. High Performance Concrete containing silica fume and fly ash was used for low permeability.

Two gleaming white concrete sculptures tower 9 m high at each end of the bridge. The sculptures were pre-cast using an SCC mix that included photo-catalytic cement with self cleaning and pollution reducing characteristics. The photo-catalytic cement is one of the new developments in the construction materials industry. The SCC concrete resulted in a marble-like, smooth white finish to the concrete surface. With a low water cementitious material ratio (w/cm), air entrainment and a rapid chloride permeability test (RCPT) value of less than 1500 coulombs at 28 days, the monument will also be a durable feature in the severe environment adjacent to the I-35 W Roadway.[2]

For the drilled shaft foundations of the I-35 Bridge, SCC was used. To control temperature during curing, fly ash and slag were incorporated as the majority of the cementitious material. This reduced the heat of hydration by approximately 50%. The concrete mixes for the footings and piers were proportioned for mass concrete and durability through the use of fly ash and slag. As the components

were massive in size, concrete mixes were modified by cementitious materials, chilled water and cooled aggregates, use of form insulation and internal cooling pipes

.

Cement Silos

The use of batching plants for producing concrete is gaining increasing acceptance. As large volumes of cement are used in a batching plant, the cement is generally stored in vertical steel silos. When cement is received in bulkers from the factory, the same is directly pneumatically pumped into the silos which have capacities ranging from 50 to 500 tonne depending upon the project requirements. If only bagged cement is available, they are emptied into the silos, usually with the help of screw conveyors. For modern applications, more than one silo will be required depending on the types of cement and mineral admixture used in the concrete mix.

In a recently commissioned batching plant complex in the Middle East, each of the two plants feature nine cement silos for Portland cement, slag cement, micro silica, fly ash and SRC cement.

Durability Enhancing Products

A full line of products are available to prevent or repair corrosion damage. A typical corrosion inhibiting admixture prevents deleterious expansion and cracking caused by the formation of rust during over-induced corrosion. There are also penetrating sealants to protect new and repaired concrete from the corrosive effects of chloride. The silane and siloxane based reacting sealers soak into the surface, creating a barrier against water or chlorides.

A number of concrete waterproofing admixtures eliminate the need for conventional external waterproofing membranes and saves time, money and hassle at the construction site. It transforms concrete into a water-resistant barrier by becoming an integral part of the concrete matrix.

Hydrophobic Concrete Waterproofing System

A typical patented product uses three materials to achieve a water-tight concrete structure, a super-plasticizer which reduces batching water requirements, thus limiting the volume of the capillary pour network in the concrete; a reactive hydrophobic pour blocking concrete admixture and product specific water stop protection at construction dams.

Other accessory products include an operation retardant, curing compound,

water stops and polypropylene fiber reinforcement. The patented product is typically added while concrete mix is being prepared to assist waterproofing. One product is applied at the rate of 5 liter per of concrete. Typically the manufacturer provides a warranty period of 10 years. The performance warranty provides for repairing water leakage through industry accepted and approved means for a period of 10 years. The product however has some negative impact on the rate of gain of strength of concrete. As a rough indication, the specified characteristic 28-day strength of concrete will not be achieved at 28 days but at 56 days or more.

The cementitious content of concrete using the integral waterproofing compound shall not be less than 325 k g / c u m with up to 50% fly ash or slag replacement. The water cement ratio shall be adjusted to compensate for the water in the waterproofing compound and super-plasticizer and maintain the required workability. The water cement ratio shall not exceed 0.42. The product is of American origin, represented by an Indian company which provides the necessary technical expertise.

Reinforcement

The revised BIS Code 1786 provides for four grades of reinforcement characterized by the yield strength – Fe 415, Fe 500, Fe 550 and Fe 600. Each of the first three grades is also available with superior ductile properties and a nomenclature is Fe 415D, Fe500D and Fe550D. Primarily the ductile grades specify a higher elongation value. Use of higher grades reduces the tonnage of steel in compression members e.g. columns substantially, results in decongested reinforcement and facilitates easy placement and vibration of concrete. Fe 415 and Fe 500 are easily available in the market. Fe 550 is now being offered by some prime producers–Tata Steel, Sail etc. After the revision of the Code, Fe 550 is also offered in selected diameters.

Fe 500 bars are now used for a number of highrise buildings, bridges and flyovers in India. Lapping of bars results in congestion of steel creates difficulties in proper placement and compaction of concrete and of course more expensive for large diameter bars. Couplers are now preferred instead of lapping. With widespread use, the cost of couplers has come down. The coupler design and manufacture permits the joints in the same plane without the need for staggering as in the case of lapping typical use of couplers for columns of a multi-storied building in Mumbai.

Ternary Blended Cements

Ternary blended cements containing the combination of fly ash–slag, fly ash–silica fume or slag–silica fume are commonly used for concrete in many parts of the world. The European Standard EN 197 for cement lists 27 different combinations for cement. Usually mineral admixture used may present a complimentary effect on cement hydration. Limestone filler addition produces favorable effects on cement test. In particular, the physical effects caused by limestone filler enhance the strength due to hydration acceleration of Portland clinker gains at very early age and the improvement of particle packing of the cementitious system. However, the rate of hydration is initially lower than that corresponding to Portland cement; shows a reduction of strength at early age and similar or greater strength at later ages. Ternary cements containing a limited proportion of limestone filler (no more than 12%) and 20 – 30% GGBFS provide a good resistance to chloride ingress and good performance in sulphate environment of low C_3A Portland cement.[4]

Photo-catalytic Cement

This is a patented Portland cement developed by Italcementi Group. The photo-catalytic components use the energy from ultra-violet rays to oxidize most organic and some inorganic compounds. Air pollutants that would normally result in discoloration of exposed surfaces are removed from the atmosphere by the components, and the residues are washed off by rain. This cement can be used to produce concrete and plaster products that save on maintenance cost while they ensure a cleaner environment.[3]

In addition to Portland cement binders, the product contains photo-catalytic titanium dioxide particles. The cement is already being used for sound barriers, concrete paver blocks and façade elements. Other applications include pre-cast and architectural planners, pavements, concrete masonry units, cement tiles etc.

Insulated Concrete Form (ICF)

ICF structural elements allow maximum clear spans. The ICF elements are used for large commercial buildings, residential buildings etc.

Exterior Self–leveling Concrete Topping

This is a Portland cement based product for fast track resurfacing and smoothing of concrete. It produces a smooth flat hard surface and dries quickly without shrinking, cracking or spalling. Pourable or pumpable when mixed with

water, it installs 6 to 20 mm thick in one application and up to 50 mm thick with the addition of aggregate. It is pourable or pumpable when mixed with water. It can be used on, above or below grade and it makes spalled or damaged concrete look like new. Once sealed it creates an excellent wearing surface.

Carbon Dioxide (CO_2)

As part of a future global atmospheric stabilization strategy, industrialized countries may lead to use large amounts of carbon dioxide. CO_2 may be used for curing pre-cast concrete units. Manufacturers of concrete masonry units could use CO_2 to reduce energy consumption. Steam curing which is conventionally used is energy intensive. Although CO_2 curing provides slower strength development than steam curing, the performance can be improved if the blocks are properly pre-conditioned before CO_2 curing. It has also been noted that the water absorption of CO_2cured blocks is lower than that of steam cured blocks.

Corrosion Inhibiters for Reinforced Concrete

Calcium nitrate has been proven to inhibit reinforcement corrosion. About 3–4% calcium nitrate of cement by weight is sufficient to protect the reinforcement steel against corrosion. Typically a corrosion inhibiter should

a. raise the level of chlorides necessary to initiate corrosion or
b. decrease the rate of corrosion after it has started or
c. both. Since it does not necessarily prevent corrosion from happening altogether, it is more appropriate to call the product as corrosion retarders.

Coarse Aggregates for Concrete

The BIS Code (IS:383) permits the use of three types of coarse aggregates– natural gravel (shingle), crushed stone or a blend of both. Many outstanding structures built in India in the past had used river gravel as coarse aggregate for concrete including dams (Bhakra), prestressed concrete aqueducts and siphons (Kunu Siphon), large number of prestressed concrete bridges, power stations (Trombay 500 MW Unit V) etc. The results are excellent. Use of rounded aggregates, by virtue of their geometry, reduces the cement and water content requirements of concrete, thus contributing to the economy. Almost 50% of all the concrete produced in the developed world utilizes natural gravel and broken stone is used only when gravel is not available within economic leads.

Recycled Aggregates

With continuous development activity worldwide, the availability of coarse aggregates from natural sources or crushed rock are dwindling; at the same time, due to demolition of old structures, roads etc., a large amount of debris is generated annually and their disposal poses problems for the individuals and the Governments. In many countries including the UK, any demolition agency is not permitted to dispose of the debris except at predetermined locations which may involve very long leads, expensive operations.

Extensive research has now established that the debris can be crushed, processed and recycled as coarse aggregate for fresh concrete. Such recycling solves the above mentioned problems of disposal, and also more economical. Many national codes in the developed world permit the use of recycled aggregates in concrete, subject to safeguards.

Lightweight Aggregates

These are manufactured products and are extensively used in all types of structures involving longer spans where the dead-load forms a major component of the loads involved in the design. Such lightweight aggregates are manufactured products using expanded clay, sintered fly ash etc. Their contribution to strength depends on the type and quality of the lightweight aggregate, the size fraction used and the amount of aggregate used as well as the type and quality of binder in concrete. However, the addition of lightweight aggregate in concrete reduces the modulus of elasticity.

High Performance Lightweight Concrete

By using high strength/high performance lightweight concrete in prestressed concrete bridge girders, spans of bridge girders can be extended by up to 20%. The implications of using lightweight aggregate on prestressing losses long-term creep and shrinkage deformation should be considered. Compressive strength of up to 75 mPa has been obtained. They also result in reduction in creep and shrinkage and consequently lower prestressed losses. The overall costs for a given load capacity are reduced. The reduction in the structure dead-load leads to a reduction in the foundation size.

Self–curing, Shrinkage-free concrete

Italian researchers have produced a concrete by the combined use of

a. a water reducing admixture based on polycarboxylate in order to reduce both the mixing water and cement.
b. a shrinkage reducing admixture
c. an expansive agent based on a special calcium oxide.

The combined use of an expansive agent and a PC based water reducing super-plasticizer results in a shrinkage-free concrete even in the absence of any wet curing. Due to the water reduction caused by the PC based super-plasticizer at a given w/c, there is a reduction in the volume of cement paste and a corresponding increase in the amount of aggregates. Both are responsible for significant reduction in the drying shrinkage.

Advanced Composite Reinforcement

In highly corrosive environments, the use of advanced composite fiber reinforced polymers (FRP) is attractive as a replacement for conventional steel reinforcements. While the FRP materials can be resistant to corrosion, there is lack of ductility. At the moment FRP reinforcement in India is quite expensive. The main market for FRP in India is for structural retrofit for increasing the load capacity, to remedy construction defects or repair damages.

Application of Nano Technology

Reducing particle size of a material to nano–scale often imparts new properties or enhances existing ones. This is typical of nano particles of titanium dioxide, which maintains its photocatalytic activity even when mixed with cement. External cement based surfaces become strongly photocatalytic, leading to a much better appearance and a significant reduction in concentration of pollutants in the surrounding air.

The photoactive titanium dioxide was found to be a more powerful photocatalytic agent when its particle size decreased to non size. This makes it a ideal vehicle for application in construction. A cement binder containing about 5% of active titanium dioxide produces concrete with a smooth surface and also converts the pollutants, removes them from the surrounding air. In a typical application on a building in France completed in 2000, the quality of concrete surface have remained unchanged till date. The structure looked as if it were Freshly built.

Cleaner Surfaces and Less Pollution

Mixing active titanium dioxide with cement produces a binder that maintains its entire normal performance characteristic when used to make concrete. The photocatalytic action makes the surfaces not only to a significant self–cleaning; it also improves the quality of surrounding environment. Using titanium dioxide in glass fiber reinforced concrete offers more efficient and economical way to achieve the benefits of photocatalytics. The environmentally active e-GRC offers the most economical way to achieve cleaner, brighter facades.

Applications for the e-GRC include

- Cladding panels and facades elements
- Permanent formwork and form liners
- Roofing tiles
- Motorway and Railway sound barriers

Advance construction techniques :-

There are many observers and academics who regard the construction industry as being slow to innovate and inefficient at applying new innovations to the industry. When you think about it, the core principles of construction today, as well as many of the techniques, technology, and much of the knowledge have been used since Roman times. However, behind the scenes, there is now a great deal of technology and innovation in the industry.

When we talk about advanced construction technologies, we are referring to a wide range of modern techniques and practices. These techniques and practices represent the latest innovations in fields as diverse as materials physics, design and planning procedures, and facility management. The use of technology in civil engineering, which encompasses the planning, design, and construction of urban environments and infrastructure projects, has been a game changer in many respects.

The technologies on this list are among the most important advanced construction technologies that are making their way into the field of civil engineering.

3D Printing

Sometimes known as ‘additive manufacturing’, 3D printing uses a printer to build objects layer by layer. 3D printers are being designed to work with increasingly complex materials; the latest models are capable of combining different materials together in a single object. This development has opened up

entirely new possibilities for the construction industry. 3D printing can be used to construct either a small component or even an entire building.

Material Physics

Metamaterials are materials which have been custom designed in order to have specific properties as a result of their molecular make up. The versatility of materials that civil engineers have at their disposal is allowing them to design and execute more innovative and adventurous projects than ever before. The most well known of these new materials is graphene, a material which can be made to have a number of different properties under different conditions. This gives it an almost limitless range of uses in the field of construction.

Modular Construction

Modular buildings, sometimes known as 'prefabricated buildings' are buildings which are constructed from different components, each of which is produced on an assembly line to ensure that they are all produced exactly the same. This makes this type of building much easier and cheaper to construct.

Smart Technologies

Smart technologies are making their way into every sector of life. Many people now have voice assistants in their homes which can be used to control lights, order items online, and even read the news and play music. Smart technologies also allow civil engineers to plan and design in considerably more detail than before.

14.1.4 Engineering Aspects Of Soil mechanics - Environmental Impact Assessment

Scope of geoenvironmental engineering :-

Any project that deals with the interrelationship among environment, ground surface and subsurface (soil, rock and groundwater) falls under the purview of geoenvironmental engineering (Fang and Daniels 2006). The scope is vast and requires the knowledge of different branches of engineering and science put together to solve the multi-disciplinary problems. A geoenvironmental engineer should work in an open domain of knowledge and should be willing to use any concepts of engineering and science to effectively solve the problem at hand. The most challenging aspect is to identify the unconventional nature of the problem, which may have its bearing on multiple factors. For example, an underground pipe leakage may not be due to the faulty construction of the pipe but caused due to the highly corrosive soil surrounding it. The reason for high corrosiveness may be attributed to single or multiple manmade factors, which

need to be clearly identified for the holistic solution of the problem. The conventional approach of assessing the material strength of the pipe alone will not solve the problem at hand.

A lot of emphasis has been laid for achieving a "green environment". Despite a lot of effort, it is very difficult to cut off the harmful effects of pollutants disposed off into the geoenvironment. The damage has already been done to the subsurface and ground water resources, which is precious. An effective waste containment system is one of the solutions to this problem. However, such a project has different socio-economic and technical perspectives. The realization of such projects require the contribution of environmentalist, remote sensing experts, decision makers, common public during its planning stage, hydrologists, geotechnical engineers for its execution stage and several experts for management and monitoring of the project. The totality of the problem can be of visualized under the umbrella of geoenvironmental engineering. Therefore, the real challenge for a geoenvironmental engineer is how well he can integrate the multi-disciplinary knowledge for achieving an efficient waste containment. As mentioned earlier, in most parts of the world, damage has already been done to the geoenvironment and groundwater reserves due to indiscriminate disposal of industrial and other hazardous wastes. Owing to the excessive demand, it becomes important to remediate and revive the already polluted geoenvironment and groundwater. A geoenvironmental engineer has a great role to play for deciding the scheme of such remediation practice. A lot of concepts from soil physics, soil chemistry, soil biology, multi-phase flow, material science and mathematical modelling, need to be taken for planning and execution of an efficient remediation strategy. Therefore, it is essential for the geoenvironmental engineer to think out of the box, to an extent that the knowledge can help him visualize the problem better and suggest efficient solution. Else, the solution to such problems becomes a trial and error process or rather, learn from mistakes and rectify. Since such projects are cost intensive one cannot afford to take too much of chances. Another important issue is the reuse and recycling of waste materials, which reduces the burden on our environment manifold. A very good example is exploring the possibility of mass utilization of fly ash for geotechnical applications. However, while using waste materials for meaningful applications there are issues such as short term and long term impact, which is a governing factor for deciding its selection as a viable material. Although, short term behavior can be assessed using planned laboratory evaluations it often becomes difficult and complex for understanding the long term behavior. The scope of geoenvironmental engineering is to simplify the process of understanding the behavior and resort to reliable predictions and estimations. This would require a thorough knowledge on material science and chemistry and the reaction it undergoes with time. This is indeed a tough task, but needless to say, such challenges make this subject quite

interesting.of The frequent occurrence of landslides especially during rainy season has drawn the attention of researchers and practicing engineers. The conventional slope stability analysis is partially helpful in understanding the problem. A wider perspective of the problem would be to include factors such as infiltration and seepage of rain water through the slope. Such factors are going to add on to the instability of slope. The scope and challenge for the geoenvironmental engineer is to couple the geotechnical, geological and hydrologic concepts to explain rainfall induced slope failure. Construction of flood protection works such as embankments and levees also comes under the purview of geoenvironmental engineering. Unless a thorough hydraulic study is conducted, any geotechnical measures for flood protection would prove to be futile. This is specifically true for large rivers and for meandering sections. Geoenvironmental engineering is more research oriented and new concepts and methodologies are still being developed. Therefore, this particular course intends to introduce different avenues and overall scope of geoenvironmental engineering to the reader. The course would highlight the uncertainties and complexities involved and the wide research potential of the subject. Special emphasis has been laid on the basics of soil-water interaction, soil-water-contaminant interaction, which are essential for understanding the impact of geoenvironmental contamination, its minimization and remediation.

Multiphase behavior of soil

Conventional or classical soil mechanics assumes soil media to be completely water or air saturated. This is a typical example of a two phase media consisting of soil solids and water/air. The assumption of two phases considerably simplifies the mathematical quantification of the complex phenomena that take place in porous media. Off late, geotechnical and geoenvironmental engineering problems require the concept of three or multiphase behaviour of soil for realistic solution of several field situations. For example, a partially saturated soil is a three phase porous media consisting of air, water and soil. The three phases result in transient and complex behaviour of of 14 unsaturated soil. Such cases are encountered while designing waste containment facility where flow characteristics of unsaturated soil need to be determined. When it comes to soil-water-contaminant interaction there are multi- phase interactions involved. The migration of non-aqueous phase liquid (denoted as NAPL) through porous media is a typical example. Fluidized bed, debris flow, slurry flow, gas permeation through unsaturated soil media are some problems where multiphase behaviour becomes important. Such studies are handy while designing remediation scheme for contaminated soil and groundwater, which are very important issues for the geoenvironmental engineer to solve. Understanding the complex interaction of different phases is challenging and has paved way for the study of multiphase behaviour of porous media. Such a

realization has generated a lot of interest in the research fraternity for developing experimental and mathematical procedures for clearly delineating the phenomena in multiphase porous media.

Role of soil in geoenvironmental applications

All civil engineering structures are ultimately founded on soil and hence its stability depends on the geotechnical properties of soil. Conventional geotechnology is more concerned about rendering soil as an efficient load bearing stratum and designing foundations that can transfer load efficiently to subsurface. Apart from this, soil is directly related to a number of environmental problems, where the approach should be a bit different. Consider the case of groundwater recharge The infiltration and permeation property of homogenous or layered soil mass above water table decides the rate of recharge. In this case, a geotechnical engineer has to work closely with hydrogeologists for deciding different schemes of artificial groundwater recharge Artificial groundwater recharge Consider the case of waste dumped on ground surface. During precipitation, water interacts with these wastes and flow out as leachate. When the leachate flows down, soil act as buffer in retaining or delaying several harmful contaminants from reaching groundwater. Such a buffering action obviously depends on the texture and constituents of soil mass. While designing a waste containment facility, the role of soil in such projects is enormous. A coarse grained soil with filter property is required for leachate collection where as a fine grained soil is required for minimizing flow of leachate. These are two entirely different functions expected from soil in the same project. The cap provided for waste dumps also necessitate the use of specific type of soils with the required properties. The amount of water that infiltrates into the waste below is minimized by soil used in such caps. Special type of high swelling soils is used as backfills for storing high level radioactive waste in deep geological repositories. Another important geoenvironmental problem, namely, carbon sequestration uses the geological storage capacity for disposal of anthropogenic CO2 to mitigate the global warming. Therefore, soil plays a very vital role in geoenvironmental projects and the property by which it becomes important is problem-specific. Precipitation Artificial recharge Aquifer Groundwater Bed rock

Importance of soil physics, soil chemistry, hydrogeology and biological process

Soil physics is the study of the physical properties and physical processes occurring in soil and its relation to agriculture, engineering and environment. It deals with physical, physico-chemical and physico-biological relationship among solid, liquid and gaseous phase of soil as they are affected by temperature, pressure and other forms of energy. Hence, the knowledge of soil

physics becomes important for solving geoenvironmental problems. The concepts of soil physics is used for determining the transport of water, solute and heat (matter and energy) through porous media, which is important to solve the problems related to subsurface hydrology, groundwater pollution, water retention characteristics of soil, improving crop production, rainfall induced landslides etc. Soil physics is mostly quantitative and mathematical in nature and requires the knowledge of soil physical properties. The important soil physical properties include soil texture which deals with the particle gradation; soil water which include mechanisms such as retention, infiltration, run off, permeation, evaporation, transpiration, irrigation scheduling etc; soil aeration to take into account exchange of gases such as oxygen and carbondioxide by plant roots and microorganisms present in the soil. While defining these physical properties of soil, it is very important to consider representative elementary volume (REV) which is required to describe or lump the physical properties at a geometrical point (Scott 2000). REV therefore describes mean property of the volume under consideration. Soil chemistry is the study of chemical characteristics of the soil and is one of the important information required for many of the geoenvironmental problems. The emergence of discipline "soil chemistry" began when J. T. Way (father of soil chemistry) realized that soil could retain cations such as NH4+, K+ in exchange for equivalent amounts of Ca+2 (Thomas 1977). This means that soils act as ion exchangers. This aspect is vital for using soil in waste management application. The contaminants leaching out of the waste dumps find its way to of groundwater flowing past the soil porous media. The concentration of contaminant at a distance away from the source for a given time is fully governed by the chemical interaction of contaminant and the soil. There are several simple and complex chemical reactions that may take place in soil-water system depending upon the prevailing favourable condition. An example is the phenomenon of solubility and precipitation as governed by the pH of the soil- water-contaminant system. The knowledge of soil chemistry is important to understand interactions between soil solids, precipitates and pore water, including ion exchange, adsorption, weathering, buffering, soil colloidal behaviour, acidic and basic soils, salinity etc. There is an interesting story which resulted in the effects of soil acidity and alkalinity. The investigation on poor crop productivity in eastern United States in early 1800's lead to the understanding of high soil acidity, which was regulated by the addition of lime. This resulted in high yield of crops. Similarly the deleterious condition of soil due to high alkalinity was realized and investigated in detail. After 1920's the understanding on structural soil chemistry and soil organic chemistry improved a lot. The acidity and complexation potential of organic matter was appraised. A lot of chemists researched on the structure and reactivity of water on soil mineral surface. These and many other findings lead to the development of soil chemistry and

today it is one of the important branches of science required to explain several phenomena in geoenvironmental engineering. Understanding subsurface for geoenvironmental problems requires extensive knowledge of hydrogeology. Hydrogeologic parameters influence a lot on how a waste containment facility performs over its design life. Therefore, while deciding the location for such facility it is important that the subsurface hydrogeology condition is fully explored and studied. Different in-situ methodologies are used for remediation of a contaminated site. For effective functioning of such methods one has to study the hydrogeological aspects of the site. Hydrogeologists play a vital role in locating groundwater aquifer, its management and optimal extraction. Efficient watershed management by artificial recharge is possible only if the hydrogeology of a particular area is known. The knowledge of hydrogeology is also required for understanding the direction of groundwater flow. This is often required for assessing the extent of contamination occurring due to a particular source of pollution and for risk assessment. Off late a lot of emphasis is laid on biological processes occurring in soils. Initially, agriculturists were more bothered about this subject. But the subject has caught the attention of many researchers due to its potential in solving different geoenvironmental problems. For example, some type of microorganisms such as Pseudomonas aeruginosa is used for remediation of hydrocarbon contaminated site. It is very essential to understand the rate of such reaction and the impact of such remediation. A lot of researchers worldwide are working on this interesting problem. Biological process in soils is dependent on temperature and climatic condition of a place, which need to be studied in detail. The soil biological process is found to influence the exchange of greenhouse gases between soil and atmosphere and many other soil physical parameters such as water retention characteristics.

14.1.5 Water Supply-Sewerage system-Waste Water- Sustainable development techniques

Norms for Water Supply:

For providing the water supply the CPHEEO Norms are considered which are as under:

(a) 150 LPCD for Metropolitan and Mega cities provided with piped water supply where sewerage system is existing/contemplated

(b) 135 LPCD for Cities provided with piped water supply where sewerage system is existing/contemplated

(c) 70 LPCD for Towns provided with piped water supply but without sewerage system

Note:
(i)In urban areas where water is provided through public standposts, 40 lpcd should be considered
(ii) Figures exclude "Unaccounted for Water" (UFW) which should be limited to 15%
(iii) Figures include requirement of water for commercial, institutional and minor industries. However the bulk supply to such establishments should be assessed separately with proper justification.
(iv) In urban villages rate of water supply should be similar to the town with which it is surrounded.
(v) Fire-fighting requirement should be added to this as per norms in the CPHEEO Water Supply Manual.

SEWERAGE SYSTEM

The underground conduit for the collection of sewage is called sewer. A network of sewers and appurtenances for the collection and conveyance of sewage generated from each of the properties to sewage pumping station for pumping to sewage treatment and disposal is called **Sewage System**. There are two types of sewerage system.

1. Separate sewerage system

2. Combined sewerage system.

Separate sewerage system

In separate system of sewerage there are two collection systems or pipe network;

1. one for collecting domestic sewage as sanitary sewerage system and
2. another for collecting storm water as storm water drainage system.

The sanitary sewerage systems for domestic sewage are designed for peak sewage flow expected at ultimate stage at the end design period. The storm water drainage systems are designed to carry the maximum storm runoff expected during the critical duration of rainfall.

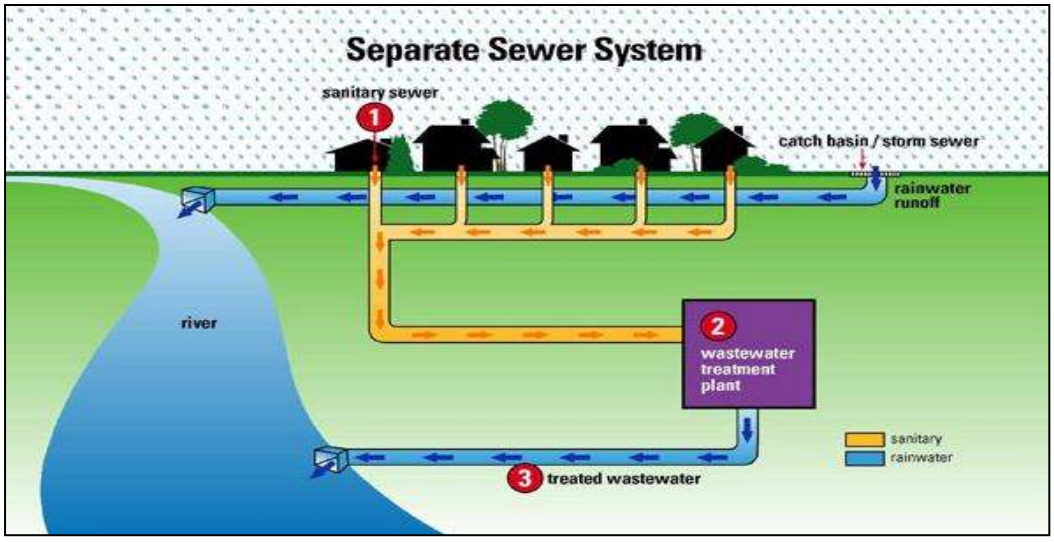


FIG. 53 :- Separate Sewage Treatment System

Advantages of separate sewerage system are:

- The capacity of the water treatment plant will be smaller since only domestic sewage alone is to be treated.
- Operational problems are less.

Disadvantage of separate sewerage system are:

- Storm water may always find its way into the domestic sewerage system either through wrong house sewer connections or through manholes and overload the sewage treatment plant.

Combined sewerage system

In Combined system of sewerage both sewage discharge and the storm runoff are collected and conveyed through a common collection system. The ratio of the maximum storm runoff to sewage flow works out to be 20 to 30. Hence during non-monsoon period only 1/20th or 1/30th of the design flow, i.e, only the sewage flow is passing through the combined system with very small velocity, resulting in clogging of the systems. Combined sewers are of special types such as egg shaped etc. Combined sewers are , therefore not recommended for Indian conditions since the rainfall occurs for a period of 3

months or less and there are poor water supplies. In India, only separate sewerage system are adopted.

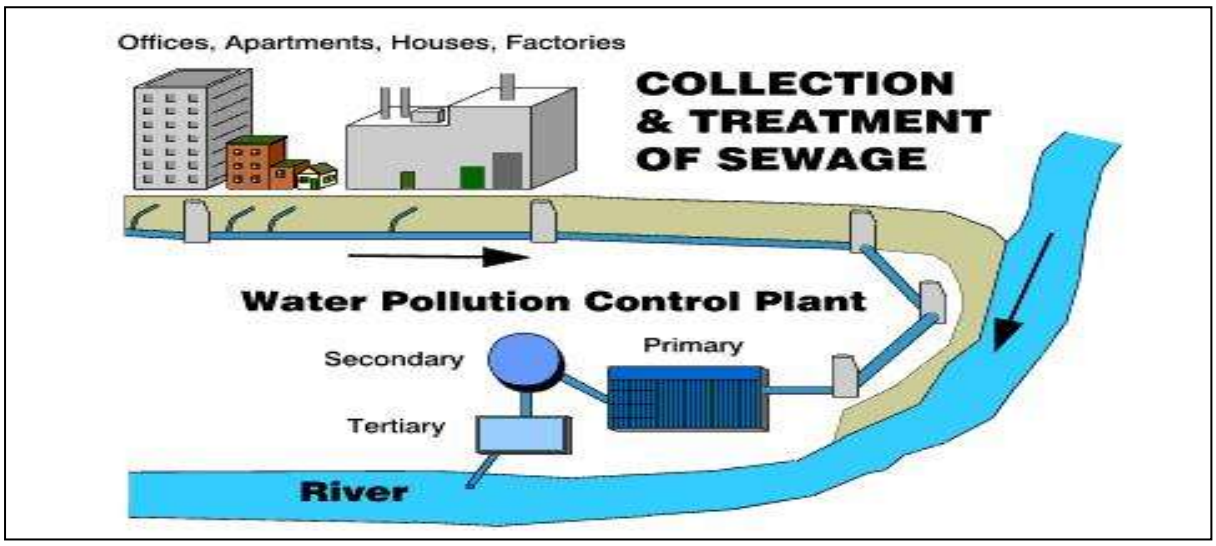


FIG. 54 :- Combined Sewage System

Advantage of Combined sewerage system are:

- Only one system is provided and therefore there will not be any confusion in giving connection, and
- Less expensive to install the system.

Disadvantage of Combined sewerage system are:

- During non-rainy days the flow will be very meager causing, salivation requiring frequent cleaning.

waste water:-

Wastewater is any water that has been contaminated by human use. Wastewater is "used water from any combination of domestic, industrial, commercial or agricultural activities, surface runoff or stormwater, and any sewer inflow or sewer infiltration".[1] Therefore, wastewater is a byproduct of domestic, industrial, commercial or agricultural activities. The characteristics of wastewater vary depending on the source. Types of wastewater include: domestic wastewater from households, municipal wastewater from communities

(also called sewage) and industrial wastewater. Wastewater can contain physical, chemical and biological pollutants.

Households may produce wastewater from flush toilets, sinks, dishwashers, washing machines, bath tubs, and showers. Households that use dry toilets produce less wastewater than those that use flush toilets.

Wastewater may be conveyed in a sanitary sewer that conveys only sewage. Alternatively, wastewater can be transported in a combined sewer that conveys both stormwater runoff and sewage, and possibly also industrial wastewater. After treatment at a wastewater treatment plant, treated wastewater (also called effluent) is discharged to a receiving water body. The terms "wastewater reuse" and "water reclamation" apply if the treated waste is used for another purpose. Wastewater that is discharged to the environment without suitable treatment can cause water pollution.

In developing countries and in rural areas with low population densities, wastewater is often treated by various on-site sanitation systems and not conveyed in sewers. These systems include septic tanks connected to drain fields, on-site sewage systems (OSS), vermifilter systems and many more.

Collection waste water and treatment

Collection

Wastewater from factories, power plants and other industrial activities is extensively regulated in developed nations, and treatment is required before discharge to surface waters. (*See* Industrial wastewater treatment.)

In many cities, municipal wastewater is carried together with stormwater, in a combined sewer system, to a sewage treatment plant. In some urban areas, municipal wastewater is carried separately in sanitary sewers and runoff from streets is carried in storm drains. Access to these systems, for maintenance purposes, is typically through a manhole.

During high precipitation periods a combined sewer system may experience a combined sewer overflow event, which forces untreated sewage to flow directly to receiving waters. This can pose a serious threat to public health and the surrounding environment.

In less-developed or rural regions, sewage may drain directly into major watersheds with minimal or no treatment. This usually has serious impacts on the quality of an environment and on human health. Pathogens can cause a variety of illnesses. Some chemicals pose risks even at very low

concentrations and can remain a threat for long periods of time because of bioaccumulation in animal or human tissue.

Treatment and disposal

At the global level, an estimated 52% of wastewater is treated. However, substantial differences in wastewater collection and treatment rates vary by level of economic development, with high-income, upper-middle, lower-middle and low income countries treating approximately 74%, 43%, 26% and 4.2% of their wastewater, respectively. Wastewater that is discharged into the environment without undergoing treatment threatens widespread water pollution.

There are numerous processes that can be used to clean up wastewaters depending on the type and extent of contamination. Wastewater can be treated in wastewater treatment plants which include physical, chemical and biological treatment processes. Municipal wastewater is treated in sewage treatment plants (which may also be referred to as wastewater treatment plants). Agricultural wastewater may be treated in agricultural wastewater treatment processes, whereas industrial wastewater is treated in industrial wastewater treatment processes.

Case study of sustainable sanitation projects Wastewater Treatment and Reuse in Indradhanushya Center, Pune, Maharashtra, India

Type of project:

Full-scale treatment system installed to treat wastewater flowing through an open stream alongside the Indradhanushya Environment Education and Citizenship Centre. This is one case study out of six within the NaWaTech project framework (‘Natural water systems and treatment technologies to cope with water shortages in urbanized areas in India’).

Project period:

- ❖ Start of construction: July 2015
- ❖ End of construction: December 2015 (proposed date)
- ❖ Start of operation: January 2016 (proposed date)
- ❖ Ongoing monitoring period planned for: after start of operation
- ❖ Project end: June 2016

Objectives of the project:

1. To demonstrate the technical, financial and environmental potential (and applicability) of natural water treatment technologies

2. To create "water-culture" by disseminating information about conservation, protection of sources, water quality, wastewater disposal and recycling. This aspect is enhanced by the fact, that the implementation site (garden of the Rainbow Museum) is already dedicated to ecological education. This emphasizes the educational function of the project and therefore high attention was paid to an aesthetically pleasing design which visitors can experience

3. To ensure the interest and potential benefits to society at large by reducing the pollution in streams and rivers

4. To create an enabling institutional environment in order to allow the take-up in practice and mainstreaming of the results (e.g. align NaWaTech initiatives with existing urban water plans, strategies and policies)

5. To establish foundations of a long-term cooperation between EU and India in water technologies as part of the Strategic Forum for International Science and Technology Cooperation (SFIC) and establish bridgeheads among research institutions and ensure the take up of the NaWaTech approach in educational curricula

Location and conditions :

The project is implemented in the garden of the Indradhanushya Centre located in Pune. The Indradhanushya Environment Education and Citizenship Centre is a public facility of the Pune Municipal Corporation (PMC) to create awareness among the population about environment and sustainable development. The main objective of the Indradhanushya center is to spread the message of environment conservation in society and develop skills and an appropriate mind-set among the citizens,

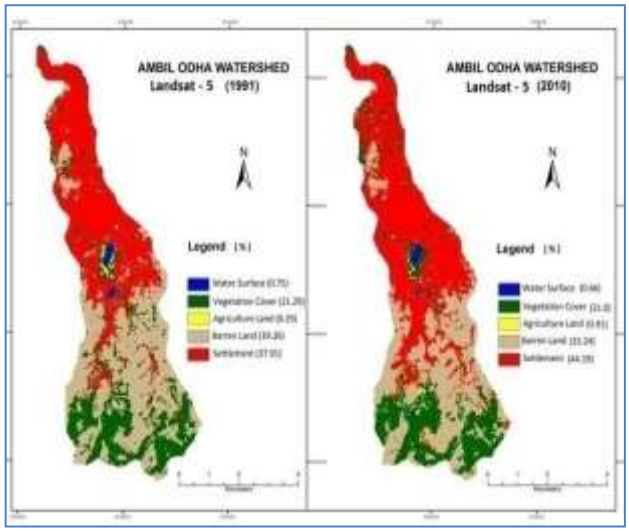
The Ambil stream (rivulet) drains a catchment of 30.02 km^2. It is located to the south of Pune city between 18°23'40'' N to 18°30'33'' N latitudes and 73°50'20'' E to 73°53'30'' E longitudes.

The rivulet originates at an elevation of 1100 m above MSL near the off-shoot Western Ghats and flows towards a North North-West direction to join the Mutha River.The physiography in the upper catchment area is hilly and of undulating nature. A dendritic type of drainage pattern is observed as the rivulet flows through the basalt. The water from the upper catchment areas gets accumulated in a reservoir known as the Katraj Lake, from where the Ambil stream flows. The entire length of the Ambil stream from the outfall of the Katraj Lake to its confluence point is ca. 9.55 km.

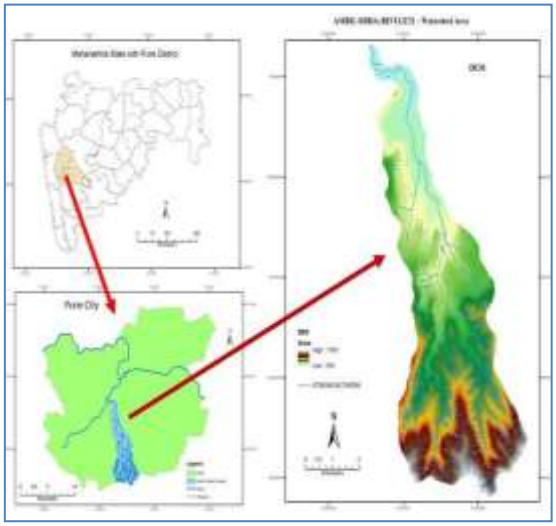
The climate of Pune city features three distinct seasons: summer, rains and

winter, as elsewhere in India. The non-monsoon flow of the Ambil Stream is approx. 70 MLD. For the co-filtration bank system 50 KLD of wastewater will be taken for treatment and recycled for gardening and flushing purposes.

The population of Pune city is about 3,115,431 (2011 census). Pune city has a population density of 12,000 per km^2 according to the 2015 data of the PMC. The population density of the Ambil stream catchment area is about 3700 per km^2.



Catchment area of the Ambil Stream



Change in land use pattern in Ambil stream catchment area

strata of the selected treatment site

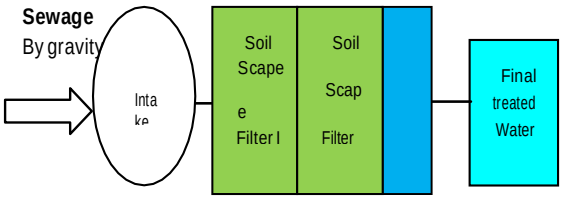
Ambil stream encircling the Indradhanushya Centre, Pune

Design information :

The proposed EFB system design consists of intake well, two linearly placed SSF (= main treatment) tanks and one treated water pool, integrated into the existing garden facilities. The system will treat 50 m^3/day which will yield 40 m^3/day treated water for irrigation and toilet flushing. Strong efforts were made to integrate the system aesthetically into the overall landscape design, particularly important as this site is a museum open to the general public.

The required quantity of contaminated water from the Ambil stream is diverted into the intake well by gravity. Water from the intake well is pumped out and distributed onto the SSF beds uniformly. The wastewater passes through the layers of the filter beds and, finally, the filtered water is collected in the treated water pond (by gravity). Prior to the intake well, a screen is installed to trap non-biodegradable floating solid waste flowing through the Ambil stream. The trapped solid waste will be collected daily and transported for dumping site.

Landscape design of the Indradhanushya project



flow chart of the treatment system

The technical details are as follows:

- Flow of Ambil Stream: 70 MLD (non-monsoon flow)
- Proposed quantity of wastewater to be treated: 50 m^3/day
- Area requirement for SSF bed: 1 m^2 area for 1 m^3 sewage/day
- Details of SSF tanks: Two linearly placed tanks, 25 m^2 surface area for each tank with effective depth of each tank being 1.2 m (10 m Length x 2.5 m Width and 1.2 m Depth of each SSF bed)
- Type of treatment system: Primary and secondary treatment system
- BOD Load: 16- 30 mg/l per m^2 area
- HRT: Nil but filtration time ranges from 10 - 30 min
- Operation time of the system: 8 hours per day
- Quantity of treated water: 40 m^3/day
- Quality of treated water: Complying with State and Central Regulatory Discharge Norms (reuse in land application and remaining for flushing purposes).

In general, the SSF tanks are made up of brick masonry with plastering and water proofing. However, as the site selected at the Indradhanushya premises is a land fill site, construction of all the required tanks used roller-compacted concrete (RCC) for structural stability.

the range of 75-90% COD & BOD, 75-85% TSS, 99.9% faecal coliforms, while the DO level increases 8-10 times depending on the exact inlet characteristics of wastewater.

For the Indradhanushya site, a periodical analysis on inlet and outlet characteristics is planned to evaluate the performance of the system and the quality of the outlet water according to the following research and monitoring plan (to be executed until June 2016). The Indradhanushya project site is yet to be completed. But SERI has installed many similar types of treatment plants all around India. Hence, some valuable experiences are described accordingly.

This system can be used for any type of terrain or in geographical conditions, in rural and urban regions. The soil strata of the selected location can provide input on which construction material the tanks should be made of (stone or brick or RCC construction). The selection of the exact treatment location is very important, because it is directly related to the structural stability of the treatment units. Land filled sites increase the construction costs. If possible, gravity benefits should be exploited, as hereby the use of pumps can be avoided.

Maintaining a proper slope inside the filter bed is vital: in case the slope is not maintained properly, water can stagnate, generating anaerobic condition and creating odour problems.

The layering of SSF system is a further very crucial part in the commissioning as it is directly related to the treatment efficiency. After layering of each supportive material the layer needs to be washed thoroughly with fresh water to remove any type of dust, contaminants particles, etc. Each layer of supportive material needs to be spread uniformly avoiding gaps which otherwise can lead to chocking of the soil gradient and will subsequently reduce the efficiency of filtration and treatment. Thus, properly trained person are needed for layering.

Daily operation and maintenance of the treatment system can be handled by unskilled labour with proper training. A maintenance manual with troubleshooting action needs to be provided.

With regards to the design of the intake well, flow variations and a contour survey of the selected stretch of stream is a

Parameters	**Sampling points**	**Frequency**
pH	Untreated and Treated water	Once every week
TSS, mg/L	Untreated and Treated water	
BOD_5 mg/L	Untreated and Treated water	
COD, mg/L	Untreated and Treated water	

O & G, mg/L	Untreated and Treated water
E.coli	Untreated and Treated water

Costs and economics :

Information regarding capital costs and operation and maintenance costs is illustrated below.

Capital Cost: Total project cost in EUR: **51,158.00 EUR**

Unit	**Function**	**Cost in EUR**
Intake well	Collection system	23,038.00
SSF bed I & II	Treatment unit	15,090.00
Treated water pond	Storage facility	5,920.00
Organotreat™ - Bacterial Consortia for SSF system	Degradation of pollutants	7,110.00

Table : Capital cost (in EUR) for treatment system installation in Indradhanushya Cente, Pune

Operation & Maintenance Expenditure :

Description	**Unit**	**Cost / month in EUR**
Unskilled (but trained) person for routine operations	1 person / month	80.00
Electricity for pumps	per month	25.00
Sampling & analysis: one set of untreated & treated samples per week	4 samples /month	175.00
Operation & Maintenance cost /month		**280.00**
Operation & Maintenance cost /year		**3,360.00**

Table : O&M cost (in EUR) for treatment system installation in Indradhanushya Center, Pune

Operation and maintenance :

The SSF system requires unskilled but trained personnel for routine operation and maintenance (O&M). SERI will train the personnel of Indradhanushya who will be responsible for the management of the system after installation. SERI will prepare an O&M Manual and Safety Plan with the necessary instructions for the management of the plant and for troubleshooting.

Normal maintenance of pumps and motors following manufacturer instructions is required as well. The PMC should carry out periodic analysis of the incoming

and treated water to monitor changes in the process which will help in trouble shooting (after the project ends).

With regards to the intake well, maintenance activities are mainly related to the removal of silt deposited in the collection well. The institutions responsible for the coordination of the safety planning process (planning, implementation, revision) are SERI and ESF during the project duration, and Indradhanushya staff after hand-over. Furthermore, SERI is responsible for the performance of foreseen analyses for three months after commissioning of the system.

The maintenance schedule for the EFB system is given below.

	Activities	**Frequency**	**Responsibilities**
1.	Removal of debris from metal screens	Daily	Local authority i.e. Pune Municipal Corporation will appoint person (Male / Female) for maintenance
2	Cleaning of intake well	Twice a month	
3.	Trimming /uprooting of plantation	Once in 2-3 months	

Table : Maintenance schedule for EFB system

14.2 Electrical Engineering

14.2.1 Design of Power Electronics converter

Power Electronic Converters

The primary task of power electronics is to process and control the flow of electric energy by supplying voltages and currents in a form that is optimally suited for user loads. Modern power electronic converters are involved in a very broad spectrum of applications like switched-mode power supplies, active power filters, electrical-machine-motion-control, renewable energy conversion systems distributed power generation, flexible AC transmission systems, and vehicular technology, etc.

Power electronic converters can be found wherever there is a need to modify the electrical energy form with classical electronics in which electrical currents and voltage are used to carry information, whereas with power electronics, they carry power. Some examples of uses for power electronic systems are DC/DC converters used in many mobile devices, such as cell phones or PDAs, and AC/DC converters in computers and televisions. Large scale power electronics

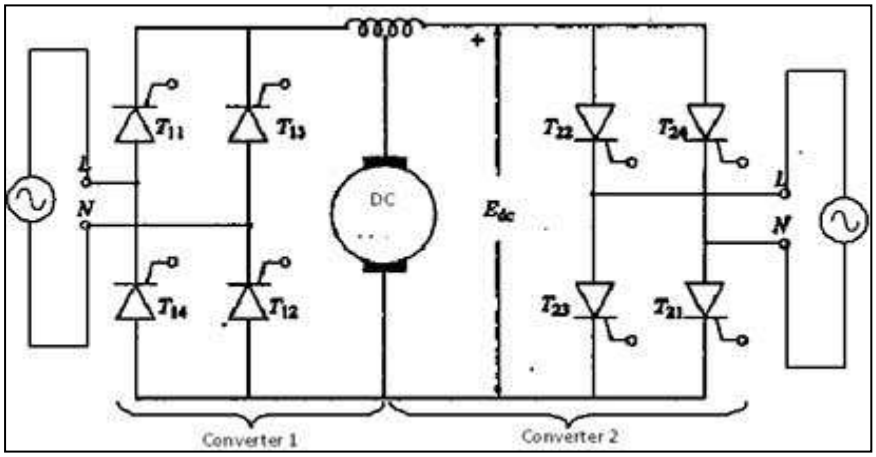
are used to control hundreds of megawatt of power flow across our nation. Some of those converters are discussed below.

Dual Converter

Dual converter is a combination of a rectifier and inverter in which the conversion of A.C to D.C happens and followed by D.C to A.C where load lies in between. A dual converter can be of a single phase or a three phase. A dual converter consists of two bridges consisting of thyristors in which one for rectifying purpose where alternating current is converted to direct current which can be given to load. Other bridge of thyristors is used for converting D.C to A.C.

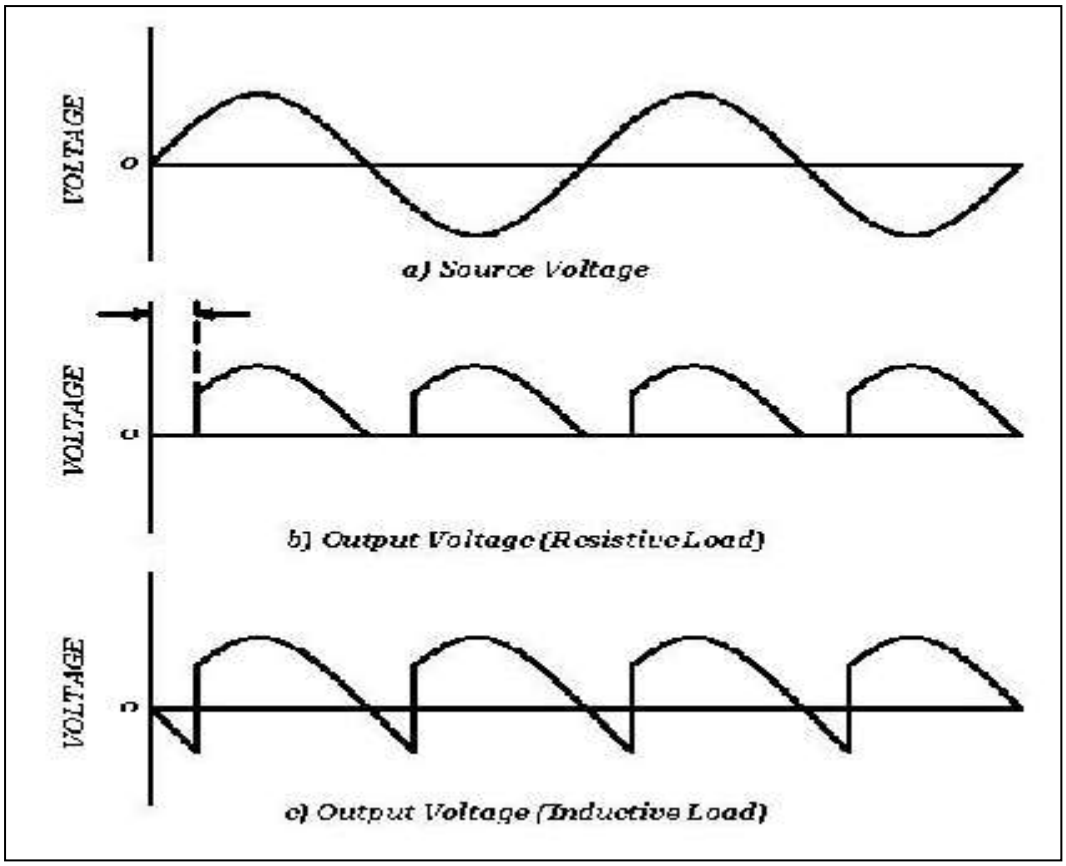
Single Phase Dual Converter

Single phase dual converter uses a single phase as source which is given to converter 1 of dual converter for rectification followed to load.

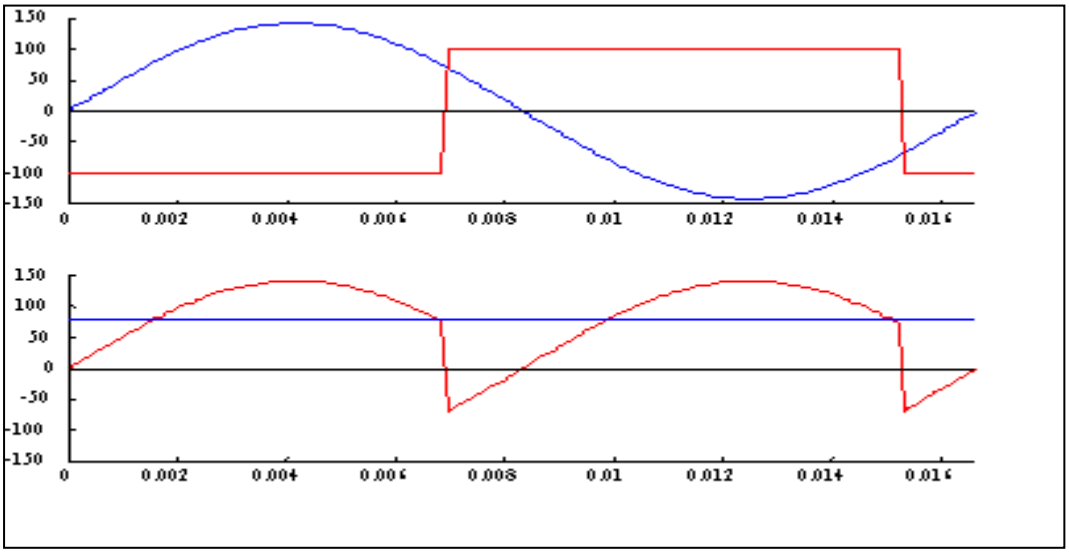


Principle of Operation:

A.C input given to converter 1 for rectification in this process positive cycle of input is given to first set of forward biased thyristors which gives a rectified D.C on positive cycle, as well negative cycle is given to set of reverse biased thyristors which gives a D.C on negative cycle completing full wave rectified output can be given to load. During this process converter 2 is blocked using an inductor. As thyristor only start conducting when current pulse is given to gate and continuous conducting until supply of current is stopped. Output of Thyristor Bridge can be as follows when it is given to different loads.



As a dual converter also consists conversion of D.C to A.C to make it work converter two is blocked, D.C inputs become load to dc power source conversion.



Firing of Thyristors:

To make thyristors conduct, a trigger pulse must be given to its gate simultaneously along with line voltage. A separate gate drive circuit must be added to a dual converter thyristor bridges Gate drive circuit must be equally synchronized with source voltage, any delay causes zero cross jitter and zero frequency fluctuates. To prevent these circuits must be included with phase lock loops and comparators.

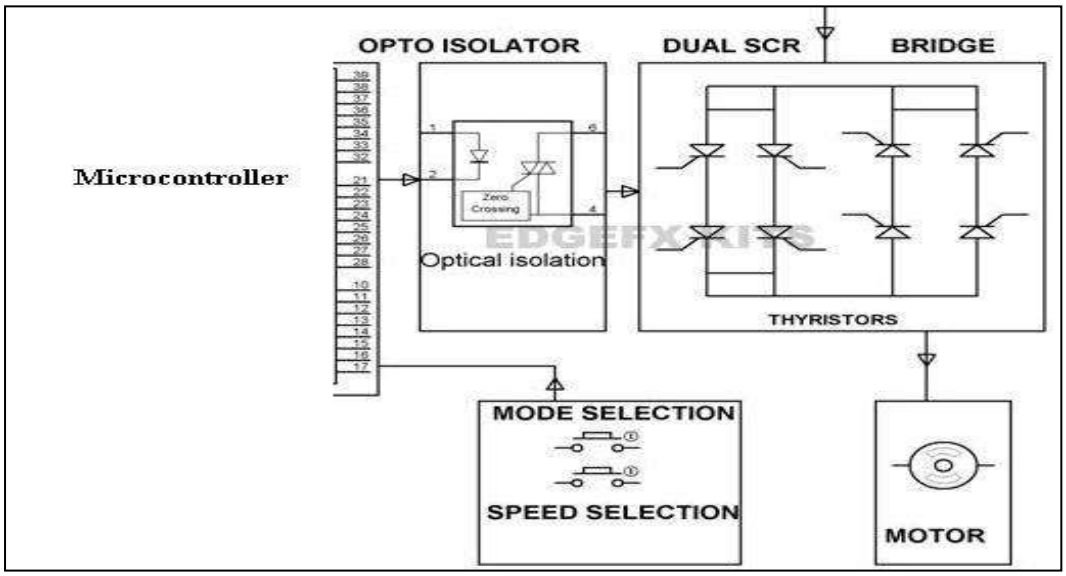
Applications of single phase dual converter

Speed control and direction control in dc motors.

Speed control and polarity control of dc motor using single phase dual converter

A single phase dual converter can be used in controlling speed and direction of rotation interfacing with microcontroller, combination of four SCR‘s is placed either side of motor and motor is load. These thyristors can be triggered through an optocoupler which is connected to a port of microcontroller.

Rotation of motor can be initialized using optocoupler by setting a set of thyristor to trigger which is placed at one side and change in direction of motor can be achieved by triggering another set of thyristor Variation in speed of motor can be achieved by delayed firing angle of SCR.



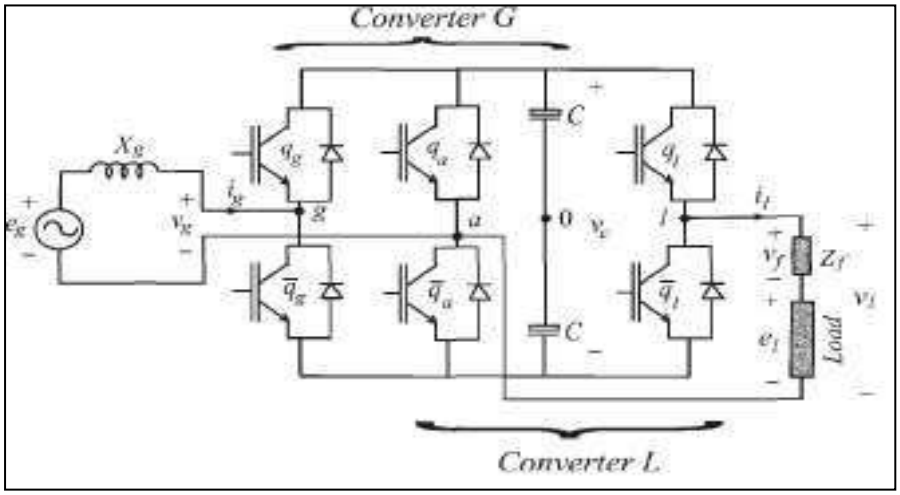
Mode selection and speed selection are microcontroller interfaced switches using these switches speed and rotation can be selected.

Single Phase – Three Leg AC/AC Converter

Power electronics is the application of electronics for power conversion. A subcategory of power conversion is the AC to AC conversion. An AC to AC voltage controller is a converter which controls the voltage, current and average power delivered to an AC load from an AC source. There are two types of AC voltage controllers, single and three phase AC controller.

A single phase AC/AC converter is a converter which converts from a fixed AC input voltage into variable AC output voltage with a desired frequency. They are used in practical circuits like light dimmer circuits, speed controls of induction motors and traction motor control etc. There are many existing technologies in single phase AC/AC converters; they are single phase – two legs, three legs and four legs. The single phase – two and four legs converters have some demerits like – they need large number of power devices, large control circuitry, more switching and losses are reduced only half to control the 50% of the output. So, to overcome these demerits present in the conventionally used converters, a better approach is use of single phase-three AC/AC converter.

A single phase – three legs consists of 3 legs and 6 switches. A leg is common for both grid side and load side. A leg performs the rectifier operation and a grid performs the inverter operation. And in this, we use Pulse Width Modulation (PWM) techniques for controlling the converter output. A single phase-three leg converter is shown figure below:



During the positive half cycle of the supply voltage switches Qg and Qa in rectifier conducts and we get rectified output across the capacitor and for inverter operation in addition to the switches Qg and Qa', switch Ql in load

side leg also triggered and we get ac output across the load. During negative half cycle switches Qa and Qg' in grid side conducts implying rectified output and for inversion operation in addition to the switches Qa and Qg', switch Ql' also triggered and we get ac output across the load. By using PWM method a fixed dc input voltage is supplied to the inverter and a controlled ac output voltage is obtained by adjusting the on and off periods of the inverter devices. The switches in the converter circuit for getting proper operation and also for reducing the harmonics. By varying the value of modulation index we can change the pulse width according to our convenience.

Advantages and Applications of 3 – Leg Converter

- The DC output voltage across the capacitor is almost doubled compared to the four leg converter.
- The power rating and voltage of the circuit can be improved.
- Same output can be obtained with reduced losses & switches. Hence the efficiency and the power factor can be improved.
- This converter is used in uninterruptable power supply circuits (UPS) and in power electronic for getting four quadrant operations of the drives.

14.2.2 Electronic Soft Starter for 1/3 Phase Induction Motor for Agriculture

There are quite different methods for starting an electric motor such as "Direct On Line (DOL)", "Star-Delta", "Auto Transformer", "Primary Resistor", or using solid-state power electronic devices such as "VFD" or "Soft Starter".

What is Soft Starter :

Since Electric Motors often require large amounts of electricity during their accelerating to the nominal speed, a Soft Starter can be used to limit the surge of current known as "inrush current" and torque of the electric motors, resulting in a safer, smoother and gradual start-up.

Soft starters will protect your electric motor from possible damage and at the same time extend the lifespan of your electric motor and the whole system by

declining the heating caused by frequent start/stops, reducing the mechanical stress on the motor, its shaft and reducing the electrodynamic stresses on the power cables.

Application in induction motor :

Water supply applications are another great use for these solid state electronic devices. When using pumps in a process you have to bring them up slowly. If not, you will cause pressure surges in the water system that could lead to dangerous conditions.

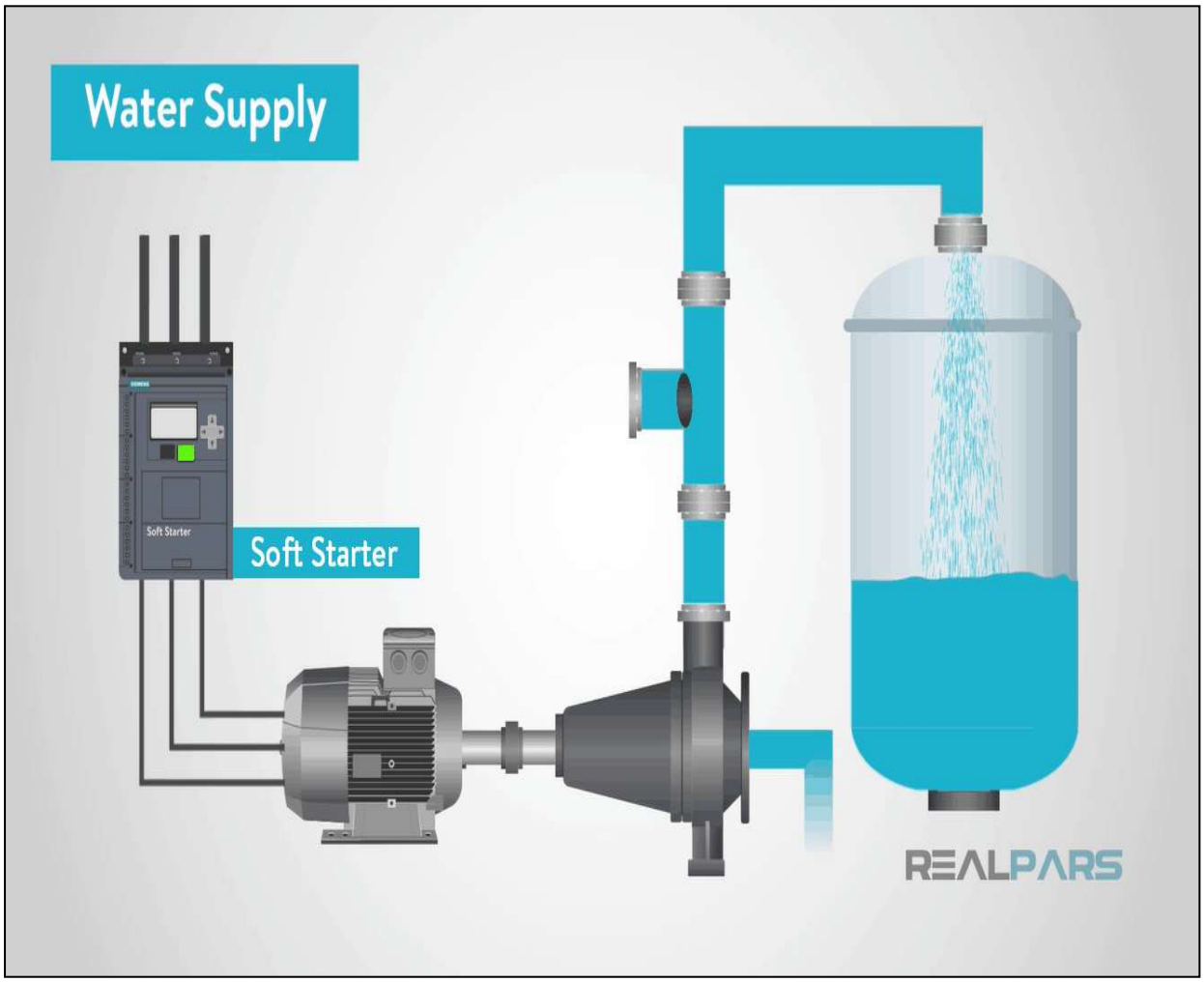


FIG. 55 :- INDUCTION MOTOR

14.2.3 Advanced Wireless Power Transfer System

Industrial training to Polytechnic students on automated wireless power transfer system.The project is a device to transfer power wirelessly instead of using conventional copper cables and current carrying wires. The concept of wireless power transfer was introduced by Nikolas Tesla. This power is made to be transferred within a small range only for example charging rechargeable batteries etc. For demonstration purposes we have used a fan instead of battery that operates by using wireless power. This requires an electronic circuit for conversion of AC 230V 50Hz to AC 12V, high frequency and this is then fed to a primary coil of an air core transformer. The secondary coil of the transformer develops 12V high frequency. Therefore by this way the power gets transferred through primary coil to secondary coil that are separated by certain distance around 3cm. Here the primary coil acts as transmitter and secondary coil receives the power to run a load. This project can be used to charge batteries of a pace maker and similar applications.

14.2.4 Industrial Temperature Controller

Temperature controller is a measurement device used on temperature control. Thermocouple-type and resistor-type temperature controllers measure temperature electronically, obtaining the temperature change from the sensor and sending the measured data to the electronic processor. The output device will then control the temperature variation within a specific range.

Commonly, the use of temperature sensors is to measure temperature in circuits, which control a variety of equipment.

There various kinds of temperature sensors used to include resistance temperature detectors (RTDs), thermocouples, thermistors, infrared sensors, and semiconductor sensors. Every sensor uses particular operating parameters. These sensors have multiple varieties, but a standard procedure to measure temperature by sensing a change in the physical characteristic.

The temperature controller takes an input from a temperature sensor and has an output that is connected to a control element such as a heater or fan. It takes a measurement and compares it with desired value, and in case there is an error (deviation), it decided how much cooling or heating is required to bring the temperature back to normal.

To accurately control process temperature without extensive operator involvement, a temperature control system relies upon a controller, which accepts a temperature sensor such as a thermocouple or RTD as input.

14.2.5 Accident Alerts in Modern Traffic Signal Control System – Camera Surveillance System

Enormous advance has proven throughout the years in the area of traffic surveillance by the growth of intelligent traffic video surveillance system. In the current work, through the traffic videos, the traffic video surveillance automatically keyed out the vehicles like ambulance and trucks, which in turn assisted us in directing the vehicles at the time of emergency. Nevertheless, it doesn't provide us a vital solution for the regulating the traffic. Moreover, this idea just identifies the vehicles, but it couldn't notice the accidents expeditiously. Therefore in the proposed work, expeditious traffic video surveillance and monitoring system are presented along with dynamic traffic signal control and accident detection mechanism. Hybrid median filter has been utilized at the beginning for pre-processing of traffic videos, and to remove the noise. Hybrid support vector machine has been utilized to chase the vehicles. Next, the histogram of flow gradient features are drew-out to categories the vehicles. According to the traffic density and through video files, vehicles are computed, and then for emergency vehicles, the traffic signal gets switched dynamically. To realize the arrival of ambulances, the cameras have been set to catch traffic videos minimum at 500 m of the signal and deep learning neural networks has been employed. Hence dynamic signal control has been incorporated expeditiously. Likewise, multinomial logistic regression has been utilized in real-time live streaming videos, to identify the accidents correctly. The observational solution shows that the proposed intelligent traffic video surveillance system render expeditious dynamic control of traffic signals and it raises the identification of accidents correctly.

With drivers using their mobile phones on 88% of trips, there is no question that traffic accidents are on the rise. With the damage to property, headaches of insurance claims, and loss of work, it can be incredibly frustrating to be in an accident.
What is even worse is when you can't prove that you weren't at fault in the accident. But I've found that many drivers can easily prove their innocence with the help of traffic monitoring cameras. Traffic cameras can help prove that the fault is elsewhere when there is an accident. They can also cut down steep increases in insurance rates.

There are a number of benefits of traffic cameras :

1. Preventing a Dangerous Accident
I was shocked to hear that even with increasing safety protocols deadly crashes are on the rise. In recent years, deadly accidents have been up as much as 5%

annually.Many experts attribute this to mobile device use. While traffic monitoring cameras are at times controversial, they are also a deterrent to dangerous crashes.More drivers who know about monitoring cameras are less likely to violate distracted driving laws. Traffic cameras help to keep drivers and pedestrians safe.But what if you're not involved in a deadly accident? Traffic cameras also help by recording the footage and helping your case.
Putting traffic footage in the right legal hands can benefit many drivers personally.

2. Valuable Evidence

The old saying goes that a picture is worth 1000 words. But video footage might be able to end all arguments entirely.If you get traffic monitoring evidence in the hands of a personal injury attorney you may drastically change the outcome of your accident case.Whether you are dealing with insurance companies or other drivers you can utilize video evidence to prove you weren't at fault.
Anyone who has dealt with a legal case knows that it is more difficult to prove you aren't at fault than it seems. Insurance companies have teams of lawyers and access to data that the average driver doesn't You can even up the outcome of your case with the valuable video footage.

3. Challenge that Rate Hike

I think the worst part of a fender bender is the costly insurance hike. You go through the stress of getting your car repaired just to find a larger insurance bill waiting in the mail.Insurance companies are notorious for rate hikes after accidents. This includes not-at-fault accidents.Using traffic monitoring cameras to dispute your fault can help cut down that rate hike. Some insurance companies may charge as much as 16% more on your insurance premium, even if you aren't at fault.Prove that you don't deserve the strong rate hike. In fact, if you aren't at fault you should be able to go through the other driver's insurance entirely.

4. Remove Doubt

So many things happen in a traffic accident. Sometimes time slows down entirely.In other cases, an injury or surprise can leave you completely disoriented. Even if you aren't at fault you may wonder what happened.
Or you may get so confused by conflicting accounts you may believe the accident is your responsibility.Traffic monitoring cameras provide valuable peace of mind in cases like this. They can show the drivers exactly what happened from a birds-eye angel and provide indisputable evidence.
When I've been in accidents I wondered what happened. At one point I was driving along just fine and then – wham!
Video evidence removes that doubt.

5. Collect Diminished Value

One thing many drivers don't consider during an accident claim is the diminished value of their car. Even if you collect payment to have your car repaired it will never be the same.Perhaps someone did serious damage to your vehicle and their insurance covered the accident. But when you go to resell your vehicle it will still be worth less money.Some experts estimate that an accident reduces the value of your car by 30%.In the hands of the right attorney traffic monitoring cameras can help you recoup that value. It's not fair to have to go through the hassle of a crash, insurance claims, and still lose money.Video evidence will help prove fault and help collect every dime you deserve.

6. Police on Your Side

You may think that if you received a traffic citation through a monitoring camera your case is a lost cause. Or, you may think that if the police cited you as at-fault in a traffic accident there is little you can do to fight back.The truth is there are always ways to dispute an accident with the help of traffic monitoring cameras. They may even help get the police on your side.Police aren't required to intervene and help your case. But if you can access their monitoring cameras you can help your case.Judges have even overturned original rulings for the police when cameras were involved. A New Orleans judge overturned 3 years and $28 million in traffic fines from cameras.

7. Cut Costs with Traffic Monitoring Cameras

When you aren't at fault a court case can still cost a bundle. I think it is often a hindrance to drivers who know they were not at fault when they think about the time and legal fees involved.

CHAPTER :- 15

15. Smart and/or Sustainable features of Chapter 8 & 13 designs, Impact on society.

No.	Design	Impact on society
1	PHC	Better health facilities available in village
2	Community hall	Social gathering is possible
3	ESR	This reservoir is help to villager is to provide drinking water through gravity flow of water
4	Drainage line	This is improve sanitation facilities in village and water borne diseases are reduced
5	Street light	This is improve night vision in village and reduced night crime in village
6	R.C.C road	This is improve transportation in village
7	Secondary school	Education facilities is improve in village and also all development of village
8	Vegetable market	Market facilities is improve in village and this is also improve allover economy of village. this is create new job in village
9	Bank	Awareness in banking field is possible and this also improve all over economy of village
10	Post office	This is improve social interaction of villger
11	Bus stand	This is speed up the villager for activity outside the village
12	Recreation centre	This is helpful for all villager

CHAPTER :- 16

16. Survey By Interviewing With Talati And/Or Sarpanch

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Survey with Interviewing

SURVEY BY INTERVIEWING WITH TALATI AND/OR SARPANCH

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

CHAPTER- 16

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

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

(વ. બ્રહ્મ. ગાંધી)
સરપંચ

A.P. Sisodra

CHAPTER :- 17

17. Irrigation / Agriculture Activites And Agro Industry, Altenate Technics And Solution

Irrigation and Agro Industry

Agriculture, including livestock husbandry, is the most characteristic form of economic activity. Sixty five percent of the population is rural and depends on agricultural activities. Dependency on rain puts food sustainability in a serious challenge. A well developed irrigation system to large and small holder farmers is vital for efficient per hectare harvest and self sufficient agricultural production. Linkage of theseagricultural produce to the manufacturing sector will uplift country's capacity to add value and market it beyond its borders. Agro industry is an integral part in linking the long dominating agriculture sector to the emerging small scale industry.

To this effect MCE provides:

- Irrigation and Land Drainage System Design
- Design and supervision of hydraulic structures
- Land Use Planning
- Soil and Topographic Survey
- Crop study
- Water Shade management
- Agricultural Marketing Study
- Livestock management study
- Project Preparation, Appraisal and Evaluation

How technology reinforces each type of irrigation system

Based on how water is distributed throughout the field, you can choose from different types of irrigation systems that can be enhanced with smart irrigation software. The most common are flood, sprinkler, center pivot, drip, and micro-irrigation systems. Let's see how technological solutions for smart irrigation can improve the efficiency of each type.

Sprinkler irrigation

In a sprinkler irrigation system, water is pumped through pipes and then distributed via high-pressure overhead sprinklers. These sprinklers can be set in a central location in the field or can be located on a moving platform.

Role of software: Thermal and acoustic rain sensors recognize rainfall and measure its intensity to schedule the next irrigation after rain stops. A smart irrigation system analyzes data and calculates the water budget for the next month. Sprinklers get automated notifications to prevent extensive water use and overwatering due to rain.

Center pivot irrigation

This is the most popular form of sprinkler irrigation and is also known as water-wheel and circle irrigation. A typical center pivot system consists of a long irrigating pipeline attached to a central tower and moves slowly over the field in a circular pattern, irrigating plants with sprayers.

Role of software: The system that controls circle irrigation sprinklers obtains data insights from in-field sensors to adjust the water stream or angle of flow. This helps to reach plants that are far from the water source and save those nearest from overwatering. By analyzing weather data and soil moisture, the system plans irrigation and calculates potential yield and harvest times.

Drip irrigation

In this type of irrigation, water is distributed directly to the roots of plants through pipes with small openings called drippers. This allows farmers to significantly reduce evaporation and runoff.

Role of software: For this type of irrigation, the main challenge is the visibility of the watering process. The system notifies the user through an app about starting and finishing irrigation. It also measures soil parameters before and after irrigation.

CHAPTER :- 18

18. Social Activities – Any Activates Planned By Students

The nation-wide lockdown imposed in India from March 25 to May 31, 2020 following the breakout of the COVID-19 pandemic affected rural India in diverse ways. This was only to be expected given the great variation in production systems and socio-economic conditions in villages across agro-ecological zones. However, the impact is differential across socio-economic classes and regions of the country, which are observed and narrated by the researchers T.S. Modak, S. Baksi and D. Johnson, which are presented below:

1. The impact on harvesting operations in the irrigated villages was limited, mainly because of the easy availability, and widespread use of combine harvesters in most of the surveyed villages. While it is too early to conclude, one can argue that the use of machines for various agricultural operations has received a thrust under the current crisis. In rainfed villages, being the lean agricultural season, the opportunities for farm employment were already restricted.

2. The major impact on agriculture, however, was in terms of access to marketing channels, and price received for the produce. In villages of Punjab and Kerala, there was active intervention by respective State governments to ensure procurement at fair prices. Such institutional mechanisms were absent in other States. The local market channel of sale through small traders and merchants had collapsed, and gravely impacted poor peasants for whom these traders were the main channel. Restricted mobility hindered access to regulated markets even for richer capitalist farmers. The disruption of the supply chain has led to a slump in the local farm harvest prices for most agricultural produce. Producers of perishable goods, particularly vegetables, were severely affected. Among them, the worst hit were poor peasants, without any access to storage facilities or procurement centers.

3. While agricultural operations were not affected much in the irrigated villages, a tendency seemingly encouraged by the lockdown is an expanded use of family labour among smaller landowners. The tendency to use family and exchange

labour among poor peasants implies that the scope of agricultural wage work was lower for manual workers during the lockdown.

4. Non-agricultural work, which was crucial in the lean agricultural season, had completely collapsed. In the complete absence of non-farm employment, workers, and even artisans, were being forced to seek employment in agriculture. The reduced mobility due to the lockdown also implied that workers who otherwise regularly migrated for work were now competing for agricultural employment. As a consequence, a downward pressure on rural wage-rates was already beginning to be felt. The Covid-19 lockdown has broken down the complementary relationship between agricultural and non-agricultural work, where the surplus labour from the former was usually absorbed by the latter.

5. Despite income flows drying up for all socio-economic classes to varying degrees, the immediate impact was most severely felt by manual workers and poor peasants who did not have any savings. With merge cash in hand, no home produce for consumption, and lack of employment, the class of manual workers were certainly the worst affected. In addition, a major blow to the class of manual workers, and poor peasants has been the complete breakdown in receipt of remittances. The combination of low levels of income, ineffective public distribution systems, and negligible income-support had serious implications for subsistence of these households, leading to increased indebtedness especially from informal sources. The class of landlord and capitalist farmer was the least impacted by the lockdown. Better access to storage facilities and regulated markets implied that their farm incomes were relatively protected. Also, they had sufficient cash in hand and food stocks for daily household consumption.

To sum up, the Covid-19 lockdown has worsened the already prevalent distress in the Indian countryside especially for manual worker and poor peasant households. There is also a fear that if the lockdown restrictions are prolonged, crop production in the kharif season will be severely affected. Government intervention is critical to maintain a basic level of household consumption and to resume normal agricultural production.

Below are the steps taken in the allocated village:

In our Bambhaniya village many difficulties face during lockdown. because of the no awerness in village area. and this is the big problem of the our village. so village headman is decide to implement the swaymsevak in village.job of the swaymsevak is to ensure the rules are followed by the people of covid guideline.

In village bambhaniya sarpach shri takes action is (1) social distance are followed by the villager (2) spray of the bleaching in entire village area (3) 14 days home quarantine those for coming in village

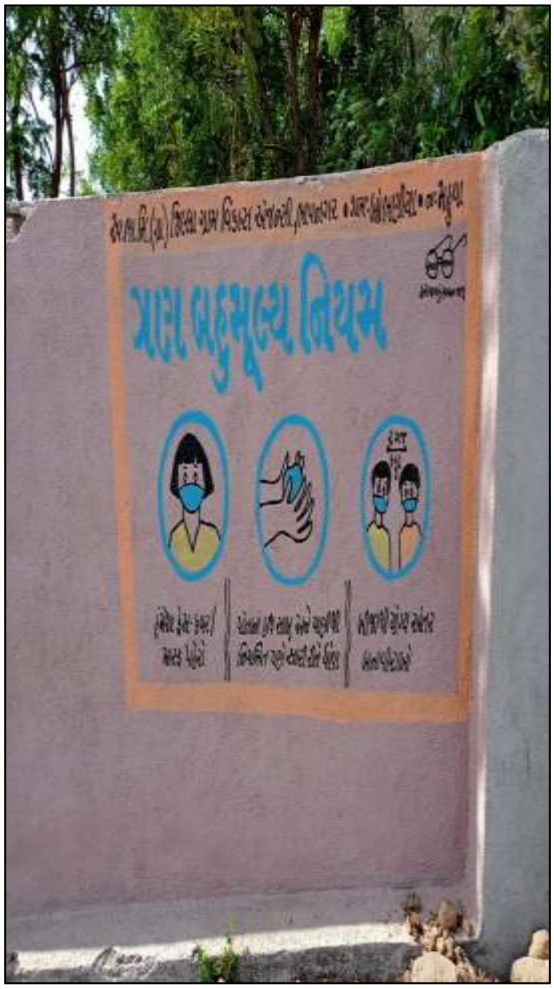
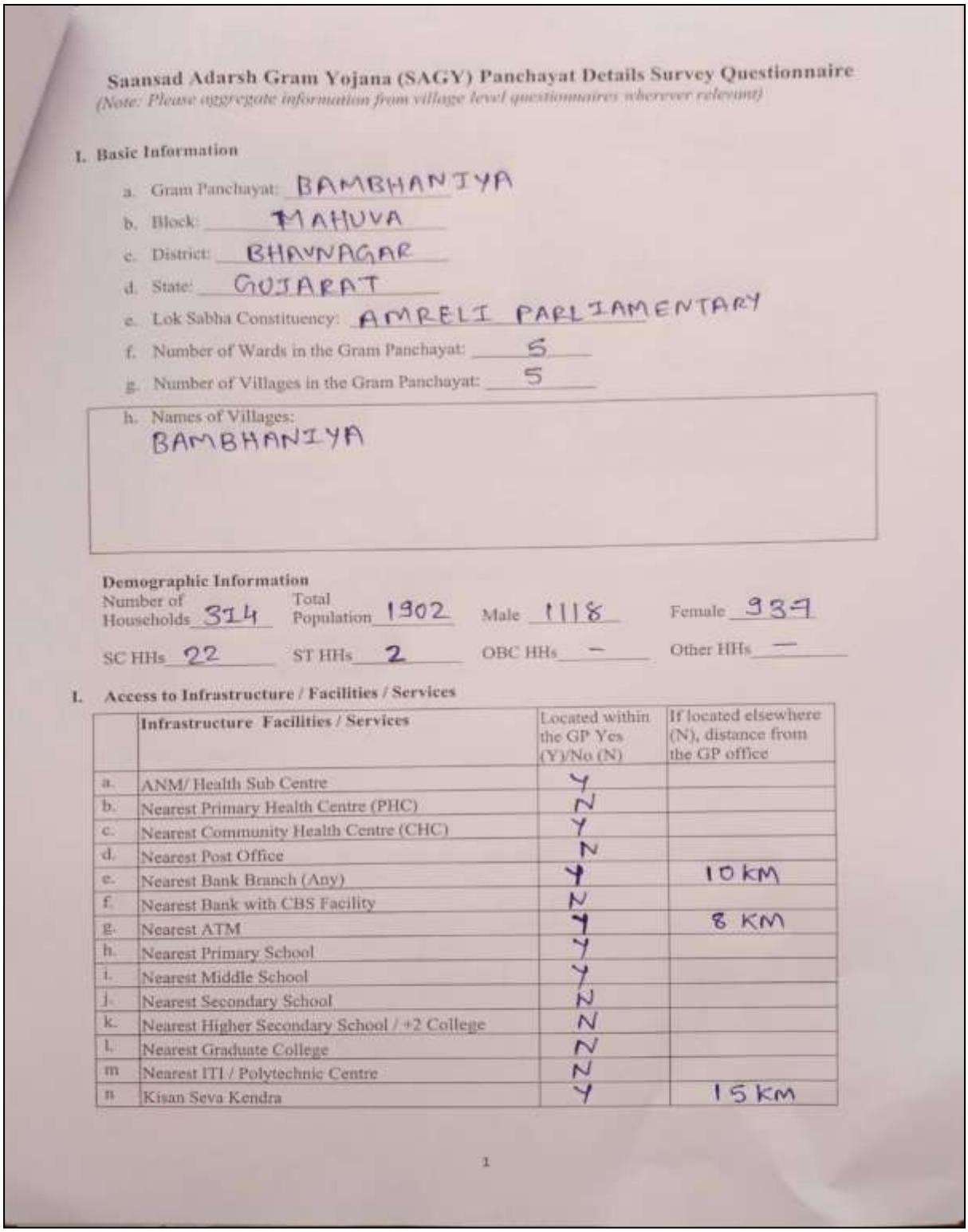


FIG. 33 : IMPLEMANTATION OF COVID-19 GUIDLINE

CHAPTER :- 19

19. SAGY Questionnaire Survey form with the Sarpanch Signature



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: BAMBHANIYA
b. Block: MAHUVA
c. District: BHAVNAGAR
d. State: GUJARAT
e. Lok Sabha Constituency: AMRELI PARLIAMENTARY
f. Number of Wards in the Gram Panchayat: 5
g. Number of Villages in the Gram Panchayat: 5
h. Names of Villages: BAMBHANIYA

Demographic Information

Number of Households 314 Total Population 1902 Male 1118 Female 937

SC HHs 22 ST HHs 2 OBC HHs – Other HHs –

I. Access to Infrastructure / Facilities / Services

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
a.	ANM/ Health Sub Centre	Y	
b.	Nearest Primary Health Centre (PHC)	N	
c.	Nearest Community Health Centre (CHC)	Y	
d.	Nearest Post Office	N	
e.	Nearest Bank Branch (Any)	Y	10 KM
f.	Nearest Bank with CBS Facility	N	
g.	Nearest ATM	Y	8 KM
h.	Nearest Primary School	Y	
i.	Nearest Middle School	Y	
j.	Nearest Secondary School	N	
k.	Nearest Higher Secondary School / +2 College	N	
l.	Nearest Graduate College	N	
m	Nearest ITI / Polytechnic Centre	N	
n	Kisan Seva Kendra	Y	15 KM

1

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

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

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total 1 Public 1 Private –

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

V. Education, ICDS

a. Number of Angan Wadi Centres: 3

b. Number of villages without Angan Wadi Centres –

Names of such villages: _____

c. Schools (Number)

Primary Private: 1 Primary Govt.: 1

Middle Private: – Middle Govt.: –

Secondary Private: – Secondary Govt.: –

Higher Secondary Private: – Higher Secondary Govt: –

VI. Public Distribution System

	Item	Private Contractor	Women's SHG	Gram Panchayat	Cooperative	Other (Mention)	Location in GP (mention Location)	If outside GP, Location & distance from GP HQrs)
a.	Cereal (Rice/ Wheat/ Millets)	✓	✓				Y	
b.	Kerosene	✓	✓				Y	
c.	Other (mention)							

2

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

VII. Coverage of Villages under different Facilities & Services

	Parameter	Villages Status[1]	Names of Villages Covered	Names of Villages not Covered
a.	Piped Water Supply Coverage to Villages	Covered ✓ All Not Covered –	BAMBHANIYA MOTA KHUTAVADA NANA ASARANA Dudhala	
b.	Hand Pump Coverage in Villages:	Covered ✓ All Not Covered –	BAMBHANIYA GUJARADA-2 PADHIYARKA LILVAN	
c.	Coverage under Covered Drains:	Covered All Not Covered –	BAMBHANIYA BHADARA MOTA ASARANA	
d.	Coverage under Open Drains:	Covered 3 Not Covered –	GUJARADA-2 PADHIYARKA NANA ASARANA	
e.	Villages with Household Electricity Connection (Numbers)	Connected All Not Connected –	BAMBHANIYA MOTA KHUNTAVADA DUDHALA	

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	405 ha.	d.	Pasture / Grazing Land	–	g.	Check Dam	2
b.	Irrigated Land	302 ha	e.	Forests/ Plantations	202 ha	h.	Wells/Bore Wells	4
c.	Un-irrigated Land	103 ha	f.	Other Common Land	–	i	Tanks /Ponds	1

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

3

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

IX. Parameters relating to Households & Institutions

		Number
a)	Number of eligible Households for pension (old age, widow, disability)	–
b)	Number of Households receiving pension (old age, widow, disability)	–
c)	Number of eligible Households who are not receiving pension	–
d)	Number of Households eligible for Ration Card	314
e)	Number of eligible HHs having ration cards	314
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	314
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	–
h)	Number of active Job Card holders under MGNREGA	1200
i)	Number of Job Card holders who completed 100 days of work during 2013-14	–
j)	Number of shops selling alcohol	–
k)	Number of BPL families	290
l)	Number of landless households	–
m)	Number of IAY beneficiaries	–
n)	Number of FRA[2] beneficiaries	–
o)	Number of Community Sanitary Complexes	–
p)	Number of Households headed by single women	–
q)	Number of Households headed by physically handicapped persons	–
r)	Total number of Persons with Disability in the village	–
s)	Number of SHGs	–
t)	Number of active SHGs	–
u)	Number of SHG Federations	–
v)	Number of Youth Clubs	–
w)	Number of Bharat Nirman Volunteers	–

Name and Signature of Surveyor and Respondent'

DABHI AKASHBHAI SAVANI VISHAL BHAI Surveyor	(જે. એમ. કાળી) સરપંચ PRI Respondent (Preferably Gram Panchayat Chairperson)	A.P. Sisodia Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	20/04/'21 Date of Survey

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

4

CHAPTER :- 20

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

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kalpesh dabhi <kd962424@gmail.com>
to collector-bav, ddo-bav, tdo-mah

17:32 (5 minutes ago)

Respected sir/madam

we are students of government engineering college bhavnagar affiliated to gujarat technological university. gtu has been assigned to vishwakarma yojana-VY in which students survey various villages and design various amenities to deliver them to make their life better as per requirements & village problem statement.

our design work is given below in table :-

Village and Team Details

Village name:	Team details:	(1) Enrollment No.:	170210106010	(1) Name	DABHI AKASHBHAI JIVANBHAI
Bambhaniya		(2) Enrollment No.:	170210106054	(2) Name	SAVANI VISHALBHAI PRAVINBHAI

Probelm Definition and Design Details

Sr. No.	Problem Definition	Capacity (mention unit)	Estimated cost (in Rs.)
Design - 1	Public Health Center	117.48 m^2	1277250
Design - 2	Community Hall	309.75 m^2	1763960
Design - 3	Street Light	2.5 km	1212720
Design - 4	Drainage system	200 household	243470
Design - 5	Elevated Service Reservoir	2 lacs litre	1301880
Design - 6	RCC Road	502 m	457400
Design- 7	Secondary school	1205 m^2	6405132
Design –8	Vegetable market	118.36 m^2	1101610
Design-9	Bank	305.12 m2	1676880
Design-10	Post office	107.94 m^2	605000
Design-11	Bus stand	150.45 m^2	920000
Design-12	Recreation centre	450.36 m2	2469878

BAMBHANIYA_D...

Reply Reply to all Forward

CHAPTER :- 21

21. Comprehensive report for the entire village

The project work started with the basic data collection, survey work and it progressed through meeting with headman, Talati-cum-Mantrishri and Principal of the existing school. The gap analysis was later framed and 6 various design problems were identified. The proposed solutions are framed in such a way that the village can enhance the overall physical, social and educational conditions of villagers and can promise the sustainable growth of the village in context to the Bhavnagar City, in which the village falls.

The concluding remarks of the project in the form of team details, problem definition and designed solutions are as follows:

Village and Team Details					
Village name:	**Team details :**	**(1) Enrollment No.:**	170210106010	**(1) Name**	DABHI AKASHBHAI JIVANBHAI
Bambhaniya		**(2) Enrollment No.:**	170210106054	**(2) Name**	SAVANI VISHALBHAI PRAVINBHAI

Probelm Definition and Design Details			
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Design-10	Post office	107.94 m^2	605000
Design-11	Bus stand	150.45 m^2	920000
Design-12	Recreation centre	450.36 m2	2469878

TABLE 28 : CONCLUSION OF THE ENTIRE VILLAGE

No.	Design	Impact on society
1	PHC	Better health facilities available in village
2	Community hall	Social gathering is possible
3	ESR	This reservoir is help to villager is to provide drinking water through gravity flow of water
4	Drainage line	This is improve sanitation facilities in village and water borne diseases are reduced
5	Street light	This is improve night vision in village and reduced night crime in village
6	R.C.C road	This is improve transportation in village
7	Secondary school	Education facilities is improve in village and also all development of village
8	Vegetable market	Market facilities is improve in village and this is also improve allover economy of village. this is create new job in village
9	Bank	Awareness in banking field is possible and this also improve all over economy of village
10	Post office	This is improve social interaction of villger
11	Bus stand	This is speed up the villager for activity outside the village
12	Recreation centre	This is helpful for all villager

It is truly believed by the project team that if the above mentioned design solutions are implemented then the village can replicate the basic facilities of nearby city and be able to lessen the migration from the village to nearest or other cities. The growth of the village can be enhanced and the prosperity as well as living conditions of the people can be well-furnished in a controlled way, such that it can fulfill the dream of father of our nation, Shri Mohandas Karamchand Gandhiji tha"*The true India lives in the village.*"