DETAILED PROJECT REPORT

VISHWAKARMA YOJNA: VIII

AN APPROACH TOWARDS RURBANISATION

MORCHAND Village

PREPARED BY

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GOVERNMENT ENGINEERING COLLEGE, BHAVNAGAR

CHINTAN A. GAJJAR

YEAR: 2020-21

GUJARAT TECHNOLOGICAL UNIVERSITY

Chandkheda, Ahmedabad– 382424 Gujarat

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Chandkheda, Ahmedabad – 382424 Gujarat

CERTIFICATE

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

Detailed Project Report for,

VILLAGE : MORCHAND

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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College Name:	**Government Engineering College, Bhavnagar**
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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 Morchand 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: Morchand village is located in Bhavnagar Tehsil of Bhavnagar District in Gujarat, India. It is situated 45km away from Bhavnagar, which is both district & sub-district headquarter of Morchand village. As per 2009 statistics, Morchand is the Gram Panchayat of Morchand Village. The total geographical area of village is 2003.72hectares. Morchand has a total population of 4492 peoples. There are about 762 houses in Morchand village. As per 2019 stats, Morchand Villages comes under Bhavnagar Rural assembly & Bhavnagar parliamentary constituency. Bhavnagar is nearest town to Morchand which is approximately 45km 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 Morchand 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 Morchand 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.

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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

1. Ideal village visit from District of Gujarat State (Civil & Electrical Concept)

1.1 Background & Study Area Location

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".

village visit :-

The village is Morchand, whose visit was conducted by the team on dtd.10/10/2020. The village is located at Ghogha Taluka in Bhavnagar District. The atmosphere of the village was cloudy and free from pollution, probably because of 95% family works on agriculture field.

The major income source of the village is agriculture. The total geographical area is 2003.72ha out of which the agricultural land is 1849.92ha and for residential purpose the 153.80ha area is used. Morchand is located at latitude 72.2134308 and longitude 21.5450643.

The main road of the village is an RCC (Reinforced Cement Concrete) road while few of the internal streets of the village have pavement block along with their connecting road to other village, which is of bituminous type pavement. Other available roads are of either matteled type or kutcha roads. The team members visited major places like temple, primary school, secondary school, public health center, community hall, gram panchayat office, over head tank, etc.

1.2 Concept: Ideal Village, Normal Village

1.2.1 Objective:

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

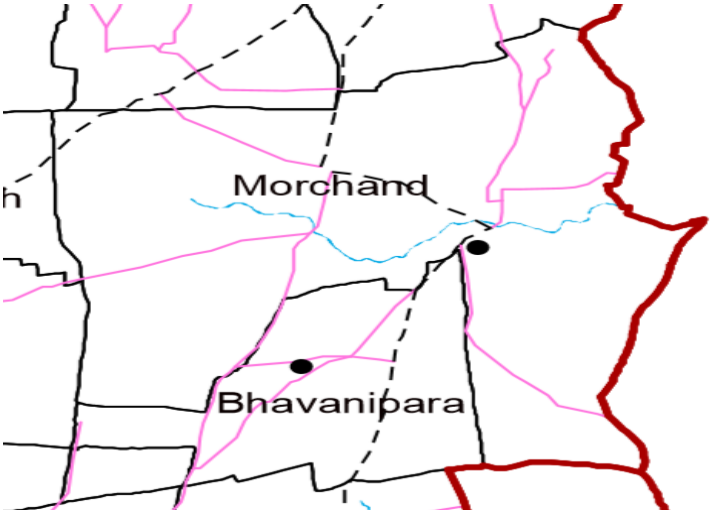

FIG 1 MORCHAND VILLAGE MAP

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

The case of village nathugadh from the bhavnagar District of the state of Gujarat has been studied as an example/live case study of ideal village of Gujarat, as it stands out as a smart and model village. The grassroot leadership, community participation, decentralisation of powers to local bodies in rural areas and financial support in the form of various government schemes have brought far reaching changes in the rural landscape of India. Economic progress has to coincide with social progress which is inclusive, sustainable, and sensitive not only to its environment but to its people as well. The village has received several awards from the state as well as national government for its outstanding achievements and has become extremely popular across the country.

The facilities like (a) *infrastructure development* in the village in context of electrical supply, CCTV, public address system (in the form of 120 waterproof loud speakers), (b) *education*, in the form of 5 primary schools and 4 secondary schools, comprises other advantages like LED screen, CCTV in the schools, separate toilets for boys and girls, computer labs, stocked libraries, mid-day-meal (MDM), (c) *health, sanitation and woman empowerment* in the village are in the form of 24/7 primary health center equipped with a pharmacy and library and maternity ward with zero maternity death, door-to-door waste collection, training for collection and disposal, street polluters are heavily fined and a self-made group for providing vocational training to empower women, (d) *democratic governance* in the form of a team of 22 full-time and 47 part-time employees along with the elected officials of the gram Panchayat along with grievance redress toll free number and complaint register. As "Swarajya (self-governance) to Surajya (good governance)" has been found as the mantra for rural development in the Pansuri Village of Sabarkantha District of Gujarat State, it has been considered as an ideal village case study for the report preparation.

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 recognised 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

nathugadh is located approximately 45 km form bhavnagar city in Gujarat. It has had phenomenal success in the past decade under the leadership of a visionary and missionary

headman (village headman) Mr. Himanshu Patel (who served as the headman from 2006 to 2016). The village has received several awards from the state as well as national government for its outstanding achievements and has become extremely popular across the country. This was the most important reason that motivated the author to visit and study this model village personally, to understand and explore how this transformation was made possible. The village has 23 communities with a population of 6000, including only 350 people living below the poverty line. Most of the people in the village are dependent on agriculture and milk production for livelihood.

Infrastructure Development: The most important concern in rural development is to provide basic amenities to each person living in the rural area. Nathugadh stands out in this regard as it has constructed a reverse osmosis plant and since then provided house-to-house piped connections to supply chlorinated water. It also has its own 66 KVA substation for electricity generation and 100 per cent coverage of all streets with LED streetlights. A public address system with 120 waterproof speakers for announcing information and spreading messages has been another striking feature of this village. The village headperson uses this public announcement system to share what he thinks, plans, and is doing at the gram Panchayat. The entire village has been put under CC TV surveillance, which has helped to bring down crime rate to almost zero per cent. Each household has a personalised lavatory and the whole village has a well-designed drainage and storm water disposal system. Atal Express is a free bus service available for commutation to all the villagers. Nathugadh is the first fully Wi-Fi-covered village in India. There are also plans to do GIS mapping for the better implementation of many government schemes. Some of the popular national banks and their ATM centres are now available as well.

Education: Education for all and free for all is the mantra this village has aspired to adopt. nathugadh has five primary schools and four secondary schools. The class rooms in these schools are fully equipped with CCTV cameras, LED screens used for teaching, mineral water plants, separate toilets for girls and boys, computer labs, and well-stocked libraries. MidMeals programme of the central government has been successfully implemented. Availability of these basic amenities within the premises of schools has also helped to reduce the dropout rate to zero.

Health, Sanitation & Women Empowerment: NATHUGADH has a 24/7 primary health centre equipped with a pharmacy and a library. It also has a 24/7 maternity ward to encourage institutional deliveries in the village. In fact, the village has been successful in achieving the goal of 100% institutional deliveries. It has also been able to materialise the objective of 100% immunization and zero per cent infant and maternal mortality rate. The waste collection system offers door-to-door collection service. The street polluters are heavily fined. There are 109 women self-help groups in the village, which has helped and changed the lives of more than 1200 women involved in them. They provide vocational training in order to make women self-reliant.

Democratic Governance: A team of 22 full-time and 47 part-time employees along with the elected officials of the gram Panchayat under the leadership of village headperson run this local unit. The village has developed an effective mechanism to redress grievances through a toll-free number. A complaint register is maintained in order to ensure timely grievance redress. A co-ordination committee involving elected representatives and government officials works tirelessly to achieve the goals of good governance.

FIG 2 GLISMPSE OF NATHUGADH VILLAGE

1.4 SWOT analysis of Ideal village / Smart Village

Nathugadh model village definitely has an excellent record in terms of fewer people living below poverty line, availability of schools, water facilities, free Wi-Fi facility, roads, proper solid waste management etc. The village has proved itself on important development indicators like health,

education, social services, women empowerment, which have already been discussed in the previous section. However, during the field wok the author observed that mere physical indicators of development are at times misleading. A model village is not necessarily an ideal village. An ideal village in author's opinion is the one that has been able to transcend social inequalities, reduce subordination of women, develop true community spirit, and work tirelessly to respect and recognize constitutional values. Villages in India are notorious for the caste divide, communal tensions, social injustices, and, at times, instances of violence. NATHUGADH has performed exceptionally well in providing basic amenities, reducing inequalities among different social groups, and improving some major social indicators of development. However, it has yet to accomplish its goal of becoming an ideal village where every citizen hailing from different socio-economic background has a voice and choice. This was observed by the author while interacting with the current nathugadh village headwoman. Interaction with her has revealed certain issues that are conveniently overlooked under the grand saga of village development. These are discussed in the following paragraph.

Sunanda Patel, current village headwoman, hails from the dominant caste called Chawdhary Patel. Interestingly but not surprisingly, Himanshu Patel also comes from the same caste group. Ms Patel did not have any experience in governance and was never involved in any political activity, yet she was fully supported and backed by Himanshu Patel (former village headman) so that she could be successfully instituted as the headman of NATHUGADH Village. At the time of rural local body election in 2016, the post of village headperson was reserved for a female candidate (according to the provisions of the 73rd Constitutional Amendment Act). Himanshu Patel had to step down, but he wanted to institute a woman from his own caste group. Hence, it was necessary to prevent women from other caste groups from winning the election in the village. However, the fact was that women from other caste groups also stood for election. In order to prevent these other (read lower caste) women from becoming the village headperson, Himanshu Patel not only mobilised his resources but also the influence that he had earned in the past ten years. This was a strategic decision taken by this previous headman to enable him to continue his influence on village politics. Therefore, Ms Sunanda Patel was supported and eventually won. The author asked this new puppet-like female headman about her future plans – what strategies she would adopt to implement her plans, etc. The answers were imprecise and inefficient. In fact, within few minutes after the interview began, her husband joined her in the office and made sure that Ms Patel answered as per a pre-determined design. She was blowing the trumpet of development achieved by Himanshu Patel and could not say anything concrete about her plans and programmes. This interview has reinforced the fact that (in most cases barring few exceptions) a woman merely plays a role of a rubber stamp and real governance is in the hands of dominant village men. It also exposes the way rural democratic institutions are actually working in India (cf. Kumar, 2006). Another important fault line found in this village is that the Gram Sabha (village assembly) meetings are not conducted on regular basis. Article 243(b) defines the Gram Sabha as "a body consisting of persons registered in the electoral rolls

relating to a village comprised within the area of the Panchayat at the village level". Gram Sabha is an integral part of the Gandhian concept of village Swaraj (rural self-government).

The objective of Gram Sabha is to enable each and every voter in a village to participate in decision-making at the local level. It is a constitutional body consisting of all persons registered in the electoral rolls of the village Panchayat. It provides a political forum to people in the village where they can meet and discuss their common problems, and consequently, understand the needs and aspirations of the community. Thus, the Gram Sabha is expected to be an epitome of participatory, deliberative, and direct democracy. It is the body that should provide valuable inputs to the Gram Panchayat to lead local government effectively. The Gram Sabha is also to act as a watchdog in the interest of village communities by monitoring the functioning of the Gram Panchayat. However, the effectiveness of Gram Sabha has been marred by issues like social exclusion, dangerous information gap, political apathy on part of villagers, dependency syndrome, and political culture of patronage. Furthermore, Joshi (2017) stresses low participation in Gram Sabha meetings and irregular and informal ways of its conduct as some of the major concerns at the grass roots. These field observations gleaned from the model village nathugadh help us understand the fact that the physical development of a village does not necessarily promise change in its social environment.

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 NATHUGADH 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 NATHUGADH 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

Our allocated village is situated in Ghogha Taluka in Bhavnagar district. The team members have identified 'Vavdi' as smart village and 'Vavdi' as ideal village. Vavdi has many facilities and amenities by which it is ideal. This village is having all weather road and block paved streets. Vavdi also has its own Bus Station. In terms of sanitation, they have Public Toilet in the village. Vavdi village is popular for its primary school education facilities. A post office is in good working condition in the village whereas the village is educationally good also. So, overall the team members can put this village in ideal village category because it is fulfilling criteria of Planning commission report.

Vavdi is village situated near National Highway and hence the people living in the village can enjoy 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. The village has pucca roads and street light system along with sanitation in good condition. Viewing economical aspect it has facilities of dairy, ATMs, Post office, market etc. and overall education structure is also in good quality. Hence, the team members can consider this village as smart village.

After gap analysis and viewing these villages, the village Morchand has not various basic amenities like agricultural market and library and many other facilities in village. In terms of economical aspect, neither any bank nor an ATM is available in the village. Educational structure is good because of good number of schools and Anganwadis, but higher secondary school and hostel for students are unavailable. The village is not having good street light system and existing facilities need improvement. As many more things are to be planned there the team members can surely convince that an effort has been made here under Vishwakarma Yojana to introduce some designs and concepts for village development.

Chapter – 2: Literature Review – (Civil & Electrical Concept)

2.1 Introduction: Urban & Rural village concept

As per the Census of India (2011) document, the term 'urban' means constituents of urban area, which are Statutory Town (ST), Census Town (CT) and Outgrowths; while the term 'rural' means all the area other than urban area and whose basic unit is a revenue village. 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. Recently in Bhavnagar City, Adhewada Village has been merged in Bhavnagar Municipal Corporation and divided into 2 separate wards. Before few years, Sidsar Village – another village of Bhavnagar Taluka – was merged under the administrative boundary of Bhavnagar Municipal Corporation.

In the wake of current planning mechanisms, most of the urban villages have the pattern of development that emerges in these areas is haphazard and chaotic. Uncontrolled invasion of non-compatible land-uses and elimination of traditional interrelationships by outside and superfluous forces leads to the disintegration of the communities. As a consequence of economic and speculative forces unleashed on villages in the periphery of the metropolis, massive transformation in their physical form and socio-cultural setup takes place.

In the above context, it has been observed in Ahmedabad, before and after its involvement under Smart City Mission, some villages have experienced population growth rates of up to 700 per cent in a decade. The village is confronted with a forced upsurge of deleterious activities, but it lacks any mechanisms to control them earlier. Though, urban villages (just like Bavla in case of Ahmedabad) provide economic advantages such as cheap land prices and inexpensive housing to the service classes in the nearby metro city, their social and physical environment undergoes gradual upgradation. The land and property prices have evolved even in village Dholka, after Ahmedabad has been named in Smart City Mission !

At the country level, as an example of New Delhi, the journey for the rural village begins the day it is notified by the Municipal Corporation of Delhi (MCD) for acquisition. Panchayats are superseded and the Delhi Development Authority acquires the land for development works. The MCD deals with the supply of infrastructural facilities and once the development work is complete, the urban village is transferred to this body for maintenance and upkeep. The entire process may take anything between 15 to 20 years -- a fairly long period for a village to lie without coordinated administration. It is during this transition stage that maximum speculative development happens in the villages. Lack of land-use regulations give birth to several illegal colonies and absence of control over pollution norms result in small-scale polluting factories taking root. Some such as *Mundka* village in north Delhi emerge as the worst hit. Here environmentally hazardous activities such as the recycling of hospital waste and plastic waste

thrive. Following the government's ban on polluting industries, several of them continue to quietly operate behind closed doors. As the city sleeps, these units come alive.

In vision of a Civil Engineer and in context of town planning and regional planning, any particular patch of land – ranging from a small area to a town/city – should be planned and grown in controlled fashion. After naming the team under allocated village as part of Vishwakarma Yojana Project (VIII Phase), the team has made up its mind with the generalized goals like identifying problems to be addressed based on priority, lowering the migration from rural to urban centers, providing better living conditions in rural area along with visualization of the planned & controlled progressive growth of an allocated village after a decade or two.

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 urban village concept, on the part of all those individuals involved, (b) To assess the extent to which the urban 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 developed through a Master Plan, backed by a series of codes, and an environmental action plan covering how the environmental impact of the village is to be managed and minimized."

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.

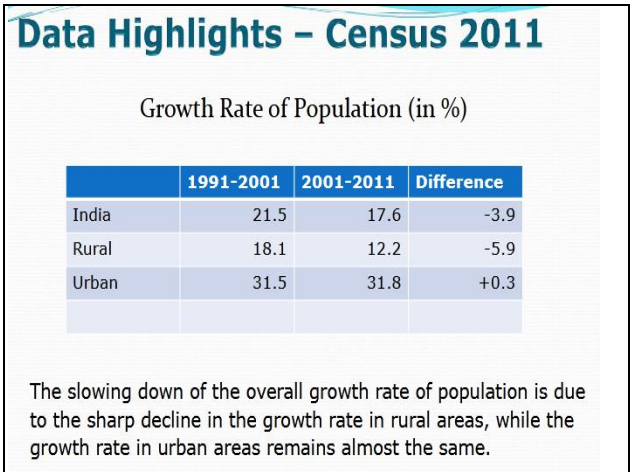

FIG 3 SENSUS DATA HIGHLIGHTS

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 going by census definition, a habitation is declared urba, 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: We 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:

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,

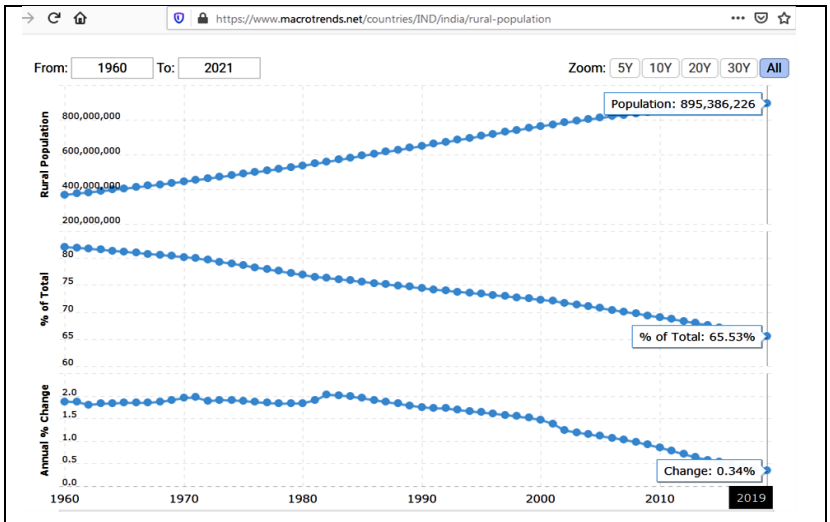

FIG 5 MIGRATION TRENDS OF LAST 5 YEAR

the size of Rural population is 833.1 million (or 68.84% 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 last decade 2001-11
- Whereas Non-EAG (Empowered Action Group) States have shown 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 wheelers.

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 by 42.60 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 SENSUS 2011 DATA

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.

Data on Rural & Urban Areas
Figures at a Glance
GUJARAT

	2001	2011
No. of Districts	25	26
No. of Sub-Districts	226	225
No. of Towns	242	348
No. of Statutory	168	195
No. of Census Towns	74	153
No. of Villages	18,539	18,225

Percentage of Urban Population	
2001	2011
37.36	42.58

		Total	Rural	Urban
Population	Persons	60,383,628	34,670,817	25,712,811
	Males	31,482,282	17,802,975	13,679,307
	Females	28,901,346	16,867,842	12,033,504

DECADAL Population GROWTH 2001-2011		Absolute			Percentage		
		Total	Rural	Urban	Total	Rural	Urban
	Persons	9,712,611	2,930,050	6,782,561	19.17	9.23	35.83
	Males	5,096,705	1,485,204	3,611,501	19.32	9.10	35.87
	Females	4,615,906	1,444,846	3,171,060	19.01	9.37	35.78

SEX RATIO (females per 1000 males)	918	947	880	

Population IN THE AGE GROUP 0-6		Absolute			Percentage to Total Population		
		Total	Rural	Urban	Total	Rural	Urban
	Persons	7,494,176	4,676,249	2,817,927	12.41	13.49	10.96
	Males	3,974,286	2,452,807	1,521,479	12.62	13.78	11.12
	Females	3,519,890	2,223,442	1,296,448	12.18	13.18	10.77

CHILD SEX RATIO (0-6 years) (females per 1000 males)	886	906	852	

LITERATES		Absolute			Literacy Rate		
		Total	Rural	Urban	Total	Rural	Urban
	Persons	41,948,677	21,896,928	20,051,749	79.31	73.00	87.58
	Males	23,995,500	12,756,737	11,238,763	87.23	83.10	92.44
	Females	17,953,177	9,140,191	8,812,986	70.73	62.41	82.08

FIG 6: DATA OF RURAL AND URABAN AREA

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.

2.7Various infrastructure guidelines 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.

2.9 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. Under the same scheme, the villages of "Rurban" area will be adopted by the engineering colleges under the Gujarat Technological University. The Engineering colleges would study the identified villages and make the recommendations on the application of technology to achieve integrated and comprehensive development, through project preparation and management.

CHAPTER – 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 **a** 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

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 liveability 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.

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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 prepare their 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 greenfield 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 for 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.

While, the framework and policy guidelines for the Smart City is as follows:

FIG 8 GUIDELINES FOR SMART CITY

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

3.4 Road Map and Safe Guards In context of ‘Smart Village’ or ‘Rurban Village’ and for 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.

Rurban Mission was implemented in 50 towns of Gujarat in 2011. The aim was to bridge the rural-urban divide and achieve balanced socio-economic development. Various yojanas like E-gram Vishvagram Yojana, Tirth Gram Yojana, Nirmal Gujarat, Swachha Gram Swasth Gram Yojana, Jamin Sampadan Yojana, Gram Mitra Yojana, Sardar Patel Awas Yojana were integrated to form Rurban schemes. As way forward, the various suggestions received in each of these included: (1) Encouraging public private partnership in physical and social infrastructure development etc., (2) Alliance of GSWC with spot exchanges, (3) Collaborations with NGOs, (4) Capacity building and skill development initiatives.

For the smart cities, The implementation of the Mission at the City level will be done by a Special Purpose Vehicle (SPV) created for the purpose. The SPV will plan, appraise, approve, release funds, implement, manage, operate, monitor and evaluate the Smart City development projects. Each Smart City will have a SPV which will be headed by a full time CEO and have nominees of Central Government, State Government and ULB on its Board. The States/ULBs shall ensure that, (a) a dedicated and substantial revenue stream is made available to the SPV so as to make it selfsustainable and could evolve its own credit worthiness for raising additional resources from the market and (b) Government contribution for Smart City is used only to create infrastructure that has public benefit outcomes. The execution of projects may be done through joint ventures, subsidiaries, public-private partnership (PPP), turnkey contracts, etc. suitably dovetailed with revenue streams.

The SPV will be a limited company incorporated under the Companies Act, 2013 at the city-level, in which the State/UT and the ULB will be the promoters having 50:50 equity shareholding. The private sector or financial institutions could be considered for taking equity stake in the SPV, provided the shareholding pattern of 50:50 of the State/UT and the ULB is maintained and the State/UT and the ULB together have majority shareholding and control of the SPV.

Funds provided by the Government of India in the Smart Cities Mission to the SPV will be in the form of tied grant and kept in a separate Grant Fund. These funds will be utilized only for the purposes for which the grants have been given and subject to the conditions laid down by the MoUD.

The State Government and the ULB will determine the paid up capital requirements of the SPV commensurate with the size of the project, commercial financing required and the financing modalities. To enable the building up of the equity base of the SPV and to enable ULBs to contribute their share of the equity capital, GoI grants will be permitted to be utilized as ULBs share of equity capital in the SPV, subject to the conditions given in Annexure 5. Initially, to ensure a minimum capital base for the SPV, the paid up capital of the SPV should be such that the ULB's share is at least equal to Rs.100 crore with an option to increase it to the full amount of the first instalment of Funds provided by GoI (Rs.194 crore). With a matching equity contribution by State/ULB, the initial paid up capital of the SPV will thus be Rs. 200 crore (Rs. 100 crore of GoI contribution and Rs. 100 crore of State/UT share). Since the initial GoI contribution is Rs.194 crore, along with the matching contribution of the State Government, the initial paid up capital can go up to Rs.384 crore at the option of the SPV. The paid up capital may be enhanced in the subsequent years as per project requirements, with the provision mentioned above ensuring that ULB is enabled to match its shareholding in the SPV with that of the State/UT.

After selection of the cities in Stage II of the Challenge, the process of implementation will start with the setting up of the SPV. As already stated, it is proposed to give complete flexibility to the SPV to implement and manage the Smart City project and the State/ULB will undertake measures. The SPV may appoint Project Management Consultants (PMC) for designing, developing, managing and implementing area-based projects. SPVs may take assistance from any of the empanelled consulting firms in the list prepared by MoUD and the handholding agencies. For procurement of goods and services, transparent and fair procedures as prescribed under the State/ULB financial rules may be followed. Model frameworks as developed by MoUD may also be used for Smart City projects.

3.5 Issues & Challenges

Issues in 'Smart Cities'

- Poor urban spatial planning is evident in the city with residential and industrial areas developed 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 with every 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 have access 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.

Challenges in 'Rurban Village'

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 Security or 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

From ideation to implementation at various levels, the monitoring can work as a key medium and hence it can be suggested to have 3 levels of committees i.e. National level, State level and City level, as detailed below:

National Level: An Apex Committee (AC), headed by the Secretary, MoUD and comprising representatives of related Ministries and organisations will approve the Proposals for Smart Cities Mission, monitor their progress and release funds. This Committee will meet periodically, as considered necessary.

State Level: There shall be a State level High Powered Steering Committee (HPSC) chaired by the Chief Secretary, which would steer the Mission Programme in its entirety. The HPSC will have representatives of State Government departments. The Mayor and Municipal Commissioner of the ULB relating to the Smart City would be represented in the HPSC. There would also be a State Mission Director who will be an officer not below the rank of Secretary to the State Government, nominated by the State Government. The State Mission Director will function as the Member-Secretary of the State HPSC.

City Level: A Smart City Advisory Forum will be established at the city level for all 100 Smart Cities to advise and enable collaboration among various stakeholders and will include the District Collector, MP, MLA, Mayor, CEO of SPV, local youths, technical experts, and at least one member from the respective area.

The implementation of the Mission at the City level will be done by a Special Purpose Vehicle (SPV) created for the purpose. The SPV will plan, appraise, approve, release funds, implement, manage, operate, monitor and evaluate the Smart City development projects. Each smart city will have a SPV which will be headed by a full time CEO and have nominees of Central Government, State Government and ULB on its Board. The States/ULBs shall ensure that, (a) a dedicated and substantial revenue stream is made available to the SPV so as to make it self-sustainable and could evolve its own credit worthiness for raising additional resources from the market and (b) Government contribution for Smart City is used only to create infrastructure that has public benefit outcomes. The execution of projects may be done through joint ventures, subsidiaries, public-private partnership (PPP), turnkey contracts, etc suitably dovetailed with revenue streams.

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 higher 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 2 LIST OF RURAL DEVLOPMENT SCHEME

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

There is no any project either at present or under pipeline contributed working by Government / NGO / Other as part of Digital Country Concept either in Bhavnagar City or District.

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 in 34 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. Besides the development of energy-smart villages mentioned before, the main products of the initiative's efforts are 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 funded by 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 at lessening 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 program aims 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. Despite 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 same time 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 no synthesis 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 within their frameworks, but also regarding some other reports and models, the energy sector lies at the core of dealing with sustainable and smart community development. Even though 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 European initiatives are working in the areas with basic infrastructure already provided and are therefore

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

Vavdi village is smart village in Ghogha taluka, which is 7 km away from Morchand village (allocated village) but due to COVID 19 our team didn't visit the village. Vavdi is a Village in Ghogha Taluka in Bhavnagar District of Gujarat State, India. It is located 37 km towards South from District head quarters Bhavnagar. 14 km from Ghogha. 233 km from State capital Gandhinagar

Vavdi Pin code is 364120 and postal head office is Tansa. Vavdi village have numbers of facilities like bus station, post office, primary school, secondary school, higher secondary school, hostel, hospital, water supply network, community hall, etc.

Vavdi 2011 Census Details

Vavdi Local Language is Gujarati. Vavdi Village Total population is 2132 and number of houses are 386. Female Population is 48.3%. Village literacy rate is 71.2% and the Female Literacy rate is 32.0%.

Population

Census Parameter	Census Data
Total Population	2132
Total No of Houses	386
Female Population %	48.3 % (1029)
Total Literacy rate %	71.2 % (1517)
Female Literacy rate	32.0 % (683)
Scheduled Tribes Population %	0.0 % (0)
Scheduled Caste Population %	2.8 % (59)
Working Population %	37.9 %
Child(0 -6) Population by 2011	231
Girl Child(0 -6) Population % by 2011	42.9 % (99)

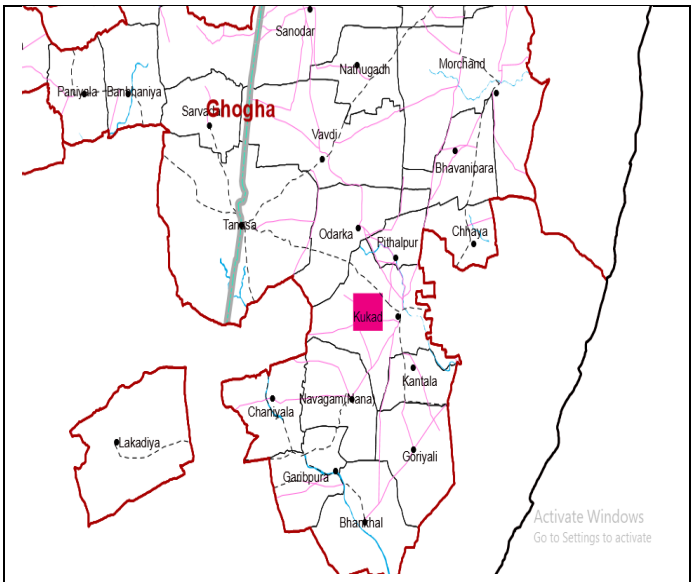


FIG 12 VAVDI VILLAGE MAP

Vavdi village is economically in good condition because of 90% families have own farm and animal husbandary business. In Vavdi village, 2 or 3 dairy is operated by privately. Good education facility in Vavdi village and good infrastructure of school with CCTV camera and mid day mil (MDM) available. Vavdi village have other facilities like gram panchayat, anganwadi, shops, good transportation facility and street light etc.

CHAPTER - 4. About <ALLOCATED VILLAGE>

4.1.1 INTRODUCTION:

About 70% of India's population, or 750 million, live in its 600,000 villages. The average village has 200-250 households, and occupies an area of 5 sq. km. Most of this is farmland, and it is typical to find all the houses in one or two clusters. Villages are thus spaced 2-3 km apart, and spread out in all directions from the market towns. The market centers are typically spaced 30-40 km apart. Each such Centre serves a catchment of around 250-300 villages in a radius of about 20 km. As the population and the economy grow, several large villages are continually morphing into towns and market centers. Around 65% of the State's population is living in rural areas. People in rural areas should have the same quality of life as is enjoyed by people living in sub urban and urban areas. Further there are cascading effects of poverty, unemployment, poor and inadequate infrastructure in rural areas on urban centers causing slums and consequential social and economic tensions manifesting in economic deprivation and urban poverty. Hence Rural Development which is concerned with economic growth and social justice, improvement in the living standard of the rural people by providing adequate and quality social services and minimum basic needs becomes essential. The present study deals with the same.
Vishwakarma Yojana would provide "Design to Delivery" solution for development of villages in 'Rurban' areas. The developmental work in villages that could undertake as per the need of the village in particular includes Physical infrastructure facilities (Water, Drainage, Road, Electricity, Solid waste Management, Storm Water Network, and 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.

4.1.2 NEED OF THE STUDY:

The need of the study is to provide the basic requirements of people in the village and for Rurban Development of the village. For this purpose the information of the village is collected based on different categories such as Education, Water Facilities, Drainage Facilities, Transportation Facilities, Primary Health Care, Bank Facilities, Public Toilets, Community hall and other amenities. 65% of the population of the country lives on agriculture which contributes only 15 % to the country's GDP. If The team members compare this with China which has a similar sector contribution to the GDP, only 30% of people depend on agriculture whereas in country like USA just 2% of the people are dependent on agriculture. Rurbanisation addresses this concern and imbalance by providing alternate jobs to rural masses dependent upon agriculture. So it is very important to develop rural area compare to urban one.

4.1.3 STUDY AREA:

Study area mainly includes study of Morchand Village which is situated at Ghogha Taluka in Bhavnagar District of Gujarat State, India. It also includes some sub-villages like Morchand, Bhavanipura, Ranadhar, Chhaya, Khadasaliya, and vadi-vistar.

The Vishwakarma Yojana is aimed to Rurban development of the village. For that purpose study area is decided for taking detail information of the village. The study area includes education, social life, basic needs of the person, economic growth of village, transport facilities etc.

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

4.1.4 OBJECTIVES OF THE STUDY:

Following are the various objectives of study…….

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

4.1.5 SCOPE OF THE STUDY:

By studying the present status and techno-economic survey of Morchand village in Bhavnagar

districts of the Gujarat state in terms of basic services, public amenities, other infrastructural facilities for the need of the people and to prepare a report on the expected socio-economic growth of the area with the consultation of TDO, DDO and headman; will help full in providing better facilities and services in village.

From the gap analysis, development strategies for village development will be proposed and planning proposals for Physical infrastructure, Social Infrastructure and Renewable energy Source will be suggested for the village.

The study will focus the development trend, growth of the village, and find out the problems related to the physical development of the area and infrastructure services of the village.

4.1.6 METHODOLOGY:

- First of all The team members studied what are the various goals and different objectives and aspect of Vishwakarma Yojana and also studied various basic definitions related to the project like rural area, urban area, urbanization etc.

- After this The team members contacted our village (Morchand) headman, talati mantri and different gram-panchayat members.

- Than after The team members frequently visited the Morchand village for the purpose of collecting various data related to various facilities and amenities and survey of different aspects related to physical, infrastructural, social facilities.

- Gap analysis is done based on data collected through survey of village. And various suggestions are made by us on development of village. And based on this suggestions The team members will design proposed facilities in the village according to the need and population of that village.

4.1.7 List of objects available related to civil/ electrical metdology

Following are some mentioned facilities:

- Drinking Water, Drainage network, sanitation facilities: Waste management facilities
- Transportation & road network
- Electricity
- Irrigation facilities
- Housing condition, health facilities
- Educational facilities, technology mobile/wifi/internet usage details. In percentage
- Sports activity as gram panchayat

- Socio- cultural facilities
- Concept of various type of method for transportation
- Various type method for drainage system
- various type method for roads
- Various type of environmental factors, any other details

The detail have to be collected and socio economic survey needs to be done. The problems in the villages and existing system needs to be addressed. The other required systems and designs must be proposed with drawing.

4.2) STUDY AREA PROFILE

4.2.1 & 4.2.2 STUDY AREA LOCATION & BASE LOCATION MAP:

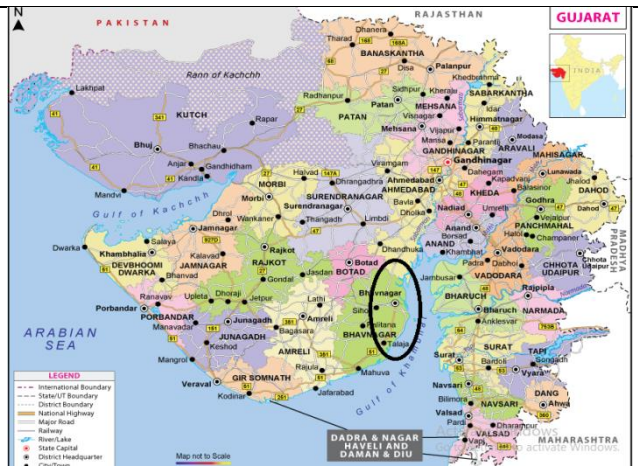


FIGURE 13: LOCATION DETAIL OF VILLAGE

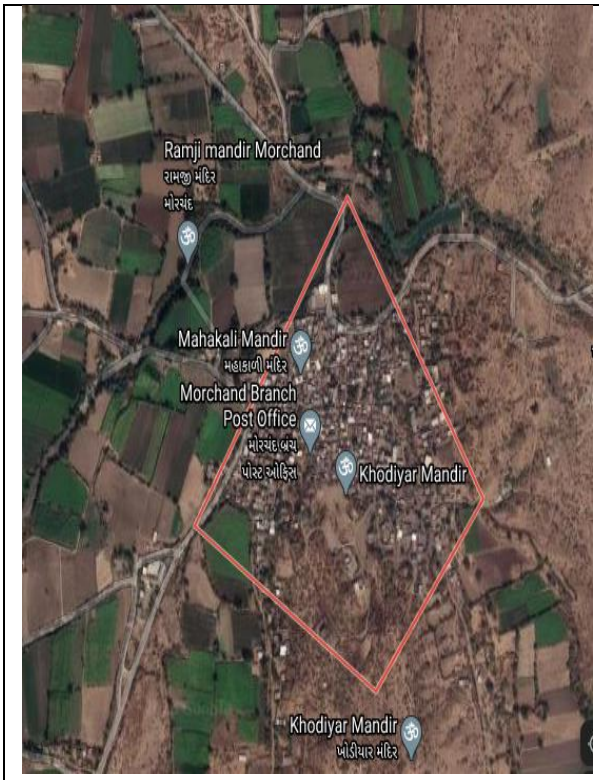


FIGURE14: BOUNDARY MAP OF MORCHAND FROM GOOGLE

Morchand village is situated on 21.545 latitude and 72.213 longitudes. Nearest town from Morchand village is Ghogha and it is 17 km away from Morchand. Morchand Village is situated at Ghogha Taluka in Bhavnagar District of Gujarat State, India. Morchand includes some sub-villages like Morchand,Bhavanipura,Badi,Padva,Vavdi and Khadasaliya. Indian Village-code of Morchand Is *516317*.

PIN: 364050

District: Bhavnagar

State: Gujarat

4.2.3 PHYSICAL & DEMOGRAPHICAL GROWTH:

Area of Morchand village (Approx.) is 7.73 sq. Miles (20.03 sq. km, 2003.72 hectares). Total agricultural land area of village is 1849.92 hectares.

NO.	Census	Population	Male	Female
1	2001	3558	1805	1753
2	2011	4492	2307	2185

TABLE 4 (DEMOGRAPHICAL DETAIL)

Future population calculation as per geometric increase method for 2021 will be 5671, and for 2031 will be 7160.

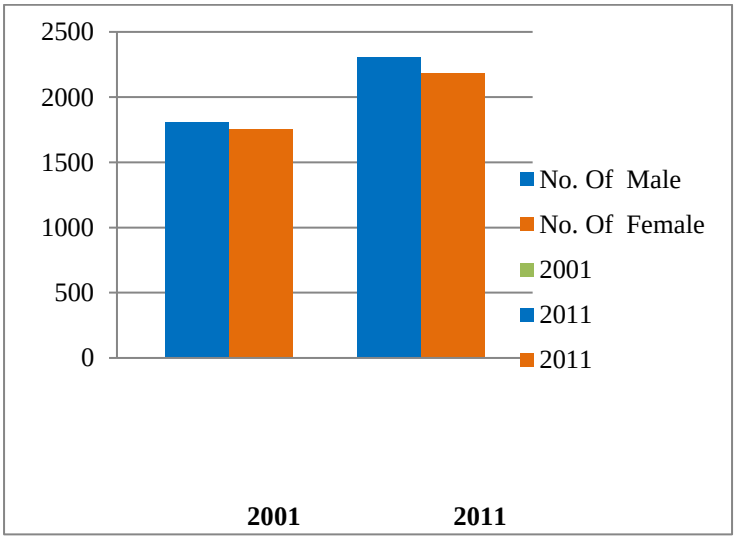


FIGURE15: POPULATION GRAPH

BRIEF HISTORY:

Morchand is a Village in Ghogha Taluka in Bhavnagar District of Gujarat State, India. It is located 33 KM towards South-East from District headquarters Bhavnagar. 225 KM from State capital Gandhinagar.

Urban areas around Morchand village are Ghogha, Alang and Talaja. Nearest town from Morchand village is Ghogha and it is 17 km away from Morchand. The village is known for its communal harmony.

4.2.4 ECONOMIC PROFILE:

Name of three major occupation groups in village are…..

1. Agriculture(70% of total population)
2. Labour work(20% of total population)
3. Business(10% of total population)

Majority Crops taken in village are Ground-nut, Bajra, Wheat, and Onion & Cotton. In Morchand village the labours concern with agricultural work are 25% of total population and concern with Padva thermal power plant and Alang ship braking yard are 15% of total population. Agriculture is the main occupation of Morchand village. Accept it some people are running stores (local shops).

4.2.5 ACTUAL PROBLEM FACED BY VILLAGERS AND SMART SOLUTION:

In Morchand village people most of problems faced due to infrastructure unavailability like bank,bus stop,liberary,school,hostel,agriculture market and etc. Is this problem solve by design all the structure by good planning management by administration of Morchand village.

First village needs to economically powerfull The team members should develop labour-intensive manufacturing units under Make-in-India so that villagers find suitable employment locally. Such units should be established in small-scale and cottage industries. Also, some industries should be reserved for small-scale units to avoid competition from bigger units. For this, skills of village labour through Skill India needs to happen.

Second, wherever relevant, rural and semi-urban areas should be well-connected with nearby tourist spots—enabling villagers to sell their products directly to tourists for better prices.

Third, The team members need to provide suitable ICT network in and around villages under Digital India, so that villagers are informed in real time about the prices of produce—both in agricultural sector as well as industrial. Farmers are already sharing and utilising necessary information delivered via TV and mobile phones to their advantage.

Fourth, the government must provide good sanitation facilities under Swachh Bharat Abhiyan. We also need to provide other necessary infrastructure such as efficient medical centres, potable water supply, housing and electricity for all, and power for industry, preferably from sources such as solar or wind, or even biomass.

The Centre and states are together spending a lot of money to set up 100 smart cities in the next 5-7 years. In addition, the private sector is expected to invest in cities of their interest. As per a 2016 study done jointly by IESE Business School of the University of Navarra, Spain, and Centre for Globalisation and Strategy, India's smart cities may take up to 15 years to reach global standards. This is because our four top cities—Mumbai, New Delhi, Bangalore and Kolkata—were ranked 167, 174, 176 and 179, respectively, out of 181 cities, based on the parameters of economy, human capital, technology, environment, international outreach, governance, planning, public management, social cohesion, mobility and transportation. In comparison, the extra expenditure to be incurred by the government in making villages smart would be a minuscule fraction. Here, The team members should not go by the sheer number of villages in India as they could be developed in clusters and the requirements in terms of infrastructure are moderate.

By developing smart villages, the poor would no longer remain a problem—rather, they would become a part of the solutions to various problems faced by cities. If the influx from rural India is not checked, smart cities would again be flooded with various problems in the course of time and the scarce resources and valuable time spent on making them smart would amount to nothing. Our cities have to be environmentally-sustainable and liveable, in consonance with UN Sustainable Development Goals, to attract foreign investment and drive future economic growth. So, developing smart villages is the crux.

Since the launch of the 'Community Development Programmes' on October 2, 1952, governments have been working on several rural development schemes but, alas, development has not been commensurate with the huge spending because of well-known reasons. Rampant corruption in implementation and lack of efficient monitoring, disjointed and fragmented planning by the concerned ministries and departments and the erstwhile Planning Commission are the factors responsible. As a lesson from past experience, I suggest that NITI Aayog or the Union ministry of rural development should work as a single, powerful coordinating authority to sort out various implementation issues arising from time to time. We should also reduce the number of these schemes, to the extent possible, to avoid duplication of efforts and for the ease

of correct **monitoring** of implementation.

4.2.6 SOCIAL SCENARIO:

In Morchand village all families are Hindu so all families celebrate festivals like Diwali, Navaratri, Makar sankranti, Holi, Dhuleti, Shiva ratri, Bhai bij and many other festivals celebrate round the year. Villagers eat healthy and vegetable Cuisine like Gujarati kadhi, undhiyu, samosa, dahi vada, chhas, ghi, rotala, etc. good think in this villagers is food come from most of own farming and its healthy food.

4.2.7 STUDY AREA LAND USE DETAILS

DESCRIPTION	AREA
AREA OF VILLAGE (APPROX.)	2003.72ha
FOREST AREA	-
AGRICULTURE AREA	1849.92 ha

TABLE 5 STUDY AREA LAND USE DETAIL

4.2.8 TO KNOW THE REASONS OF MIGRATIONS/TRENDS OF MIGRATIONS

There are total of 2307 male persons and 2185 females and a total number of 762 children below 6 years.

The percentage of male population is 51.35%

The percentage of female population is 48.64%

The percentage of child population is 9.35%

The basic reasons for the migrations: Higher studies, jobs and services after graduation, better perks and salaries at metro cities etc.

(4.3) DATA COLLECTION

4.3.1 MATHODS OF DATA COLLECTION:

Base line survey is a benchmark for any intervention during and post implementation of any development programme. A detailed baseline survey was undertaken which involved household census survey, Bio-physical survey and Village level data collection from headman. This gave in the details of the demographic profile of the village, the literacy percentage, SC/ST population, number of BPL household, cattle population and net consumption rate in the village, average

milk production of the cattle and various schemes running and their benefits Bio-physical survey was undertaken to identify various natural resources available in the village. It included the soil typology, well in the area, crop taken in the field, Cropping pattern, fertilizer used and various sources of irrigation in the field.

4.3.2 PRIMARY SURVEY DETAILS:

Primary survey is done in order to collect the basic information about various facilities available in the village. In this survey data is collected by various means like house to house means door to door survey, by interviewing people, school teachers, shop keepers, and other public. Accuracy of this data is not sufficient means that data based on primary survey is not reliable or very accurate. Variances in the data happened due to different views of people.

We checked the infrastructure condition of different buildings like school, gram-panchyat,Anganwadi and community hall etc. And also check the condition of various basic amenities like water supply, drainage, electricity, bus station, Animal hospital, PHC, overhead tank and underground sump etc. Secondary survey includes data collection from various government offices like gram panchyat, school, PHC, etc.

We collect the data related total population of the Morchand village , male female ratio, literacy rate of village, growth rate, number of schools, various government schemes running for village development, area of village, agricultural area of village, major occupations, major crops taken, water supply source for drinking as well as irrigation water, etc.

4.3.3 AVERAGE SIZE OF HOUSE

Average size of the house is reported as 15ft. x 18ft.

4.3.4 GEO-TAGGING OF HOUSE

The most of the house were only masonary and concrete build rather than the village huts. The geographical feature is very ortho topographical as mountains are also present nearby. There is about 762 houses out of this 720 used for residing.

4.3.5 NO. OF HUMAN BEING IN ONE HOUSE

In village genrally each family consists average area 5 to 6 m. there are around 800 children in village.

4.3.6 WHICH MATIRIALS USED LOCALLY

For the house, they used mainly bricks, sands and woods. As bricks manufacturing is available in near village bricks are economical for them.

4.3.7 OUT SOURCED MATIRIALS

Concrete materials, cements are reainforced materials are outsourced only.

4.3.8 LABOUR WORK DOING

Most of villagers of the Morchand connected with farming and household work only. Some of them having their own small scale business like shops, stalls, drivers of the own transportation vehicles, etc.

4.3.9 ANY COASTING

Due to good connectivity with near by cities and also good connectivity with national highway. Village has less transportation coast.

4.3.10 GEOGRAPHICAL DETALE:

Morchand village is located in Ghogha Tehsil of Bhavnagar district in Gujarat, India. It is situated 21km away from sub-district headquarter Ghogha and 33km away from district headquarter Bhavnagar. As per 2009 stats, Morchand village is also a gram panchayat. The total geographical area of village is 2003.72 hectares.

4.3.11 DEMOGRAPHICAL DETAILE:

Following table is showing the sex ratio of female and male and literacy rate of village population as per census data for year 2001 and 2011.

Sex-Ratio (Female/Male)	Literacy rate
.9711% IN 2001	67.88% IN 2001
.9471% IN 2011	74.30% IN 2011

TABLE 6 (SEX-RATIO & LITERACY RATE)

Following table is about cast vise population detail as per population data of 2011 of census

India.

	TOTAL
GENERAL	3594
OBC	719
OTHER	179

TABLE 7 (CAST VISE POPULATION)

(4.4) INFRASTRUCTURE DETAILE

4.4.1 DRINKING WATER

Pure drinking water is supplied through underground pipes in easy way from Narmada River to the underground storage tanks and from tank it is supplied to the village.

As per standard data of NBC code, 100 liters of water is required for per person per day in village area. Total 987000 liters of water is needed for whole village per day. This is sufficient for the whole village.Tank capacity is 10 lakh liters.

FIGURE 16 : UNDER GROUND TANK (10 LAKH LITERS)

4.4.2 DRAINAGE NETWORK:

Almost in all areas of village an underground drainage network is available which remain in good working condition throughout a year. RCC piped network has been established across the village. Underground drainage system is preferable for good health conditions. Diameter of pipe is 30 cm, which is sufficient for the peak hour discharge.

4.4.3 TRANSPORTATION & ROAD NETWORK:

An approach road of RCC material to reach Morchand village is available, but in poor condition. Streets are in acceptable condition in village. Internal streets are in good weather condition and

suitable in all weathers like monsoon. Quality of internal streets is good due to pavement block to be provided. Morchand village is 15 km away from NH 51.

A Bus-station is available in Morchand village near Juna Padar area, but without proper infrastructure. As per the population of Morchand village, it needs to be constructed. Nearest bus station is Bhavnagar bus station (33 km away from Morchand). A railway-station is not available in the village, while the nearest railway-station is 35 km away, i.e. Bhavnagar-Terminus.

FIG 17: INTERNAL STREET

FIGURE 18: APPROACH ROAD

4.4.4 HOUSING CONDITION:

Both kutchha and pucca houses were observed in Morchand village, whose approximate ratio is nearly 50:50. Housing conditions are needed to be improved. Most of the houses have bath-toilet facility and electricity.

FIGURE 19 :BUS STATION AREA

4.4.5 SOCIAL INFRASTRUCTURE FACILITIES:

Primary health center is available in village near gram panchayat area which is near to center of village and it is under construction with adequate capacity.

FIGURE 20 :PHC FACILITY MORCHAND

The health facilities are also available for animals.

FIGURE 21 :GOVERNMENT ANIMAL HOSPITAL MORCHAND

4.4.6 EDUCATION FACILITIES:

4 primary and 1 secondary schools are available in the Morchand village which is sufficient for whole village population, but higher secondary school is required, too. 3 aaganwadis (ICDS) are available in the village, which is not sufficient for whole village population and areas as 1 more ICDS is required. ITI College is not available in village because there is less number of people doing higher studies and ITI is available nearby in Ghogha Village.

FIGURE 22: PRIMARY SCHOOL

FIGURE 23 :SECONDARY SCHOOL

FIGURE 24 : ANGANWADI

4.4.7 TECHNOLOGY MOBILE/WIFI/INTERNET USAGE DETAILS IN %

After the digitalization, the use of internet is also increasing day by day in the villages. Most of the villagers used their personal mobile phones and there is not facility of public wifi in the village. Total 90% of public of village are using their personal cell phones.

4.4.8 SPORTS AVTIVITY AS GRAM PANCHAYAT

Open spaces are present in the villages along with grounds, for children and other villagers to play and perform recreational activities. At government school, there is available special play ground for children's.

4.4.9 SOCIO- CULTURAL FACILITIES:

Various socio-cultural facilities like Public Library, Public Garden /Park, Village Pond are not available in the village. One community hall is available in the village. Accept it no other recreational facilities are available in the village.

4.4.10 OTHER FACILITIES:

- One post office is available in Morchand.
- A gram panchyat building and computer room is available in Morchand village which need to be repair or reconstruct.

4.4.11 OTHER DETAILE:

4.4.11.1 ELECTRICITY:

Government electricity is available in village and it is supplied almost for 24 hours. In all the government buildings like gram-panchyat, phc, anganwadi, schools, post- office; good electrification is available which is adequate.

4.4.11.2 SANITATION FACILITIES:

Public toilet blocks are available in the Morchand village. In government buildings like gram panchyat, phc, school,community hall and animal hospital are own sanitation facilities. Accept it most of houses have their own toilet-bath facilities.

FIGURE 25: POST-OFFICE

4.4.11.3 IRRIGATION FACILITIES:

Irrigation water is available in adequate amount for agricultural activities from well and spring through submersible pipes farmers have their own deep wells in their farms. Farmers use conventional irrigation system like border strip system which results in waste full use of water. It is advisable to use drip-irrigation system to conserve water.

4.5 ELECTRICAL CONCEPT

Electrical concepts includes the efficient energy principles.

4.5.1 RENEUABLE ENERGY SOURCE PLANNING PERTICULARLY FOR VILAGES

Planning for 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.

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

- Small solar electricity systems
- Small wind electricity systems
- Microhydropower system
- Small hybrid electric systems(solar and wind)

Planning for home renewable energy system is processed that include analyzing your existing electricity use looking at local codes undertaking technology options you have for your site.

4.5.2 IRRIGATION FACILITY

Irrigation is the application of controlled amounts of water to plants at needed intervals. Irrigation helps to grow agriculture crops, maintain landscapes, and rejuvenate 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 rainfed.

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 like drip, sprinkler, etc. have 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.

Lateral move irrigation Water is distributed through a series of pipes, each with a wheel and a set of sprinklers, which are rotated either by hand or with a purpose-built mechanism. The sprinklers move a certain distance across the field and then need to have the water hose reconnected for the next distance. This system tends to be less expensive but requires more labor than others.

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 The Village selected for the Vishwakarma Project Phase VIII is situated in bhavnagar District and the name of Village is Morchand. The village administration served from the Gram panchayat Morchand, bhavnagar. The basic and other details of the Morchand Village is depicted below.

Locality Name : MORCHAND

City Name : BHAVNAGAR

District : BHAVNAGAR

State : GUJARAT

Language : Gujarati and Hindi

Time zone: IST (UTC+5:30)

Pin Code: 364050

4.6.1 Bachat Mandali

Banks are present in the villages where villagers can deposit and collect their money. Also ATM‘s are there in the village from which the money can be collected for local expense.

4.6.2 Dudh Mandali

which can The local Dhudh mandli be referred to as a local dairy is also situated in the village.

4.6.3 Mahila forum

There are various rights and reserved honours for the ladies in the era of local self-government in the villages. The women empowerment schemes are onserved in the villages as well.

4.6.4 Plantation for the Air Pollution

The village gram panchayat organizes the programs such as tree plantation and awareness camps for the restoration of the local natural air. As the industrial tract is away from the village and no big industry is near the village so air pollution is not causing any problem within the village.

4.6.5 Rain Water Harvesting Rainwater harvesting is the accumulation and storage of rainwater for reuse on-site, rather than allowing it to run off. Rainwater can be collected from rivers or roofs, and in many places, the water collected is redirected to a deep pit (well, shaft, or borehole), aquifer, a reservoir with percolation, or collected from dew or fog with nets or other tools. Its uses include water for gardens, livestock, irrigation, domestic use with proper treatment, indoor heating for houses, etc. The harvested water can also be used as drinking water, longer-term storage, and for other purposes such as groundwater recharge.

Presently the practices of rain water harvesting is not followed but can be planned for the Chital village.

4.6.6 Agricultural Development

Agriculture is the science and art of cultivating plants and livestock. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities. The history of agriculture began thousands of years ago. After gathering wild grains beginning at least 105,000 years ago, nascent farmers began to plant them around 11,500 years ago. Pigs, sheep and cattle were domesticated over 10,000 years ago. Plants were independently cultivated in at least 11 regions of the world. Industrial agriculture based on large-scale monoculture in the twentieth century came to dominate agricultural output, though about 2 billion people still depended on subsistence agriculture into the twenty-first.

4.6.7 Any Other

- Balika Samridhdhi Yojana
- Mid-day Meal Programme
- Intergrated Child Development Scheme(ICDS)
- Mahila Mandal Protsahan Yojana (MMPY)
- National food For Work Programme (NFFWP)
- National Rural Employment Programme
- Prime Minister Rojgar Yojana (PMRY)

Chapter 5. Technical Options with Case Studies

5.1 Concept (civil)

Sustainability is defined the desire to perform activities without any depletion of resources or bringing any harmful effect on the environment. Practicing sustainable construction methods will help avoiding harmful effects from construction activities. Construction involves activities like use of building materials from various sources, use of machineries, demolition of existing structures, use of green fields, cutting down of tress etc. which can impact environment in one or more ways. Civil engineering field being the major part of the economy, it is very essential that sustainable construction practice dominate the past followed conventional construction practice and methods.

Construction has a direct impact on the environment due to following reasons:

1. Generation of waste materials
2. Emissions from vehicles, machineries
3. Noise pollution due to use of heavy vehicles and construction machineries.
4. Releases of wastes and pollutants into water, ground and atmosphere.

Sustainability assessment of construction projects is essential to the fact that it does not create any harmful effects on the living ecosystem while optimizing the cost of construction. This is to ensure the availability of resources for the future generations.

1. Biodiversity Enhancement
2. Support to the Community
3. Effective Use of Resources
4. Pollution Reduction
5. Creating Healthy Environment
6. Process Management

5.1.1 Advance construction techniques

The construction industry is repeatedly criticised for being inefficient and slow to innovate. The basic methods of construction, techniques and technologies have changed little since Roman times. But the application of innovation in the construction industry is not straight forward.

Every construction project is different, every site is a singular prototype, construction works are located in different places, and involve the constant movement of personnel and machinery. In addition, the weather and other factors can prevent the application of previous experience effectively.

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.

Incorporating advanced construction technology into practice can increase levels of quality, efficiency, safety, sustainability and value for money. However, there is often a conflict between traditional industry methods and innovative new practices, and this is often blamed for the relatively slow rate of technology transfer within the industry.

The adoption of advanced construction technology requires an appropriate design, commitment from the whole project team, suitable procurement strategies, good quality control, appropriate training and careful commissioning.

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 areused 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

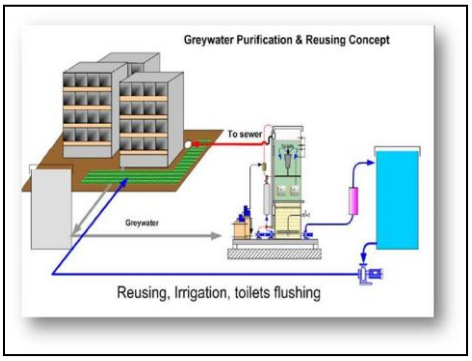
Another innovation for the top of commercial properties comes from green roofs. Grass, plants, flowers, bushes and other greenery grows on the roofing material. Stormwater is absorbed into the soil and managed more easily than with a bare roof. Heating and cooling costs are reduced, and the air quality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

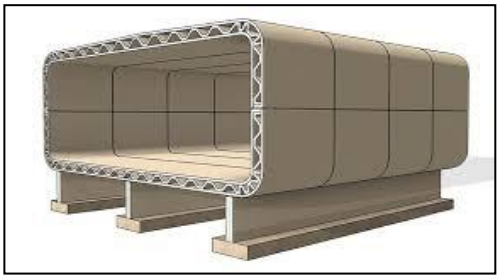
Greywater systems reduce the facility's need for fresh water, as everything except for toilet streams can be processed for reuse. The most common uses for this water include irrigation and supplying toilets with water.

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

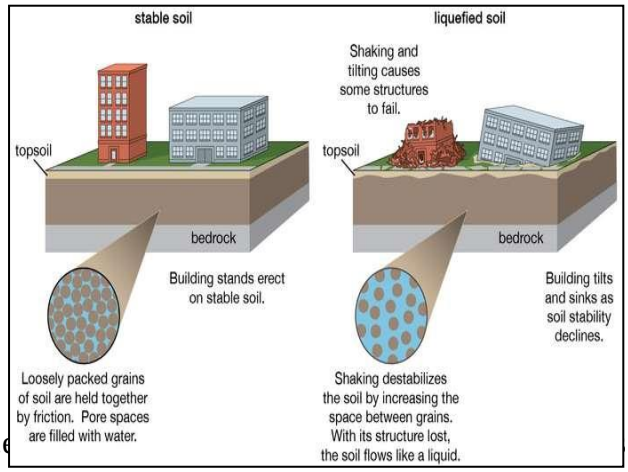
This material is in its early stages, but once it's commercially viable it opens up many sustainable possibilities. Everything from roads to walkways can benefit from concrete that heals itself. Road crews would no longer need to shut down busy streets and highway lanes to address potholes and cracks

5.1.2 Causes Prevention And Repair of Cracks In Building / rectification of building tilt / rehabilitation techniques

Repair and rehabilitation of existing damaged concrete structures have emerged as one of the most important construction activities globally. Money used on repairing damaged structures has exceeded that of the money used on building new structures. The earthquake strikes recently in Asian countries such as Japan and Borneo Malaysia have attracted the attention of structural engineers and scholars on the research and development of rapid repairing techniques. Confinement is one of the rapid repairing techniques that is popular and proven to be efficient in restoring the original capacities of damaged concrete. Although many research investigations have been done to confirm the suitability of these techniques in repairing damaged concrete structures, there are several barriers that hindered the widespread use in practical. These barriers include the lack of design and installation guidelines and long-term durability studies.

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 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.

5.1.3 Disaster management in natural calamities

Disaster Management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters.

Disaster management in India it refers to the conservation of lives and property during a natural and man-made disaster. Disaster management plans are multi-layered and are planned to address issues such as floods, hurricanes, fires, mass failure of utilities , rapid spread of disease and droughts. India is especially vulnerable to natural disasters because of its unique geo-climatic conditions, having recurrent floods, droughts, cyclones, earthquakes, and landslides. As India is a very large country, different regions are vulnerable to different natural disasters. For

example, during rainy season the peninsular regions of South India is mostly affected by cyclones and states of West India experience severe drought during summer.

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 Various types of Roads / Intelligent transport system

A **road** is a route, or way on land between two places that has been surfaced or otherwise improved to allow travel by foot or some form of conveyance, including a motor vehicle, cart, bicycle, or horse. Roads have been adapted to a large range of structures and types in order to achieve a common goal of transportation under a large and wide range of conditions.

The roads are classified based on many factors as follows.

- Materials
- Location & function
- Traffic volume
- Width
- Economy
- Traffic type
- Rigidity
- Topography

Types of Roads Based on Materials

- Earthen roads
- Gravel roads
- Murrum roads
- Kankar roads
- WBM roads
- Bituminous roads
- Concrete roads

An **intelligent transportation system** (**ITS**) is an advanced application which aims to provide innovative services relating to different modes of transport and traffic management and enable users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.

Some of these technologies include calling for emergency services when an accident occurs, using cameras to enforce traffic laws or signs that mark speed limit changes depending on conditions.

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

5.1.5 Various type of Environmental Factors

An **environmental factor**, **ecological factor** or **eco factor** is any factor, abiotic or biotic, that influences living organisms Abiotic factors include ambient temperature, amount of sunlight, and pH of the water soil in which an organism lives. Biotic factors would include the availability of food organisms and the presence of conspecifics, competitors, predators, and parasites.

Environmental factors such as pH, temperature, dissolved oxygen, salinity, and additional toxicants are always important considerations when characterizing bioaccumulation and toxicity. Most of these environmental variables will affect the rates of uptake and elimination (toxicokinetics) of a toxicant, which can greatly affect the amount accumulated and the resulting toxic response. Additionally, even when two individuals contain equal concentrations of a toxicant in their tissues, many of these environmental factors can affect the potency (toxicodynamics) of the compound by one of several actions, such as altering biochemical rates or changing membrane permeability.

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 E – waste disposal / Any Waste disposal

In India, the quantity of ―e-waste‖ or electronic waste has now become a major problem. Disposal of e-waste is an emerging global environmental and public health issue, as this waste has become the most rapidly growing segment of the formal municipal waste stream in the world. E-waste or Waste Electrical and Electronic Equipment (WEEE) are loosely discarded, surplus, obsolete, broken, electrical or electronic devices. In India most of the waste electronic items are stored at households as people do not know how to discard them. This ever-increasing waste is very complex in nature and is also a rich source of metals such as gold, silver, and copper, which can be recovered and brought back into the production cycle. So e-waste trade and recycling alliances provide employment to many groups of people in India. Around 25,000 workers including children are involved in crude dismantling units in Delhi alone where 10,000–20,000 tonnes of e-waste is handled every year by bare hands. Improper dismantling and processing of e-waste render it perilous to human health and our ecosystem. Therefore, the need of proper e-waste management has been realized. It is necessary to review the public health risks and strategies to combat this growing menace.

5.1.7 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure

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 of steel, cracking and spalling of concrete cover thereby reducing durability of concrete structure . Repair has been suggested as the protective solution for damaged structure due to corrosion.

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

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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.

5.2 Concept (Electrical)

Efficient energy consumption system is the need of hour.

5.2.1 Local / Out Source of Energy

Electrical supply is through the Electric poles and wires and no system of electricity developed for self generation near the study area such as wind mill or small scale hydroelectric plants.

5.2.2 Auto Intensity Controlled Solar LED Street Light / High Power LED

Street lights are presents and during the night time efficient lighting within the village is observed.

5.2.3 Automatic Water Plant System / Designing of DC Motor Speed Control Unit / Irrigation Water Pump Controller for Illiterates Using GSM

At present not any automatic water plant system is present in the village. An irrigation sprinkler (also known as a water sprinkler or simply a sprinkler) is a device used to irrigate agricultural crops, lawns, landscapes, golf courses, and other areas. They are also used for cooling and for the

control of airborne dust. Sprinkler irrigation is the method of applying water in a controlled manner in way similar to rainfall. The water is distributed through a network that may consist of pumps, valves, pipes, and sprinklers. Irrigation sprinklers can be used for residential, industrial, and agricultural usage. It is useful on uneven land where sufficient water is not available as well as on sandy soil. The perpendicular pipes, having rotating nozzles on top, are joined to the main pipeline at regular intervals of time. When water is allowed to flow through the main pipe under pressure with the help of pump it, escapes from the rotating nozzles. It gets sprinkled on the crop. In sprinkler or overhead irrigation, water is piped to one more central locations within the field and distributed by overhead high pressure sprinklers or guns.

5.2.4 Central Control Unit for Irrigation Water Pumps Construction

Irrigation is done through the mode of controlled furrow and sprinkler system in some regions. Central controlled units may be designed for the effective irrigation supply.

5.2.5 Design of Sensing Soil Moisture Content By Auto Irrigation System

Smart irrigation systems tailor watering schedules and run times automatically to meet specific landscape needs. These controllers significantly improve outdoor water use efficiencies.

Unlike traditional irrigation controllers that operate on a preset programmed schedule and timers, smart irrigation controllers monitor weather, soil conditions, evaporation and plant water use to automatically adjust the watering schedule to actual conditions of the site.

For example, as outdoor temperatures increase or rainfall decreases, smart irrigation controllers consider on site-specific variables, such as soil type, sprinklers‘ application rate, etc. to adjust the watering run times or schedules. There are several options for smart irrigation controllers.

5.2.6 Energy Meter Reading with Load Control Using GSM

- **Wire less GSM/GPRS systems With *CityLight* software for constant monitoring, controlling and logging of switching on time, RTC data, electricity parameters and faults.**

- Low annual operating cost type **GSM** base are among the most inexpensive wireless technologies available. And Low initial costs of installation As **GSM** wireless, there is no need to establish cable connection and is easily expandable to new areas and cities. Also it required no **government licensing.**

5.2.7 Street Light Monitoring and Control System

- Fast detection of errors by feeder pillar and along with GSM communication the street lights are always online any fault in street lighting electrical circuits is known to the operator within sort time. Simultaneously User settable Mobil no of supervisor and technician for instantaneous fault reporting.
- *Unit self generate data massage* like, ON time, Off Time, Power Down time, Auto mode, Manual Mode, Volt Fault, Over Current Fault, Short Circuit Fault, Neutral Fault, RTC Fault, Memory Fault, Low Ampere Fault, Door Open, Relay Fault, Calibration Data, and acknowledge the massage received from master like E Stop, Test Mode, Live Status, E Profile, parameter update, All this massage contain All electrical parameter with real-time clock date and time. it send to *CityLight* software through GSM/GPRS systems.

5.3 DESIGN OF FOUNDATION

Design a plain concrete footing for a column of 400 mm x 400 mm carrying an axial load of 400 kN under service loads. Assume safe bearing capacity of soil as 300 kN/m^2 at a depth of 1 m below the ground level. Use M 20 and Fe 415 for the design

Step 1: Transfer of axial force at the base of column

It is essential that the total factored loads must be transferred at the base of column without any reinforcement. For that the bearing resistance should be greater than the total factored load P_u.

Here, the factored load P_u = 400(1.5) = 600 kN.

The bearing stress, as per cl.34.4 of IS 456 and given in Eqs.11.7 and 8 of sec.11.28.5(g) of Lesson 28, is

with a condition that

$(A1/A2)^{1/2} \leq 2$.

Since the bearing stress

O_{br} at the column-footing interface will be governed by

the column face, The team members have A1 = A2 = 400(400) = 160000 mm2. Using A1 = A2, in Eq.11.7, The team members have

Pbr = Bearing force = 0.45 fck A1 = 0.45(20)(160000)(10-3) = 1440 kN > Pu (= 600 kN).

Thus, the full transfer of load Pu is possible without any reinforcement.

Step 2: Size of the footing

Let us assume the weight of footing and back fill soil as 15 per cent of P_u. Then, the base area required = 400(1.15)/300 = 1.533 m^2. Provide 1250 x 1250 mm (= 1.5625 m^2) as shown in Fig.11.29.1. The bearing pressure q_a = 400(1.15)/(1.25)(1.25) = 294.4 kN/m^2

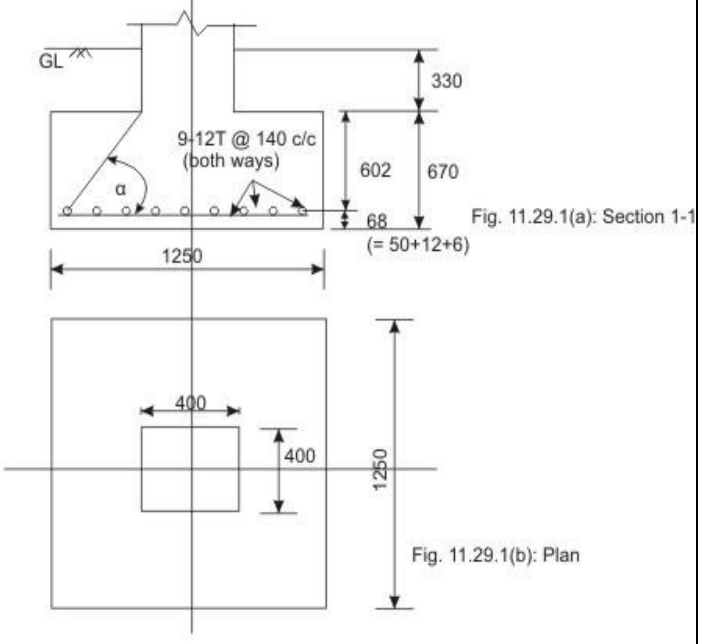


FIG NO 27: DESING OF FOUNDATION

Step 3: Thickness of footing

The thickness of the footing h is governed by Eq.11.3 of sec.11.28.5 of Lesson 28. From Eq.11.3, The team members have

$$\tan\alpha \leq 0.9\{(100qa/fck) + 1\}1/2 \quad \ldots. (11.3)$$

$$\leq 0.9[\{100(0.2944)/20\} + 1]1/2$$
$$\leq 1.415$$

We have from Fig.11.29.1a:

h = {(1250 - 400)/2}(tan) = 601.375 mm

Provide 1250 x 1250 x 670 mm block of plain concrete.

Step 4: Minimum reinforcement

The plain concrete block 1250 x 1250 x 670 shall be provided with the minimum reinforcement 0.12 per cent for temperature, shrinkage and tie action.

Minimum A_{st} = 0.0012(1250)(670) = 1005.0 mm^2.

Provide 9 bars of 12 mm diameter (= 1018 mm^2) both ways as shown in Fig.11.29.1b. The spacing of bars = (1250 - 50 - 12)/8 = 148.5 mm c/c. Provide the bars @ 140 mm c/c.

Step 5: Check for the gross base pressure

Assuming unit weights of concrete and soil as 24 kN/m^3 and 20 kN/m^3 Service load = 400.00 kN
Weight of footing = (0.67)(1.25)(1.25)(24) = 25.125 kN Weight of soil
= (0.33)(1.25)(1.25)(20) = 10.3125 kN
Total = 435.4375 kN
q_a = 435.4375/(1.25)(1.25) = 278.68 kN/m^2 < 300 kN/m^2

Hence, o.k.

CHAPTER NO. 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 Panchayati Raj Institutions.
- Encouraging affordable and proper technology for ecological life and sustainable sanitation.
- The schools which are not covered under Sarva Siksha Abiyan 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.

During village visit the team members observed cleanliness at various major places like Primary school, secondary school, PHC, temples, approach roads, internal streets, anganwadi and gram-panchayat, etc. The cleanliness can be categorized in 'good' class. In a conversation with the headman, he said that people pay a lot of attention to cleanliness in the village and there is a door-to-door garbage collection facility by the panchayat. The headman of the village, the members of the Panchayat, the school principal and the people of the village are very much aware about hygiene. There are heaps of dung somewhere in this village, but the people here also take care that it does not spread the disease and they also spray medicine. This is a good thing, many hygiene programs are organized in the village and the house by Asha workers from home to home hygiene is inspected.

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.
- Convert dry latrines to pour flush latrines, and eliminate manual scavenging practice, wherever in existence in urban areas.

In context of above features and under Swachh Bharat Mission, following guidelines have been framed by Government of India. The guidelines are with hyperlink, so that the successors in Vishwakarma Yojana can get an advantage of directly referring the guidelines and can find the report worth reading:

No.	Title
1	Swachh Bharat Mission - Urban Guidelines
2	G.R. Pay & Use Toilet
3	G.R. Individual Toilet
4	G.R. Pay & Use Block
5	Gujarat State Urban Solid Waste Management and Sanitation Policy-2018
6	Solid Waste Management Rules 2016
7	Plastic Waste Management Rules 2016
8	Gujarat Waste Energy Policy 2016
9	Construction and Demolition Rules 2016
10	Advisory on decentralised composting
11	Bulk Waste Generator Book
12	C&D Waste Ready Reckoner

No.	Title
13	Waste to Wealth
14	GR Of Kailashdam
15	UD AND UHD GR DATED-20.01.2015 FOE 'OPEN DEFECATION FREE TOWNS'

TABLE 8 REFRNCE AND GUIDELINES

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

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 meagre 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:

Due to covid 19 lockdown in Morchand village, villagers is close all roads of village coming from district and other village. Due to the corona virus, the villagers avoided going out without work. Inside the village, 70 % of the people were engaged in farming and could not walk without leaving the house, so those who went out of the house had to follow the guidelines of the government. When the lockdown was imposed, migrants from villages and small towns across India who had moved to big cities in search of jobs and better lives lost their jobs. Faced with the difficult decision of staying put and starving, or walking back home to their villages, many migrants chose to walk home, often walking for days, often going without food and water. Many of them had older family members in tow and carried young children on their shoulders. The return of these migrants to their villages posed special problems for the heads of the villages because they had to be quarantined, and many migrants were unwilling to allow themselves to be quarantined.

The biggest concern in the village was for the rabi crop. “In the case of rabi crops, mostly wheat, and chickpeas, sorghum, paddy and other crops, harvesting has been hampered due to lockdown for various reasons. The availability of labor, the scarcity of family labor, the availability of machines, the practice of physical distance and the fear of the police were the major obstacles in the harvesting of rabi crops in the village.

During covid 19 awareness regarding word pandemic situation is most important in village, so some educated villagers,headman,panchayat member and government health officer is start people awareness program in Morchand village

Following activities were conducted recently:

1. Creating awareness about what is Covid-19 virus, how it spreads and explaining how social distancing checks spread of coronavirus
2. Demonstrating how wearing of masks can reduce the risk of infecting others and protecting ourselves
3. Correct method of using and discarding the masks
4. Distribution of masks to the villagers
5. Demonstration of correct method of washing with soap
6. Effective use of sanitizers and
7. Distribution of sanitizers to the panchayat cleaning staff

Due to COVID 19 or heavy rain in Gujarat different area in monsoon agricultural crops like cotton, groundnut, etc. were damaged. As 70% of the people of Morchand village depend on agriculture, as mentioned above, the loss of crops caused huge loss to the people financially and that reasons Morchand village economy is decreased and now people have not enough money to purchase a seeds, government have announce krushi sahay package it's good help of farmers.
Testing facilities available in Morchand primary health centre, testing is conducted through the rapid test kit. Great thing about Morchand village is that no any positive case found during lockdown as well as during unlock. This shows that the villagers have proper awareness and management of village is nice.

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

As mentioned earlier, the team members found themselves unable to carry out any 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

(Scenario / Existing Situation / Proposed Design in Auto cad / Recapitulation Sheet / Measurement Sheet / Abstract Sheet / Sustainability of Proposal / Any other software)

Proposed Design in the village

1. Design of anganwadi building

2. Design of agricultural product market building

3. Design of school building

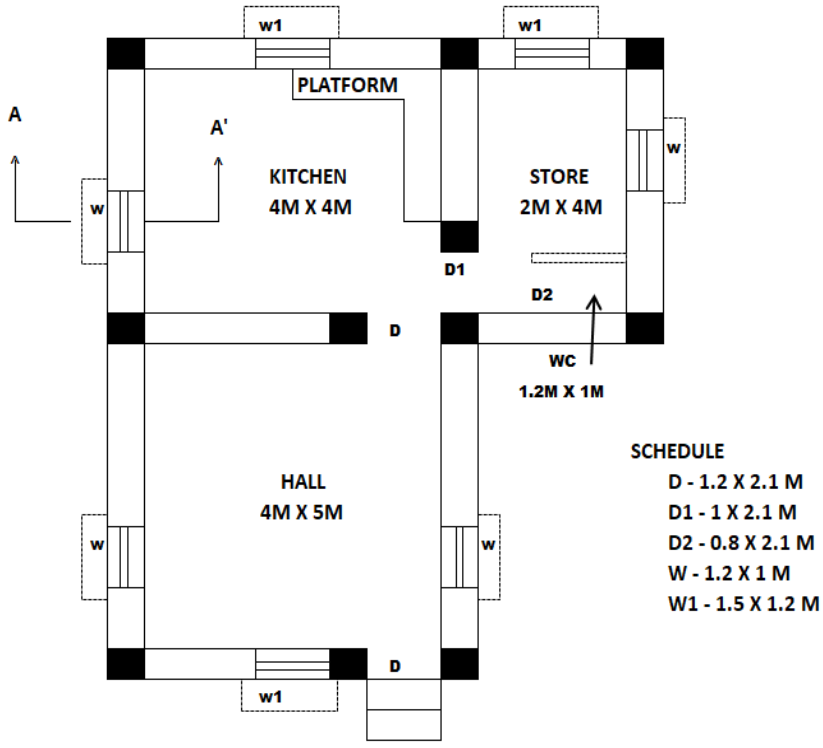
4. Design of hostel building

5. Design of bank

6. Design of library

8.1 Design Proposals

1. Design of anganwadi building



FLOOR PLAN OF ANGANWADI MORCHAND VILLAGE

FIG 28 DESING OF AGANWADI

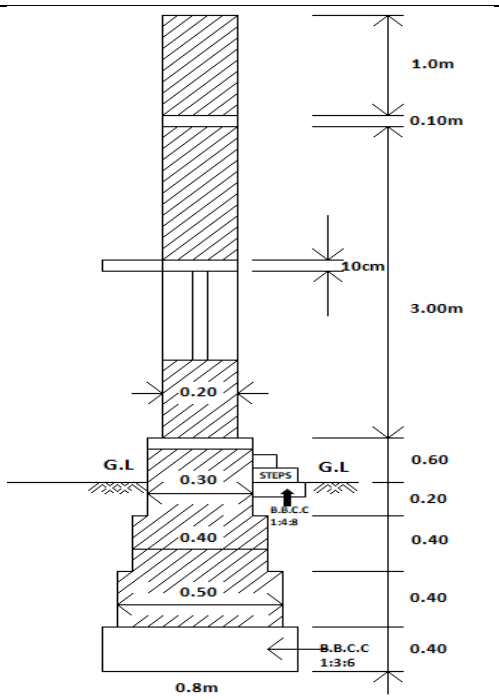


FIG 29 FOUNDATION DETAIL OF AGANWADI

Measurement sheet

No.	Item Description	No.	Length (m)	Breadth (m)	Depth (m)	Quantity (m^2 or m^3)
1	Excavation in foundation					
	Long walls : (vertical)	2	10.2	0.8	1.4	22.85
	Long walls : (Right side)	1	5	0.8	1.4	5.6
	Short walls	3	3.4	0.8	1.4	11.42
	Short walls	2	1.4	0.8	1.4	3.14
	Below steps (Assume depth .2 m.)	1	1.2	0.6	0.2	0.14
						Total quantity = 43.15 m^3
2	BBCC (1:3:6)					
	Long walls : (vertical)	2	10.2	0.8	0.4	6.53
	Long walls : (Right side)	1	5	0.8	0.4	1.6
	Short walls	3	3.4	0.8	0.4	3.26
	Short walls	2	1.4	0.8	0.4	0.9
						12.29 m3

No.	Item Description	No.	Length (m)	Breadth (m)	Depth (m)	Quantity (m^2 or m^3)
3	Brick work upto plinth in c.m. (1:6)					
	(1) Long walls					
	Step 1	2	9.9	0.5	0.4	3.96
	Step 2	2	9.8	0.4	0.4	3.14
	Step 3	2	9.7	0.3	0.75	4.36
	(2) Long walls					
	Step 1	1	4.7	0.5	0.4	0.94
	Step 2	1	4.6	0.4	0.4	0.74
	Step 3	1	4.5	0.3	0.75	1.01
	(3) Short walls					
	Step 1	3	3.7	0.5	0.4	2.22
	Step 2	3	3.8	0.4	0.4	1.82
	Step 3	3	3.9	0.3	0.75	2.62
	(4) Short walls					
	Step 1	2	1.7	0.5	0.4	0.68
	Step 2	2	1.8	0.4	0.4	0.58
	Step 3	2	1.9	0.3	0.75	0.85
						Total quantity = 22.92 m^3
4	DPC (1:2:4) above plinth walls.					
	Long walls	2	9.7		0.3	5.82
	Long walls	1	4.5		0.3	1.35
	Short walls	3	3.9		0.3	3.51
	Short walls	2	1.9		0.3	1.14
						11.82 m^2
5	Earth filing in plinth					
	Hall	1	4.9	3.9	0.45	8.59
	Store room	1	3.9	1.9	0.45	3.33
	Kitchen	1	3.9	3.9	0.45	6.84
						18.76 m^3
6	RCC work for slab (1:2:4)					
	Hall and Kitchen	1	9.6	4.4	0.1	4.22
	Store room	1	4.4	2.2	0.1	0.968
						5.18 m^3

No.	Item Description	No.	Length (m)	Breadth (m)	Depth (m)	Quantity (m^2 or m^3)
7	Brickwork for steps					
	Lower step	1	1.2	0.6	0.2	0.144
	Upper step	1	1.2	0.3	0.2	0.072
						0.216 m^3
8	Mosaic tile flooring					
	Hall	1	3	5		15
	Store room	1	2	4		8
	Door sills – D	2	1.2	0.2		0.48
	D1	1	1	0.2		0.2
	D2	1	0.8	0.2		0.16
						23.84 m^2
9	Wood work for door-window (sq.m)					
	D	2	1.2		2.1	5.04
	D1	1	1		2.1	2.1
	D2	1	0.8		2.1	1.68
	W	4	1.2		1	4.8
	W1	3	1.5		1.2	5.4
						19.02 m^2
10	Smooth plaster on inside walls and ceiling					
	in cm. (1:3)					
	Long walls	2	9.6		3	57.6
	Long walls	1	4.4		3	13.2
	Short walls	3	3		3	27
	Short walls	2	2		3	12
	Hall Ceiling	1	5	4		20
	kitchen Ceiling	1	4	4		16
	Store room Ceiling	1	4	2		8
						153.80 m^2
	Deduction for doors/windows:					
	D	2	1.2		2.1	5.04

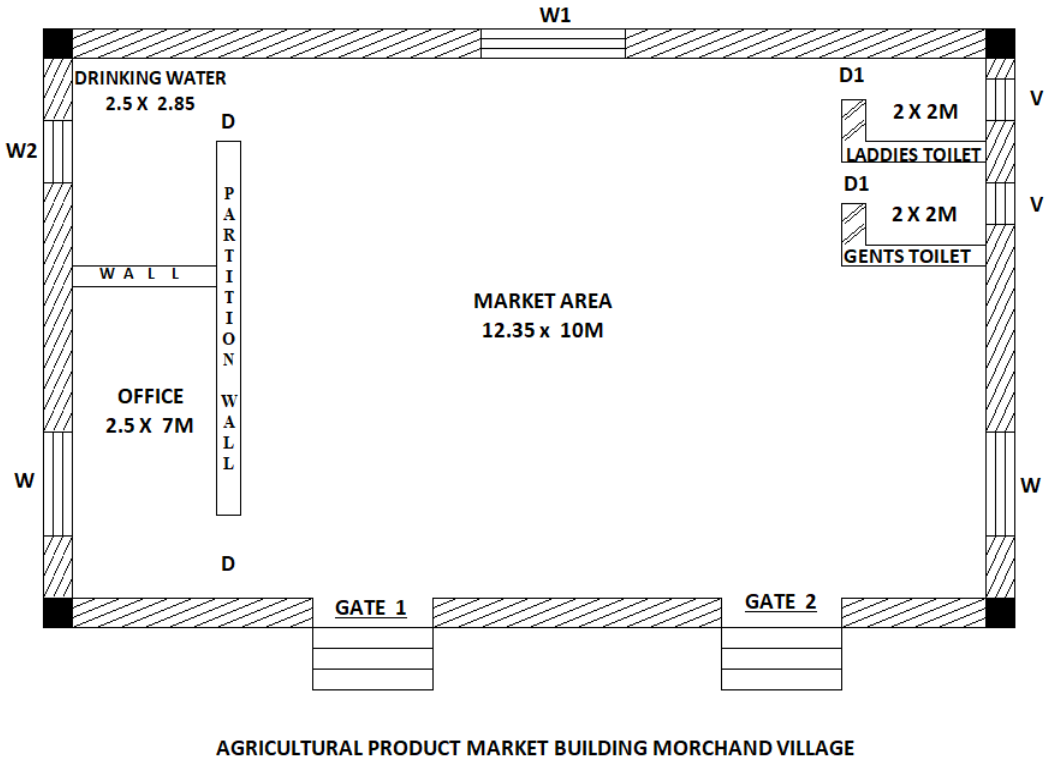
No.	Item Description	No.	Length (m)	Breadth (m)	Depth (m)	Quantity (m^2 or m^3)
	D1	1	1		2.1	2.1
	D2	1	0.8		2.1	1.68
	W	4	1.2		1	4.8
	W1	3	1.5		1.2	5.4
						Total deduction = 19.02 m^2
						Net quantity = 134.78 m^2
	Outerside plaster up to parapet wall					
	Long walls	2	9.6		4.1	78.72
	Long walls	1	4.4		4.1	18.04
	Short walls	3	3		4.1	36.9
	Short walls	2	2		4.1	16.4
	Deduction for doors/windows:	(-)	(-)		(-)	(-)15.24
						134.82 m^2
						Total quantity = 269.6 m^2
11	Brickwork in super structure in cement					
	mortar 1:4 (up to slab)					
	Long wall	2	9.6	0.2	3	11.52
	Long wall	1	4.4	0.2	3	2.64
	Short wall	3	4	0.2	3	7.2
	Short wall	2	2	0.2	3	2.4
	Number of bricks for parapet wall :	1	29.6	0.2	1	5.92
	In 1 m^3 brickwork 500 bricks are required.					**29.68 m^3**
	So, total bricks = 5.92 x 500 = 2960 nos.					
	Deduction for door/windows:					
	D	2	1.2	0.2	2.1	1.008
	D1	1	1	0.2	2.1	0.42
	D2	1	0.8	0.2	2.1	0.336
	W	4	1.2	0.2	1	0.96
	W1	3	1.5	0.2	1.2	1.08

No.	Item Description	No.	Length (m)	Breadth (m)	Depth (m)	Quantity (m^2 or m^3)
						(-)3.804 m3
	Deduction for lintels: 15cm bearing at each end					
	D	2	1.5	0.2	0.1	0.06
	D1	1	1.3	0.2	0.1	0.026
	D2	1	1.1	0.2	0.1	0.022
	W	4	1.5	0.2	0.1	0.12
	W1	3	1.8	0.2	0.1	0.108
						(-)0.336 m^3
						Total deduction = 4.14 m^3
						Net quantity = 25.54 m^3

Abstract Sheet

No.	Item Description	Qty.	Rate	Per	Amount Rs.
1	Excavation in foundation	43.15	85	m^3	3667.75
2	BBCC (1:3:6)	12.29	2700	m^3	33183
3	Brick work upto plinth in c.m. (1:6)	22.92	3200	m^3	73344
4	DPC (1:2:4) above plinth walls	11.82	150	m^2	1773
5	Earth filing in plinth	18.76	50	m^3	938
6	RCC work for slab (1:2:4)	5.18	8800	m^3	45584
7	Brickwork for steps	0.216	3200	m^3	691.2
8	Mosaic tile flooring	23.84	500	m^2	11920
9	Wood work for door-window shutters	19.02	7800	m^2	148356
10	Smooth plaster inside, outerside and Ceiling in c.m.(1:3)	269.6	150	m^2	40440
11	Brick work for in Super structure	25.54	3500	m^3	89390
				Rs.	449287
				Add 5%	22464
				Rs.	471751

2.Design of agricultural product market building



FI G 31 PLAN DESING OF AGRICULTURE PRODUCTS MARKET

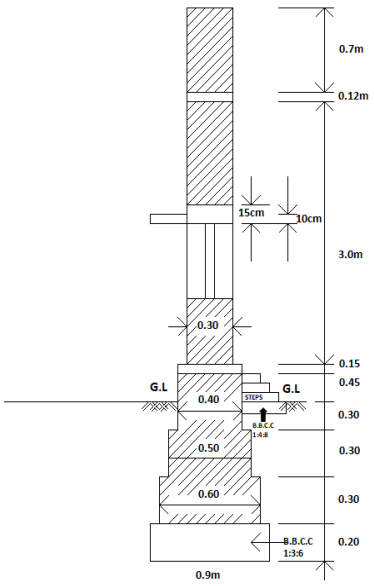


FIG 32 FOUNDATION DETAIL OF AGRICULTURE PRODUCTS MARKET

Measurement sheet

Sr. No.	Item Name	Nos.	L (M)	B (M)	H (M)	Quantity (m^3)
1	Excavation for Building in soft Soil (1) Long wall (2) Short wall	 2 2	 16.35 9.4	 0.9 0.9	 1.1 1.1	 32.37 18.61 ——— 50.98 m^3
2	BBCC (1:4:8) 1) Long wall 2) Short wall	 2 2	 16.35 9.4	 0.9 0.9	 0.2 0.2	 5.88 3.38 ——— 9.26m^3
3	Brick masonry up to plinth 1) Long wall • Step 1 • Step 2 • Step 3 2) Long wall • Step 1 • Step 2 • Step 3	 2 2 2 2 2 2	 15.95 15.85 15.75 9.8 9.9 10	 0.5 0.4 0.3 0.5 0.4 0.3	 0.3 0.3 0.85 0.3 0.3 0.85	 4.785 3.80 8.03 2.94 2.376 5.1
						——— 27.031m^3
4	Brick masonry above plinth 1) Long wall 2) Short wall Deduction=6.556 m^3	 2 2	 0.3 0.3	 3 3	 15.75 10 46.35-6.556 = 39.80 m^3	 28.35 18 ——— 46.35m^3

5	R.C.C Slab, lintel, chajja 1. Slab 2. Chajja 3. Lintel	 1 W1=6 W2=1 –	 15.75 1.8 1.5 –	 10.6 0.6 0.6 –	 0.12 0.10 0.10 –	 20 0.648 0.09 0.82 m^3 ——— 21.56 m^3
6	Earth filling	1	15.15	10	0.55	83.32m^2
7	Internal smooth plaster 1. long wall 2. short wall 3. ceiling Deduction	 2 2 1 -	 15.15 10 15.15 -	 - - 10 -	 3 3 _ - 302.4- 9.55=	 90.9 60 151.5 9.55 ——— 292.85m^2
8	Outer plaster 1. long wall 2. short wall 3. Deduction	 2 2 -	 15.75 10.6 -	 - - -	 3.1 3.1 - 163.37- 9.55=	 **97.65** **65.72** 9.55 m^2 ——— 153.82 m^2

Abstract sheet

Item Name	Quantity	Rate	Per	Amount
Excavation for Bus stand	50.98	85	m^3	4333.3
BBCC (1:4:8)	9.26	2700	m^3	25002
Brick masonry up to plinth	27.031	3200	m^3	86499.2
Brick masonry above plinth	39.80	3500	m^3	139300

R.C.C Slab, lintel ,chajja	21.56	8800	m^2	189728
Earth filling	83.32	50	m^3	4166
Internal smooth plaster	292.85	150	m^2	43927.5
Outer plaster	153.82	150	m^2	23073
Total cost of building = 516029 Rs				

3.DESIGN OF LIBRARY BUILDING

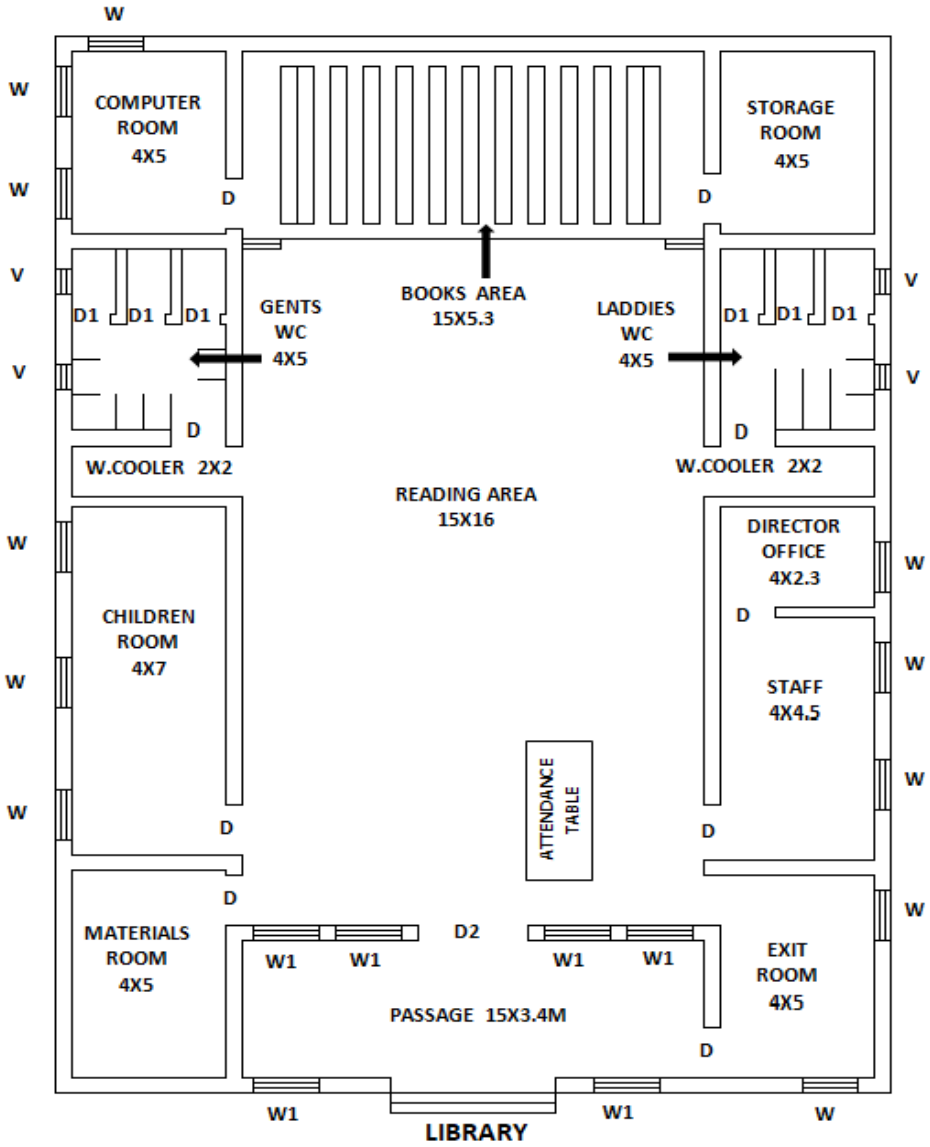


FIG 34 PLAN OF LIBRARY BUILDING

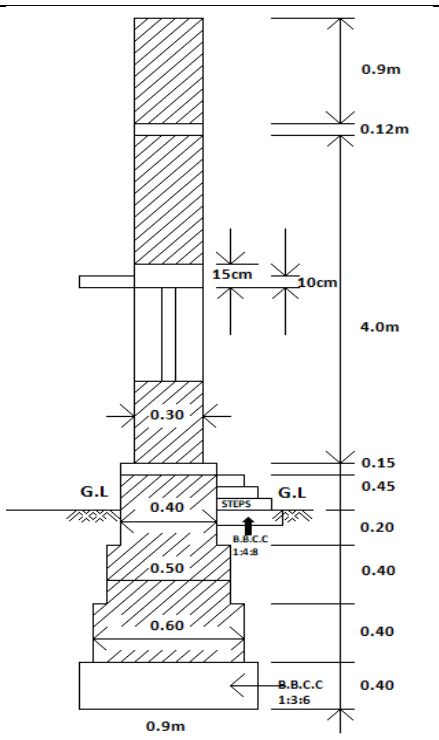


FIG 35 PLAN OF LIBRARY BUILDING

Measurement sheet

No	Item Description	No.	Length (m)	Breadth (m)	Height (m)	Quantity
1	Excavation in foundation					
	Long walls : (vertical)	4	26.8	0.9	1.4	135.072
	Short walls 1	3	14.4	0.9	1.4	54.432
	Short walls 2	10	3.4	0.9	1.4	42.84
	Below steps (Assume depth .2 m.)	1	5	0.6	0.2	0.6
					Total quantity = 232.94 m^3	
2	BBCC (1:3:6)					
	Long walls : (vertical)	4	26.8	0.9	0.4	38.592
	Short walls 1	3	14.4	0.9	0.4	15.552
	Short walls 2	10	3.4	0.9	0.4	12.24
						66.38 m3
3	Brick work upto plinth in c.m. (1:6)					
	(1) Long walls					

	Step 1	4	26.5	0.6	0.4	25.44
	Step 2	4	26.4	0.5	0.4	21.12
	Step 3	4	26.3	0.4	0.75	31.56
	(2) Short walls 1					
	Step 1	3	14.7	0.6	0.4	10.584
	Step 2	3	14.8	0.5	0.4	8.88
	Step 3	3	14.9	0.4	0.75	13.41
	(3) Short walls 2					
	Step 1	10	3.7	0.6	0.4	8.88
	Step 2	10	3.8	0.5	0.4	7.6
	Step 3	10	3.9	0.4	0.75	11.7
					Total quantity = 139.17 m^3	
4	DPC (1:2:4) above plinth walls.					
	Long walls	4	26.3		0.4	42.08
	Short walls 1	3	14.9		0.4	17.88
	Short walls 2	10	3.9		0.4	15.6
						75.56 m^2
5	Earth filing in plinth					
	COMPUTER+STORE+WC+MATERIAL+EXIT	6	4	5	0.45	54
	CHILDREN+STAFF ROOM	2	4	7	0.45	25.2
	BOOK AREA	1	15	5.3	0.45	35.775
	HALL	1	15	16	0.45	108
	PASSAGE	1	15	3.4	0.45	22.95
	WATER COOLER ROOM	2	4	2	0.45	7.2
						253.92 m^3
6	Brickwork in super structure in cement					
	mortar 1:4 (up to slab)					
	Long wall	4	26.2	0.3	4	125.76
	Short wall 1	3	15	0.3	4	54
	Short wall 2	10	4	0.3	4	48
	Partition wall	3	4	0.2	4	9.6
	Parapet wall					
	Long wall	2	26.2	0.3	0.9	14.148
	Short wall	2	23.6	0.3	0.9	12.744
						264.25 m^3
	Deduction for door/windows:					
	D	9	1.2	0.3	2.1	6.804
	D1	6	0.9	0.2	2.1	2.268
	D2	1	2.5	0.3	2.1	1.575

	W	11	1.2	0.3	1.2	4.752
	W1	6	2	0.3	1.2	4.32
	V	4	0.6	0.3	0.5	0.36
						(-)20.08 m3
	Deduction for lintels: 15cm bearing at					
	each end					
	D	9	1.5	0.3	0.12	0.486
	D1	6	1.2	0.2	0.12	0.1728
	D2	1	2.8	0.3	0.12	0.1008
	W	11	1.5	0.3	0.12	0.594
	W1	6	2.3	0.3	0.12	0.4968
	V	4	0.9	0.3	0.12	0.1296
						(-)1.98 m^3
					Total deduction =	**22.06 m^3**
					Net quantity =	**242.19 m^3**
7	Brickwork for steps					
	Lower step	1	5	0.6	0.2	0.6
	Upper step	1	5	0.3	0.2	0.3
						0.9 m^3
8	2cm thick marble flooring					
	COMPUTER+STORE+WC+MATERIAL+EXIT	6	4	5		120
	CHILDREN+STAFF ROOM	2	4	7		56
	BOOK AREA	1	15	5.3		79.5
	HALL	1	15	16		240
	PASSAGE	1	15	3.4		51
	WATER COOLER ROOM	2	4	2		16
	Door sills – D	9	1.2	0.3		3.24
	D1	6	0.9	0.2		1.08
	D2	1	2.5	0.3		0.75
						567.57 m^2
9	Wood work for door-window (sq.m)					
	D	9	1.2		2.1	22.68
	D1	6	0.9		2.1	11.34
	D2	1	2.5		2.1	5.25
	W	11	1.2		1.2	15.84
	W1	6	2		1.2	14.4
						69.51 m^2

10	RCC work in slab, chajja and lintel					
	RCC slab	1	26.2	24.2	0.12	76.0848
	RCC chajja					
	W	11	1.2	0.6	0.1	0.792
	W1	6	2	0.6	0.1	0.72
					RCC lintels (From item no.6)	1.98
						79.57 m^3
11	Smooth plaster on inside walls and ceiling					
	in cm. (1:3)					
	COMPUTER+STORE+WC+MATERIAL+EXIT					
	Long wall	12	5		4	240
	Short wall	12	4		4	192
	Ceiling	6	5	4		120
	CHILDREN+STAFF ROOM					
	Long wall	4	7		4	112
	Short wall	4	4		4	64
	Ceiling	2	7	4		56
	BOOK AREA+HALL					
	Long wall	2	21.3		4	170.4
	Short wall	2	15		4	120
	Ceiling	1	21.3	15		319.5
	PASSAGE					
	Long wall	2	3.4		4	27.2
	Short wall	2	15		4	120
	Ceiling	1	15	3.4		51
	WATER COOLER ROOM					
	Long wall	4	2		4	32
	Short wall	4	4		4	64
	Ceiling	2	2	4		16
						1704.1 m^2
	Deduction for doors/windows:					
	D	9	1.2		2.1	22.68
	D1	6	0.9		2.1	11.34
	D2	1	2.5		2.1	5.25
	W	11	1.2		1.2	15.84
	W1	6	2		1.2	14.4
	V	4	0.6		0.5	1.2
						70.71 m^2

						Net quantity = 1633.39 m^2
	Outerside plaster up to parapet wall					
	Long walls	2	26.2		5	262
	Short walls 1	2	15		5	150
	Short walls 2	4	4.6		5	92
	Deduction for doors/windows:	(-)	(-)		(-)	(-)70.71
						433.29 m^2
						Total quantity = 2066.65 m^2

Abstract sheet

No.	Item Description	Qty.	Rate	Per	Amount Rs.
1	Excavation in foundation	232.94	85	m^3	19799.9
2	BBCC (1:3:6)	66.38	2700	m^3	179226
3	Brick work upto plinth in c.m. (1:6)	139.17	3200	m^3	445344
4	DPC (1:2:4) above plinth walls	75.56	150	m^2	11334
5	Earth filing in plinth	253.92	50	m^3	12696
6	RCC work for slab ,Chajja and lintels	79.57	8800	m^3	700216
7	Brickwork for steps	0.9	3200	m^3	2880
8	2cm thick marble flooring	567.57	500	m^2	283785
9	Wood work for door-window shutters	69.57	7800	m^2	542646
10	Smooth plaster inside, outerside and Ceiling in c.m.(1:3)	2066.65	150	m^2	309997.5
11	Brick work for in Super structure	242.19	3500	m^3	847665
				Rs.	3355589
				Add 5%	167779.5
				Rs.	3523369

8.4 DESIGN OF HOSTEL

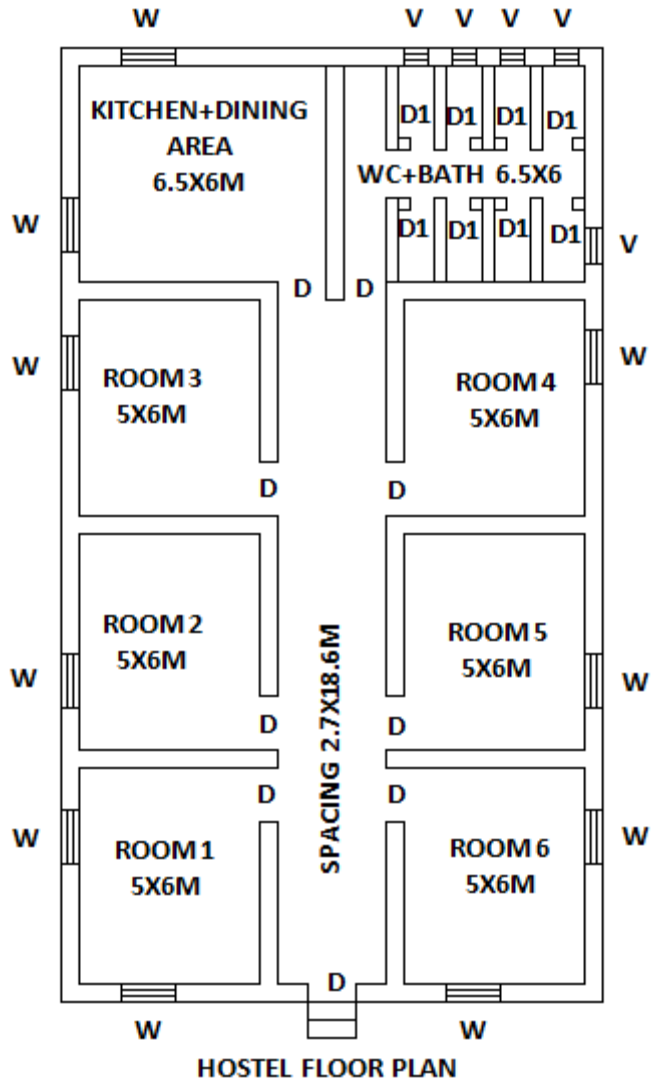


FIG 37 HOSTEL FLOOR PLAN

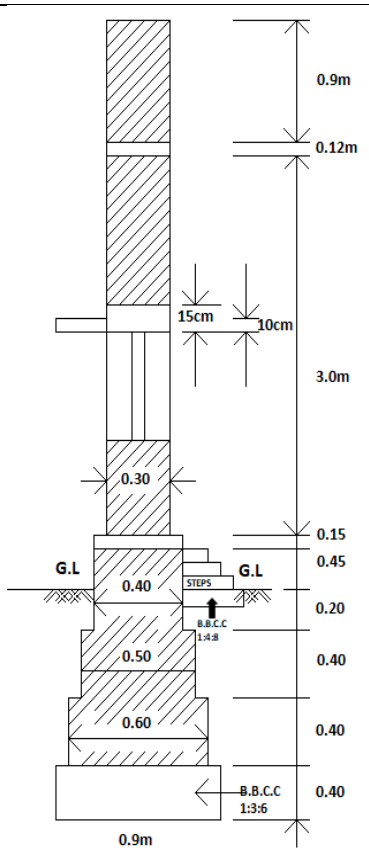


FIG 38 FOUNDATION DETAIL OF HOSTEL

Measurement sheet

No.	Item Description	No.	Length (m)	Breadth (m)	Height (m)	Quantity
1	Excavation in foundation					
	Long wall 1	2	26.1	0.9	1.4	65.772
	Long wall 2	2	19.8	0.9	1.4	49.896
	Long wall 3	1	7.2	0.9	1.4	9.072
	Short wall 1	3	12.7	0.9	1.4	48.006
	Short wall 2	4	4.4	0.9	1.4	22.176
	Below steps (Assume depth .2 m.)	1	1.2	0.6	0.2	0.144
					Total quantity = 195.06 m^3	
2	BBCC (1:3:6)					
	Long wall 1	2	26.1	0.9	0.4	18.792
	Long wall 2	2	19.8	0.9	0.4	14.256

	Long wall 3	1	7.2	0.9	0.4	2.592
	Short wall 1	3	12.7	0.9	0.4	13.716
	Short wall 2	4	4.4	0.9	0.4	6.336
						55.69 m3
3	Brick work upto plinth in c.m. (1:6)					
	(1) Long wall 1					
	Step 1	2	25.8	0.6	0.4	12.384
	Step 2	2	25.7	0.5	0.4	10.28
	Step 3	2	25.6	0.4	0.75	15.36
	(2)Long wall 2					
	Step 1	2	19.5	0.6	0.4	9.36
	Step 2	2	19.4	0.5	0.4	7.76
	Step 3	2	19.3	0.4	0.75	11.58
	(3)Long wall 3					
	Step 1	1	6.9	0.6	0.4	1.656
	Step 2	1	6.8	0.5	0.4	1.36
	Step 3	1	6.7	0.4	0.75	2.01
	(4) Short wall 1					
	Step 1	3	13	0.6	0.4	9.36
	Step 2	3	13.1	0.5	0.4	7.86
	Step 3	3	13.2	0.4	0.75	11.88
	(5) Short wall 2					0
	Step 1	4	4.7	0.6	0.4	4.512
	Step 2	4	4.8	0.5	0.4	3.84
	Step 3	4	4.9	0.4	0.75	5.88
					Total quantity = 115.08 m^3	
4	DPC (1:2:4) above plinth walls.					
	Long wall 1	2	25.6		0.4	20.48
	Long wall 2	2	19.3		0.4	15.44
	Long wall 3	1	6.7		0.4	2.68
	Short wall 1	3	13.2		0.4	15.84
	Short wall 2	4	4.9		0.4	7.84
						62.28 m^2
5	Earth filing in plinth					
	ROOM 1 TO 6	6	5	6	0.45	81
	KITCHEN+DINING	1	6.5	6	0.45	17.55
	WC+BATH	1	6.5	6	0.45	17.55
	PASSAGE	1	18.6	2.7	0.45	22.599
						138.7 m^3

6	Brickwork in super structure in cement mortar 1:4 (up to slab)					
	Long wall 1	2	25.5	0.3	3	45.9
	Long wall 2	2	19.2	0.3	3	34.56
	Long wall 3	1	6.6	0.3	3	5.94
	Short wall 1	3	13.3	0.3	3	35.91
	Short wall 2	4	5	0.3	3	18
	Partition wall					0
	Long wall	8	1.8	0.2	3	8.64
	Short wall	2	5.3	0.2	3	6.36
	Parapet wall					
	Long wall	2	25.5	0.3	0.9	13.77
	Short wall	2	19.2	0.3	0.9	10.368
						179.44 m^3
	Deduction for door/windows:					
	D	9	1.2	0.3	2.1	6.804
	D1	8	0.9	0.2	2.1	3.024
	W	10	1.2	0.3	1.2	4.32
	V	5	0.6	0.3	0.5	0.45
						(-)14.6 m3
	Deduction for lintels: 15cm bearing at each end					
	D	9	1.5	0.3	0.12	0.486
	D1	8	1.2	0.2	0.12	0.1728
	W	10	1.5	0.3	0.12	0.594
	V	5	0.9	0.3	0.12	0.1296
						(-)1.38 m^3
					Total deduction =	**15.98 m^3**
					Net quantity =	**163.46 m^3**
7	Brickwork for steps					
	Lower step	1	1.2	0.6	0.2	0.144
	Upper step	1	1.2	0.3	0.2	0.072
						0.216 m^3
8	2cm thick marble flooring					
	ROOM 1 TO 6	6	5	6		180
	KITCHEN+DINING	1	6.5	6		39
	WC+BATH	1	6.5	6		39
	PASSAGE	1	18.6	2.7		50.22
	Door sills – D	9	1.2	0.3		3.24

	D1	8	0.9	0.2		1.44
						312.9 m^2
9	Wood work for door-window (sq.m)					
	D	9	1.2		2.1	22.68
	D1	8	0.9		2.1	15.12
	W	10	1.2		1.2	14.4
						52.2 m^2
10	RCC work in slab, chajja and lintel					
	RCC slab	1	25.5	19.2	0.12	58.752
	RCC chajja					
	W	10	1.2	0.6	0.1	0.72
					RCC lintels (From item no.6)	1.38
						60.85 m^3
11	Smooth plaster on inside walls and ceiling in cm. (1:3)					
	ROOM 1 TO 6					
	Long wall	12	6		3	216
	Short wall	12	5		3	180
	Ceiling	6	6	5		180
	KITCHEN+DINING					
	Long wall	2	6		3	36
	Short wall	2	6.5		3	39
	Ceiling	1	6.5	6		39
	WC+BATH					
	Long wall	2	6		3	36
	Short wall	2	6.5		3	39
	Ceiling	1	6.5	6		39
	PASSAGE					
	Long wall	2	18.6		3	111.6
	Short wall	2	2.7		3	16.2
	Ceiling	1	18.6	2.7		50.22
						982.02 m^2
	Deduction for doors/windows:					
	D	9	1.2		2.1	22.68
	D1	8	0.9		2.1	15.12

	W	10	1.2		1.2	14.4
	V	5	0.6		0.5	1.5
						53.7 m^2
					Net quantity = 928.32 m^2	
	Outerside plaster up to parapet wall					
	Long walls	2	25.5		4	204
	Short walls	2	13.6		4	108.8
	Deduction for doors/windows:	(-)	(-)		(-)	(-)53.7
						259.1 m^2
					Total quantity = 1187.1 m^2	

Abstract sheet

No.	Item Description	Qty.	Rate	Per	Amount Rs.
1	Excavation in foundation	195.06	85	m^3	16580.1
2	BBCC (1:3:6)	55.69	2700	m^3	150363
3	Brick work upto plinth in c.m. (1:6)	115.08	3200	m^3	368256
4	DPC (1:2:4) above plinth walls	62.28	150	m^2	9342
5	Earth filing in plinth	138.7	50	m^3	6935
6	RCC work for slab ,Chajja and lintels	60.85	8800	m^3	535480
7	Brickwork for steps	0.216	3200	m^3	691.2
8	2cm thick marble flooring	312.9	500	m^2	156450
9	Wood work for door-window shutters	52.2	7800	m^2	407160
10	Smooth plaster inside, outerside and Ceiling in c.m.(1:3)	1187.1	150	m^2	178065
11	Brick work for in Super structure	163.46	3500	m^3	572110
				Rs.	2401432
				Add 5%	120071
				Rs.	2521503

5.SECONDARY SCHOOL

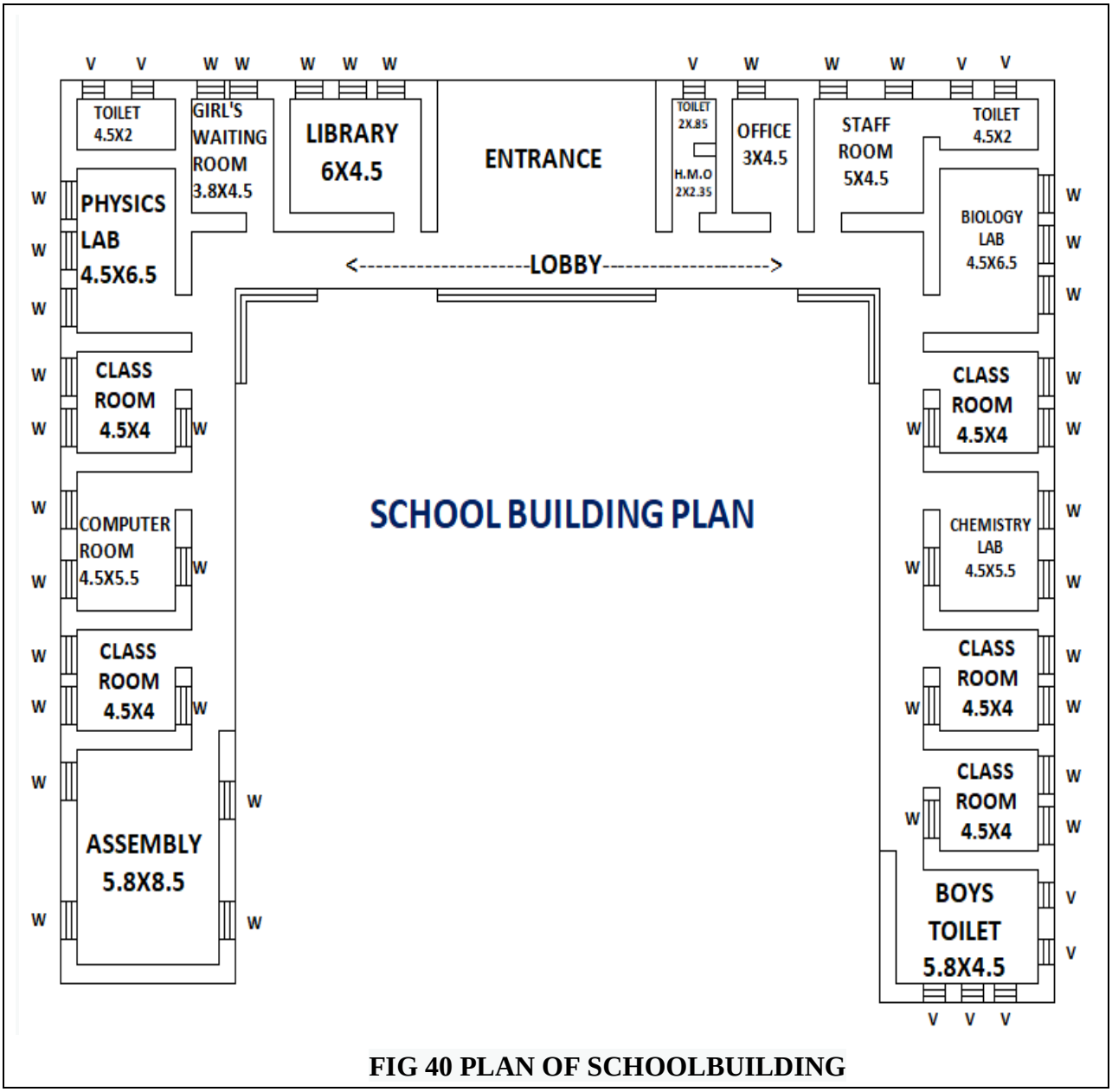


FIG 40 PLAN OF SCHOOLBUILDING

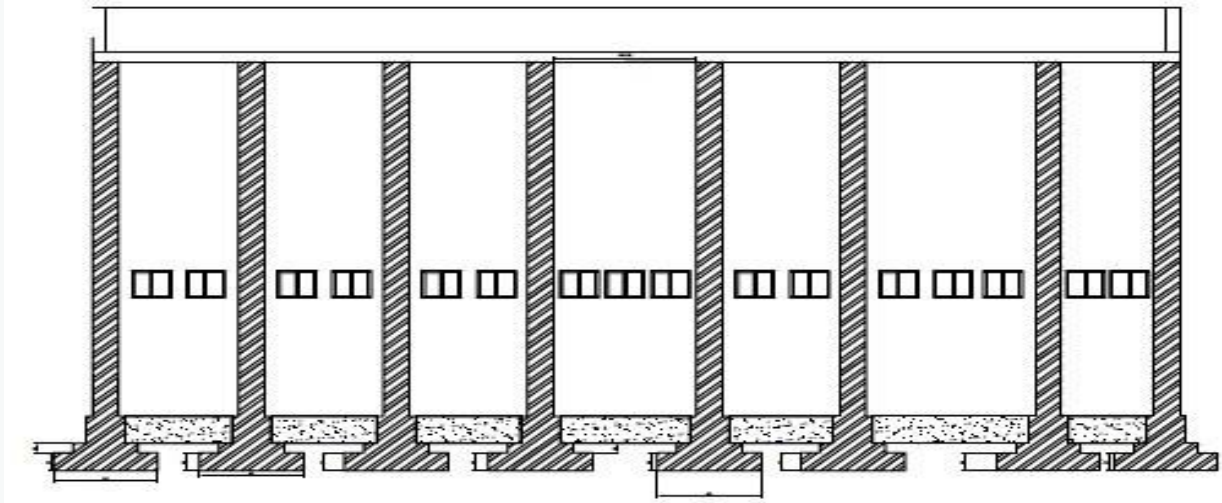


FIG 41 FRONT SECTION OF SCHOOL

1. **Brick work in All Walls**

secondary school masonry quantity

Iteam No.	Brick work in super structure	L	B	H	QTY
1.	Wall -1	30.5	0.3	4.5	41.175
2.	Wall -2	5.8	0.3	4.5	7.83
3.	Wall -3	4.5	0.3	4.5	6.075
4.	Wall -4	4.5	0.3	4.5	6.075
5.	Wall -5	4.5	0.3	4.5	6.075
6.	Wall -6	4.5	0.3	4.5	6.075
7.	Wall -7	4.5	0.3	4.5	6.075
8.	Wall -8	9.8	0.3	4.5	13.23
9.	Wall -9	4.5	0.3	4.5	6.075
10.	Wall -10	4.5	0.3	4.5	6.075
11.	Wall -11	9.5	0.3	4.5	12.825
12.	Wall -12	4.2	0.3	4.5	5.67

13.	Wall -13	14.5	0.3	4.5	19.575
14.	Wall-14	4.2	0.3	4.5	5.67
15.	Wall-15	4.5	0.3	4.5	6.075
16.	Wall-16	4.5	0.3	4.5	6.075
17.	Wall-17	31.5	0.3	4.5	42.525
18	Wall-18	4.5	0.3	4.5	6.075
19.	Wall-19	4.5	0.3	4.5	6.075
20.	Wall-20	4.5	0.3	4.5	6.075
21.	Wall-21	4.5	0.3	4.5	6.075
23.	Wall-22	4.5	0.3	4.5	6.075
					239.61

2. Wood work on walls

1.	D Door	18	1	0.3	2.1	11.34
2.	D1 Door			0.3	2.1	0.72
3.	Window glazed			0.3	2.1	11.52
						23.58
						47.16

3. Wall plaster

Iteam No.	Wall plaster	L	B	H	QTY
1.	Wall-1	30.5	0.02	4.5	2.74
2.	Wall-1	5.8	0.02	4.5	0.522
3.	Wall-1	4.5	0.02	4.5	0.405
4.	Wall-1	4.5	0.02	4.5	0.405
5.	Wall-1	4.5	0.02	4.5	0.405
6.	Wall-6	4.5	0.02	4.5	0.405
7.	Wall-7	4.5	0.02	4.5	0.405
8.	Wall-8	9.8	0.02	4.5	0.882
9.	Wall-9	4.5	0.02	4.5	0.405
10.	Wall-10	4.5	0.02	4.5	0.405
11.	Wall-11	9.5	0.02	4.5	0.855
12.	Wall-12	4.2	0.02	4.5	0.378
13.	Wall-13	14.5	0.02	4.5	1.305
14.	Wall-14	4.2	0.02	4.5	0.378
15.	Wall-15	4.5	0.02	4.5	0.405
16.	Wall-16	4.5	0.02	4.5	0.405

17.	Wall-17	31.5	0.02	4.5	2.835
18.	Wall-18	4.5	0.02	4.5	0.405
19.	Wall-19	4.5	0.02	4.5	0.405
20.	Wall-20	4.5	0.02	4.5	0.405
21.	Wall-21	4.5	0.02	4.5	0.405
23.	Wall-22	4.5	0.02	4.5	0.405
					0.405
					15.967

4. Slab work of cement concrete

Item No.	Slab work of cement concrete	L	B	H	QTY
1.	Slab of Assembly	5.8	9.1	0.15	7.91
2.	Slab of Class room	4.5	4.6	0.15	3.10
3.	Slab of Computer room	4.5	6.1	0.15	4.11
4.	Slab of Class room	4.5	4.6	0.15	3.10
5.	Slab of Physics lab	4.5	7.1	0.15	4.79
6.	Slab of Toilet	4.5	2.6	0.15	1.75
7.	Slab of Girl's waiting room	3.8	5.1	0.15	2.90
8.	Slab of Library	6	5.1	0.15	4.59
9.	Slab of Entrance	10.1	4.2	0.15	6.36
10.	Slab of Head master	2	2.35	0.15	0.70
11.	Slab of Toilet	2	1.85	0.15	0.55
12.	Slab of Office	3	5.1	0.15	2.29
13.	Slab of Staff room	5	5.1	0.15	3.82
14.	Slab of Toilet	4.5	2.6	0.15	1.75
15.	Slab of Biology lab	4.5	7.1	0.15	4.79
16.	Slab of Class room	4.5	4.6	0.15	3.10
17.	Slab of Chemistry lab	4.5	6.1	0.15	4.11
18.	Slab of Class room	4.5	4.6	0.15	3.10
19.	Slab of Class room	4.5	4.6	0.15	3.10
					4.32
					65.92

5. Slab of plaster

Item no	Slab of plaster	L	B	H	QTY
1.	Slab plaster of Assembly	5.8	8.5	0.0.2	0.986
2.	Slab plaster of Class room	4.5	4	0.0.2	0.36
3.	Slab plaster of Computer	4.5	5.5	0.0.2	0.495
4.	Slab plaster of Class room	4.5	4	0.0.2	0.36
5.	Slab plaster of Physics lab	4.5	6.5	0.0.2	0.585
6.	Slab plaster of Toilet	4.5	2	0.0.2	0.18
7.	Slab plaster of Girl's waiting room	3.8	4.5	0.0.2	0.342
8.	Slab plaster of Library	6	4.5	0.0.2	0.54
9.	Slab plaster of Head master room	2	2.35	0.0.2	0.094
10.	Slab plaster of Toilet	2	1.85	0.02	0.074
11.	Slab plaster of Office	3	4.5	0.02	0.27
12.	Slab plaster of Staff room	5	4.5	0.02	0.45
13.	Slab plaster of Toilet	4.5	2	0.02	0.18
14.	Slab plaster of Biology lab	4.5	6.5	0.02	0.585
15.	Slab plaster of Class room	4.5	4	0.02	0.36
16.	Slab plaster of Chemistry lab	4.5	5.5	0.02	0.495
17.	Slab plaster of Class room	4.5	4	0.02	0.36
18.	Slab plaster of Class room	4.5	4	0.02	0.36
					0.522
					Total
	Total				7.598

Abstract sheet

No.	Item Description	Qty.	Rate	Per	Amount Rs.
1	Brick work in walls	239.61	150	m^3	35941.5
2	Bbcc	55.69	2700	m^3	150363
3	Brick work upto plinth in c.m. (1:6)	115.08	3200	m^3	368256
4	DPC (1:2:4) above plinth walls	62.28	150	m^2	9342
5	Earth filing in plinth	138.7	50	m^3	6935

6	RCC work for slab ,Chajja and lintels	65.92	8800	m^3	580096
7	Brickwork for steps	0.216	3200	m^3	691.2
8	2cm thick marble flooring	312.9	500	m^2	156450
9	Wood work for door-window shutters	47.16	7800	m^2	367848
10	Smooth plaster inside, outerside and Ceiling in c.m.(1:3)	1187.1	150	m^2	178065
11	Colour work for in Super structure	1187.1	100	m^3	118710
				Rs.	1972697
				Add 5%	98634
				Rs.	2071331

6.BANK

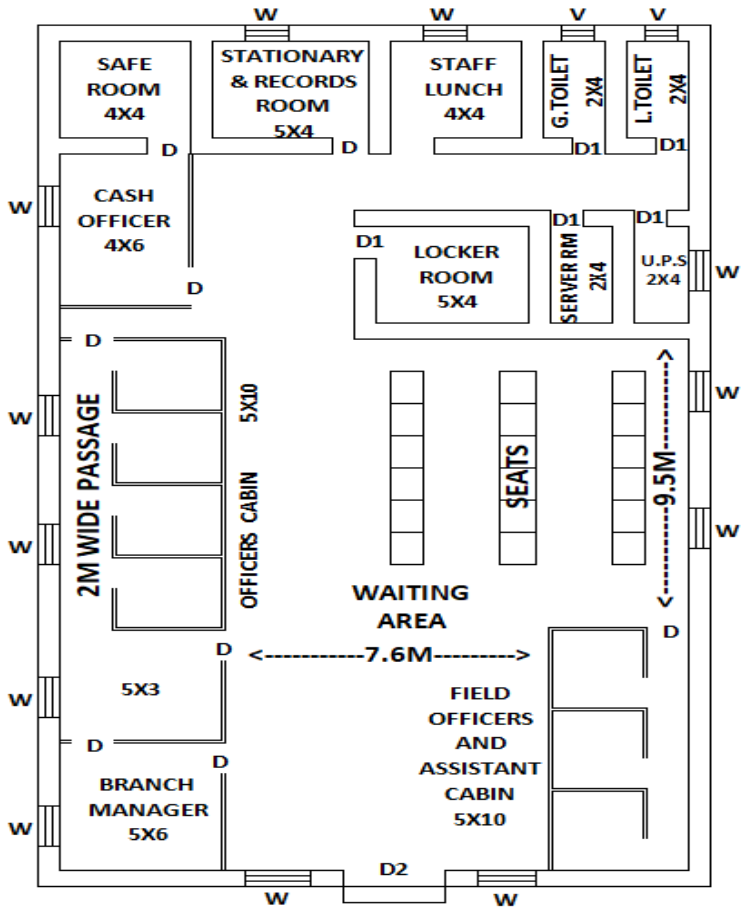


FIG 43 DESING OF BANK

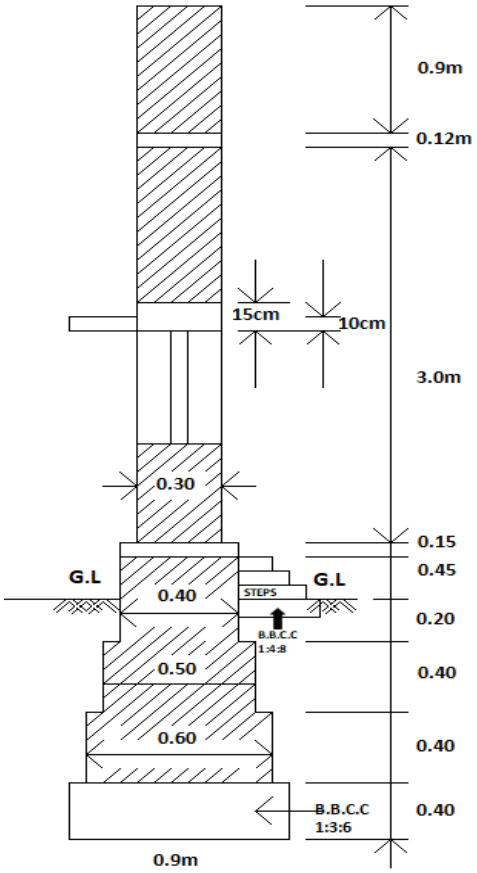


FIG 44 FOUNDATION DETAIL OF BAMK

Measurement sheet

Solving this problem using centre line method there are 16 junction of the walls.

Total centre line length

=3(0.15+17+1.2+0.15) + 2(0.15+9+0.6+0.15) + 2(0.15+28.4+0.9+0.15)+ 7(4.3) =165.05m

No.	Item Description	No.	Length (m)	Breadth (m)	Height (m)	Quantity
1	Excavation in foundation					
	Length=165.05-1/2*0.9*16=157.85	1	157.85	0.9	1.4	198.891
					Total quantity = 198.891m^3	
2	BBCC (1:4:8)					
	Length=165.05-1/2*0.9*16=157.85	1	157.85	0.9	0.4	56.86
					Total quantity = 56.86m^3	
3	Brick work upto plinth in c.m.					

	(1:6)					
	First step: L_1 =165.05-(1/2*0.6*16)	1	160.25	0.5	0.4	38.46
	Second step: L_2 =165.05-(1/2*0.5*16)	1	161.05	0.5	0.4	32.21
	L_3= 165.05- (1/2*0.4*16)	1	161.85	0.4	0.65	42.081
					Total quantity = 112.751m^3	
4	Brick work upto slab					
	(L=165.05-(1/2*0.3*16))	1	162.65	0.3	3	146.385
	=162.65					**=146.385m^3**
					Total brick work=259.136m^3	
5	Deduction of brick work					
	For door D	4	1.1		2.1	9.24
	For door D1	4	0.9		2.1	7.56
	For door D2	1	4		2.5	10
	For window	12	1.8		1.4	30.24
	For ventilator	2	0.6		0.6	0.72
					Net quantity = (-57.76)	
	Deduction for lintel					
	D	4	1.4	0.3	0.15	0.252
	D1	4	1.2	0.2	0.15	0.144
	D2	1	4.3	0.3	0.15	0.1935
	W	12	2.1	0.3	0.15	1.131
	v	2	0.9	0.3	0.15	0.081
					Total net quantity = 1.8045	
			Total brick work = 199.5715			
	Wood work for door window					
	D	4	1.1		2.1	9.24
	D1	4	0.9		2.1	7.56
	D2	1	4		2.5	10
	W	12	1.8		1.4	30.24
						=57.04m^2

Abstract sheet

No.	**Item Description**	**Qty.**	**Rate**	**Per**	**Amount**
					Rs.
1	Excavation in foundation	198.891	85	m^3	16906

2	BBCC (1:3:6)	56.86	2700	m^3	153522
3	Brick work upto plinth in c.m. (1:6)	112.751	3200	m^3	360804
4	Brick work for in Super structure	163.46	3500	m^3	572110
5	Wood work for door-window shutters	57.04	7800	m^2	444912
				Rs	1548254
				Add 10%	154825.4
				Add 1.5%	23223.81
				Rs.	17263032.21

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

Through our study we will try to planning and designing might be including provisions of all the facilities suggest by us, then we focus on the improvement in the existing facilities suggest by us our main aim is to work according to new upcoming T.P. scheme in morchand village.

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

As per the requirement and development of the village we are trying to proposing the designs are as below :-

- Main RCC Road
- Community hall
- Expand street light networks
- Public toilet/bath(pay and use)
- Bus station
- Sport complex

This all amenities may stop migration from the village towards the urban area .

By performing this project we are able to reduce the pressured on the urban area. As well as this amenities are very much helpful for overall development of the village.

CHAPTER 10 Conclusion (entire village project)

Rurbanisation is to bring peace of mind to the villagers by providing them the basic amenities required and still keeping the village soul intact. This project gives one new idea for Development of rural villages. Also gives procedure how they fulfil requirement of the villages. Now a day people are moving from rural to urban area due to lack of basic amenities. So this help to provide better solution for the available problems in rural area like drinking water, Drainage facility road network, etc.

The following points can be summarized as the outcome of the study:

1. Socio Economic Survey has been done for the study area in detail. All the types of the needs, facilities has been studied in detail. Gap analysis have been done and interviews of the local peoples has been done in detail.

2. The existing structures and infrastructures have been studied and reviewed in detail. Suggestions have been proposed for the repair and renovation of existing structures and design proposals for its development.

3. The preliminary survey and socio-economic study shows that the village has insufficient infrastructure requirement. If the planning and proposals will be proposed based on the requirement of the people the life of the people can be made prosperous.

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:

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 that "*The true India lives in the village.*"

Village and Team Details					
Village name:	**Team details:**	**(1) Enrollment No.:**	170210106016	**(1) Name**	Gohil Shivrajsinh J
Morchand		**(2) Enrollment No.:**	170210106035	**(2) Name**	Pal Pankaj Rajkumar
Probelm Definition and Design Details					
Sr. No.	**Problem Definition**			**Capacity (mention unit)**	**Estimated cost (in Rs.)**
Design – 1	Design of anganwadi building			20 kids	471751
Design – 2	Design of agricultural product market building			15 stalls	516029
Design – 3	Design of secondary school building			5 class rooms, 4 labs, 1 assembly	2071331
Design – 4	Design of hostel building			30 student	2521503
Design – 5	Design of bank building			30×20 m^2	1548254
Design – 6	Design of library building			24×26 m^2	3523369

TABLE 21 DESIGN CONCLUSION

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CHAPTER 12

:12.1 SCANED COPY OF ORIGNAL IDEAL VILLAGE SURVEY FORM:

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:	NATHUGADH
Name of Taluka:	GHOGHA
Name of District:	BHAVNAGAR
Name of Institute:	G.E.C. BHAVNAGAR.
Nodal Officer Name & Contact Detail:	Prof. C.A. GAJJAR Asst. Prof, Civil engineering Dept.
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	H. D. OZA
Date of Survey:	12/10/2020

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	805	423	382	191
ii)	2011	968	495	473	223

2. **Geographical Detail:**

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	567.21 hecteges.
	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:	25 KM FROM GHOGHA

3. Occupational Details:

Name of Three Major Occupation groups in Village	1. FARMING 2. LABOUR WORK 3. DAIRY 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		2.5 Lack litres.
	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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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)	NO			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	GOOD	YES		
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Auto/ MAJIC 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	12 hrs	YES		
	Power supply for Commercial Use		YES		
	Road/ Street Lights		YES		

	Electrification in Government Buildings/ Schools/ Hospitals		YES		
	Renewable Energy Source Facilities (Y/ N)		YES		
	LED Facilities		YES		
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.		YES		
	Location Condition	GOOD			
	Community Toilet (With bath/ without bath facilities)				ABSENT
	Solid & liquid waste Disposal system available				NO
	Any facility for Waste collection from road				NO
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	TUBE WELL	YES		
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	1/3		YES	

5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks

K.	**Health Facilities:**				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	P.H.C			
	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: .....kms.				
Suggestions if any:					

M.	**Socio- Culture Facilities**				
	Community Hall (With or without TV) Location:				NO

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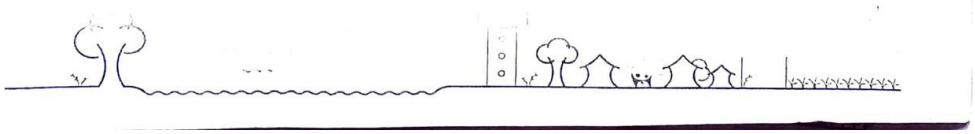
	Condition:				NO
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	GOOD	YES		
	Public Garden Location: Condition:				NO
	Village Pond Location: Condition:		YES		
	Recreation Center Location: Condition:				NO
	Cinema/ Video Hall Location: Condition:				NO
	Assembly Polling Station 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

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

8. **Additional Information/ Requirement:**

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	**Repair & Maintenance of Existing Public Infrastructure facilities(School Building, Health Center, Panchayat Building, Public Toilets & any other)**		ONGOING
2.	**Additional Information/ Requirement**		

9. **Smart Village Proposal Design**

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	ELECTRICITY GENERATION	WIND POWER PLANT	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

સરપંચ
નથુગઢ ગ્રામ પંચાયત

12.2 SCANNED COPY OF ORIGENAL SMART VILLAGE SURVEY DETAIL

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

Name of District:	BHAVNAGAR
Name of Taluka:	GHOGHA
Name of Village:	VAVDI
Name of Institute:	GEC BHAVNAGAR
Nodal Officer Name & Contact Detail:	Prof. C.A. GAJJAR Asst. Prof Civil ENGG Deptt.
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	S. D. SOLANKI
Date of Survey:	14/10/2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	2052	1058	994	399
2.	2011	2360	1232	1128	424

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	1400.08 hectares (lat. = long. =)
2.	Forest Area (In hect.)	ABSENT
3.	Agricultural Land Area (In hect.)	ABSENT
4.	Residential Area (In hect.)	ABSENT
5.	Other Area (In hect.)	ABSENT
6.	Distance to the nearest railway station (in kilometers):	ABSENT

7.	Name of Nearest Town with Distance:	32 km (Bhavnagar)
8.	Distance to the nearest bus station (in kilometers):	AVALABLE 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. GOVT. JOBS 3. LABOUR
Major crops grown in the village:	1. COTTON 2. ONION 3. GROUNDNUT

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				ABSENT
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/** Irrigation Channel Bottled Water Hand Pump Other(Specify)**Lake/ Pond**		YES		

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Suggestions if any:						
B.	**Water Tank Facility**					
	Overhead Tank	Capacity:	YES		10 Lack Liters	
	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.	NH-51 3 KM AWAY	YES			
Suggestions if any:						
E.	**Transport Facility**					
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	32 km Bhavnagar			NO	
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)		YES			
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Auto/Jeep other	YES			
Suggestions if any:						
F.	**Electricity Distribution**					
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	more than 6hr.	YES			

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	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:

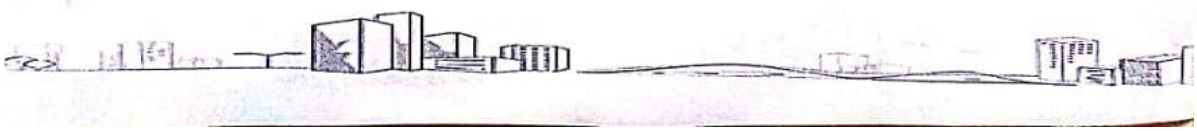
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.		YES		
	Location Condition		GOOD		
	Community Toilet (With bath/ without bath facilities)		YES		
	Solid & liquid waste Disposal system available		YES		
	Any facility for Waste collection from road	TMC	YES		

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		



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/		YES		
	Nursing Home				
	AYUSH Health Facility		YES		
	sonography /ultrasound facility				
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
	Suggestions if any:				
K.	**Education Facilities:**				
	Aaganwadi/ Play group		YES		
	Primary School		YES		
	Secondary school		YES		
	Higher sec. School		YES		
	ITI college/ vocational Training Center				NO
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities				NO
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				

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Techno Economic Survey

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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	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)				NO

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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				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 ……YES…….. FOGGING……YES…….. 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 ?	C.C.TV 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

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12.3 SCANED COPY OF ORIGNAL ALLOCATED VILLAGE SURVEY FORM:

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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:	GHOGHA
Name of Village:	MORCHAND
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)	GOHIL JAYUBHA LALUBHA (Panchayat Member)
Date of Survey:	10/10/2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	3558	1805	1753	590
2.	2011	4492	2307	2185	762

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	2003.72 hectares (Lat. =21.545643 long. = 72.213430)
2.	Forest Area (In hect.)	0 hectares
3.	Agricultural Land Area (In hect.)	1649.92 hectares
4.	Residential Area (In hect.)	153.80 hect.
5.	Other Area (In hect.)	0 hectares
6.	Distance to the nearest railway station (in kilometers):	33 KM AWAY BHAVNAGAR TERMIN

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7.	Name of Nearest Town with Distance:	GHOGHA -17 KM , TALAJA -29 KM ALANG - 17.5 KM , VARTEJ -26 KM
8.	Distance to the nearest bus station (in kilometers):	33 KM AWAY BHAVNAGAR BUS STATION
9.	Whether village is connected to all road for the any facility or town or City?	YES

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1. FARMING 2. LABOUR 3. GOVT. JOBS

Major crops grown in the village:	1. GROUNDNUT 2. COTTON 3. BAJARA

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

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	Other(Specify)Lake/ Pond	POND available			
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: 5000 Litre	✓		Damaged condition
	Underground Sump	Capacity: 2 lack lit	✓		2 underground sump available
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1	UNDERGROUND DRAINAGE NAILABLE	✓		
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Kutchha			
	Main road	Black topped pucca			
	Internal streets	BLOCK			
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH 51 15 km Away			
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	NO (33 km AWAY)		✓	
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	NO (35 km AWAY BHAV. BUS STATION)		✓	
	Local Transportation (Auto/ Jeep/~~Chhakda~~/ Private Vehicles/ Other)	Private vehicles Auto Jeep	✓		
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	YES (More than 6 hrs)	✓		

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	Power supply for Domestic Use	Yes available	✓		
	Power supply for Agricultural Use	Yes	✓		
	Power supply for Commercial Use	Not available		✓	
	Road/ Street Lights	Not available		✓	
	Electrification in Government Buildings/ Schools/ Hospitals	Yes available	✓		
	Renewable Energy Source Facilities (Y/ N)	NO		✓	
	LED Facilities	NO		✓	

Suggestions if any:

G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	1.	✓		
	Location Condition	Good condition but not used		✓	
	Community Toilet (With bath/ without bath facilities)	available without bath		✓	Toilet not used public because location is not at required place.
	Solid & liquid waste Disposal system available	Not available		✓	
	Any facility for Waste collection from road	YES available	✓		

Suggestions if any:

H.	**Main Source of Irrigation Facility:**				
	TANK/POND	~~PARTY~~		✓	
	STREAM/RIVER	—		✓	
	CANAL	—		✓	
	WELL	YES USED	✓		
	TUBE WELL.	YES USED	✓		
	OTHER (SPECIFY)	—		✓	

Suggestions if any:

I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	50+/50.			

V. SOCIAL INFRASTRUCTURAL FACILITIES:

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

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

Suggestions if any:

We have designed anganwadi building & School building.

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

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

Suggestions if any:

We have designed Public library in our Village.

M.	Other Facilities	Condition	Location	Available (YES)	Available (NO)
	Post-office	GOOD, WORKING	CENTRE OF MORCHAND	✓	
	Telecommunication Network/ STD booth				✓
	General Market				✓
	Shops (Public Distribution System)	NO.5 OF SHOPS are available	MORCHAND Residential area	✓	
	Panchayat Building	NEED MAINTANANCE		✓	
	Pharmacy/Medical Shop				✓
	Bank & ATM Facility				✓
	Agriculture Co-operative Society				✓
	Milk Co-operative Soc.	WORKING	ENTRANCE IN MORCHAND	✓	
	Small Scale Industries				✓
	Internet Cafes/ Common Service Center/Wi Fi				✓
	Youth Club				✓
	Mahila Mandal	SAKHI MAHILA MANDAL	MORCHAND	✓	

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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	milk co-operative society. available and working Saraswatham dairy MORCHAND			
	Other Facility				

Suggestions if any:
We have designed Bank in our village.

N.	Other Facilities	Condition		Available (YES)	Available (NO)
	1. Have these programme implemented the village?				
	2. Are there any beneficiaries in the village from the following programme?				
	3. Janani Suraksha Yojana				
	4. Kishori Shakti Yojana				
	5. Balika Samriddhi Yojana	yes active			
	6. Mid-day Meal Programme	yes working condition			
	7. Intergrated Child Development Scheme (ICDS)				
	8. Mahila Mandal Protsahan Yojana (MMPY)				
	9. National Food for work Programme (NFFWP)				
	10. National Social Assistance Programme				
	11. Sanitation Programme (SP)				
	12. Rajiv Gandhi National Drinking Water Mission				
	13. Swarnjayanti Gram Swarozgar Yojana	Yes this yojana is available			
	14. Minimum Needs Programme (MNP)				
	15. National Rural Employment Programme				
	16. Employee Guarantee Scheme (EGS)				
	17. Prime Minister Rojgar Yojana (PMRY)	No available			
	18. Jawahar Rozgar Yojana (JRY)				
	19. Indira Awas Yaojna (IAY)	Yes 25-30 house built by using IAY facilities			
	20. Samagra Awas Yojana (SAY)				
	21. Sanjay Gandhi Niradhar Yojana (SGNY)				
	22. Jawahar Gram Samridhi Yojana (JGSY)				
	23. Other (SPECIFY)	MANREGA VIDHVA SAHAY YOJANA ELDER PENSION YOJANA available.			

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	NOT AVAILABLE		✓	
2.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	NOT AVAILABE		✓	Solar Street light available but not working.
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 AVAILABE in HARD COPY AS WELL AS SOFT COPY	✓		
2.	Recent Projects going on for Development of Village			✓	
3.	Any NGO working for village development			✓	
4.	Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS ✓ CYCLONE ✓ DROUGHT ✓ LANDSLIDES AVALANCHE OTHER (SPECIFY)	In last one year FLOODS CYCLONE DROUGHT (Hydrological) occurs in MORCHAND village.			In last two months Hydrological drought may cause near 90+. crops damages. in MORCHAND.

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 Need maintanance	
2.	Additional Information/ Requirement		
3.	During the last six months how many times CLEANING .....N.O..... FOGGING.....N.O..... 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 ?	C.C.T.V. Camera.	

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

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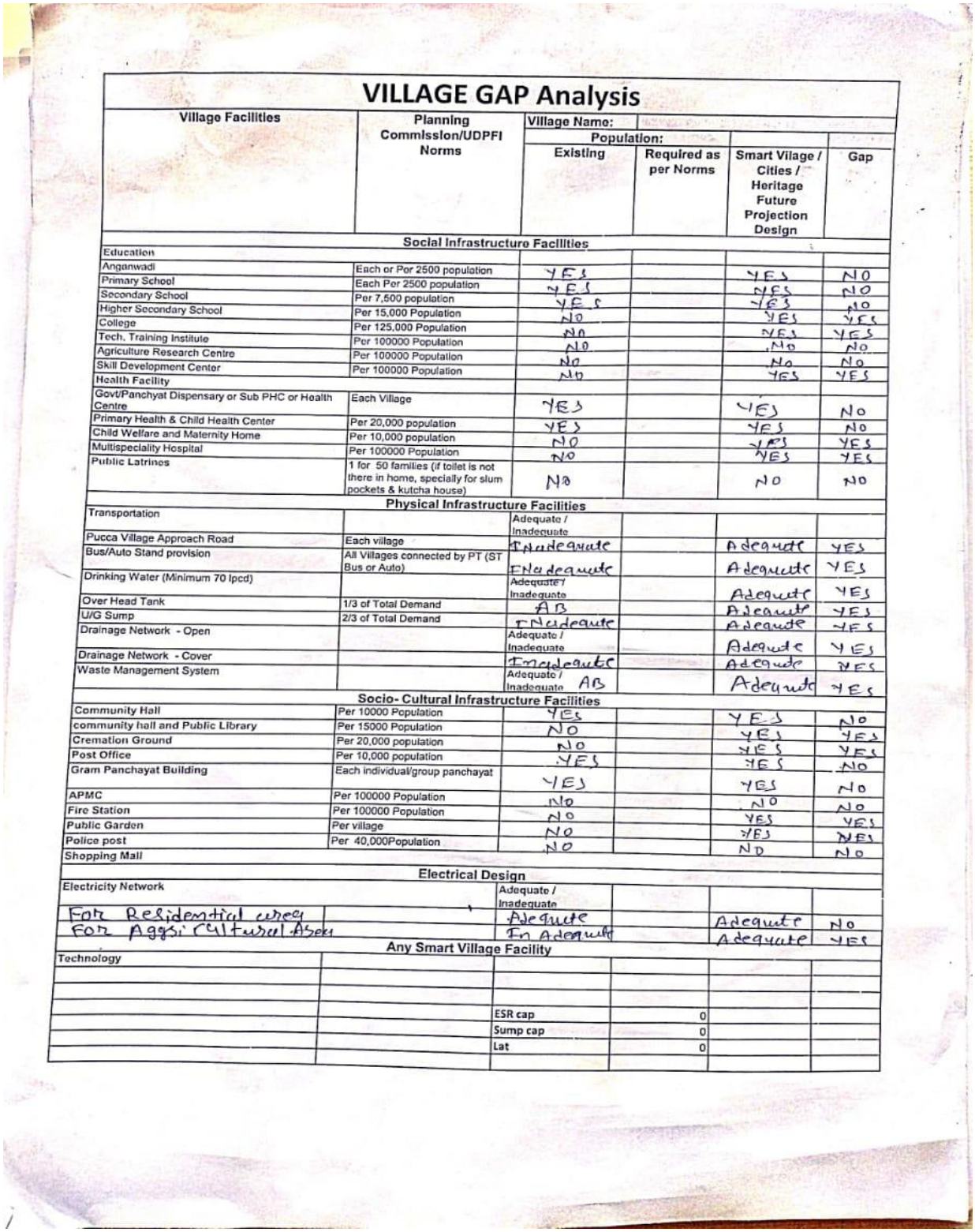
તા. ઘોઘા, જી. ભાવનગર

12.4 GAP ANALYSIS



VILLAGE GAP Analysis

Village Facilities	Planning Commission/UDPFI Norms	Village Name: / Population: Existing	Required as per Norms	Smart Vilage / 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	YES		YES	NO
Higher Secondary School	Per 15,000 Population	NO		YES	YES
College	Per 125,000 Population	NO		YES	YES
Tech. Training Institute	Per 100000 Population	NO		NO	NO
Agriculture Research Centre	Per 100000 Population	NO		NO	NO
Skill Development Center	Per 100000 Population	NO		YES	YES
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	YES		YES	NO
Child Welfare and Maternity Home	Per 10,000 population	NO		YES	YES
Multispeciality Hospital	Per 100000 Population	NO		YES	YES
Public Latrines	1 for 50 families (if toilet is not there in home, specially for slum pockets & kutcha house)	NO		NO	NO
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		Inadequate		Adequate	YES
Waste Management System		Adequate / Inadequate AB		Adequate	YES
Socio- Cultural Infrastructure Facilities					
Community Hall	Per 10000 Population	YES		YES	NO
community hall and Public Library	Per 15000 Population	NO		YES	YES
Cremation Ground	Per 20,000 population	NO		YES	YES
Post Office	Per 10,000 population	YES		YES	NO
Gram Panchayat Building	Each individual/group panchayat	YES		YES	NO
APMC	Per 100000 Population	NO		NO	NO
Fire Station	Per 100000 Population	NO		YES	YES
Public Garden	Per village	NO		YES	NEI
Police post	Per 40,000Population	NO		NO	NO
Shopping Mall					
Electrical Design					
Electricity Network		Adequate / Inadequate			
For Residential area		Adequate		Adequate	NO
For Aggsi Cultural Aseas		In Adequate		Adequate	YES
Any Smart Village Facility					
Technology					
		ESR cap	0		
		Sump cap	0		
		Lat	0		

12.5 SUMMARY DETAIL OF ALL VILLAGES DESIGN IN TABLE.

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

12.7 VILLAGE PHOTOGRAPHS

FIG 42MORCHAND VILLAGE PHOTOGRAPS

12.8 Village Interaction with Sarpanch Report :-

By following and respecting theGovt.'s COVID-19 Guidelines, On the date 23th October 2020 at morchand Panchayat office we have carried out the Techno Economic Survey with Sarpanch and other Panchayat members, village dwellers has remained present to give their feedback.

We explained how the development of morchand village is possible we presented our study work under this project. We explained theme of Vishwakarma Yojana, various benefits physical

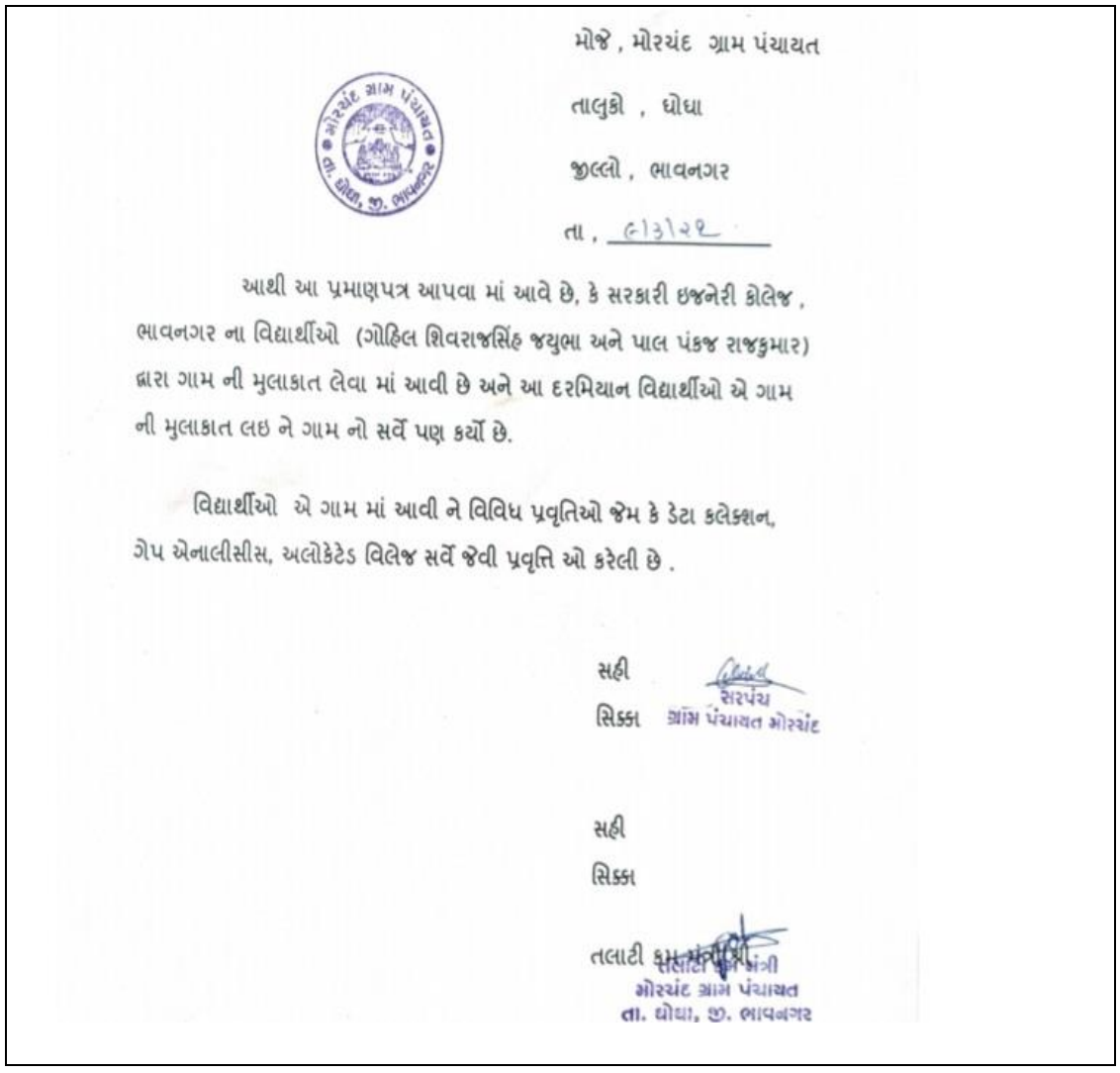
infrastructure, social infrastructure, social infrastructure and socio-cultural facilities such a internal street road, light, public toilet and bath, bus stand & other.

village dwellers shared different problems faced by them before this project implementation while designing such a facilities, we gave various method and technics of such facility with proposed design.

The presentation was very helpful to understand what village dwellers actually needs in the village and what amenities to be designed at village level for the overall development of the morchand village as Rurban town.

Our team thanked all the dwellers of the village for their support during this work period and made them understand that the implementation of this project can build a better village for upcoming future.

12.9 SARPANCH LATER



મોજે , મોરચંદ ગ્રામ પંચાયત

તાલુકો , ઘોઘા

જીલ્લો , ભાવનગર

તા , 01/12/2

આથી આ પ્રમાણપત્ર આપવા માં આવે છે, કે સરકારી ઇજનેરી કોલેજ , ભાવનગર ના વિદ્યાર્થીઓ (ગોહિલ શિવરાજસિંહ જયુભા અને પાલ પંકજ રાજકુમાર) દ્વારા ગામ ની મુલાકાત લેવા માં આવી છે અને આ દરમિયાન વિદ્યાર્થીઓ એ ગામ ની મુલાકાત લઇ ને ગામ નો સર્વે પણ કર્યો છે.

વિદ્યાર્થીઓ એ ગામ માં આવી ને વિવિધ પ્રવૃતિઓ જેમ કે ડેટા કલેક્શન, ગેપ એનાલીસીસ, અલોકેટેડ વિલેજ સર્વે જેવી પ્રવૃત્તિ ઓ કરેલી છે .

સહી
સરપંચ
સિક્કા ગ્રામ પંચાયત મોરચંદ

સહી
સિક્કા

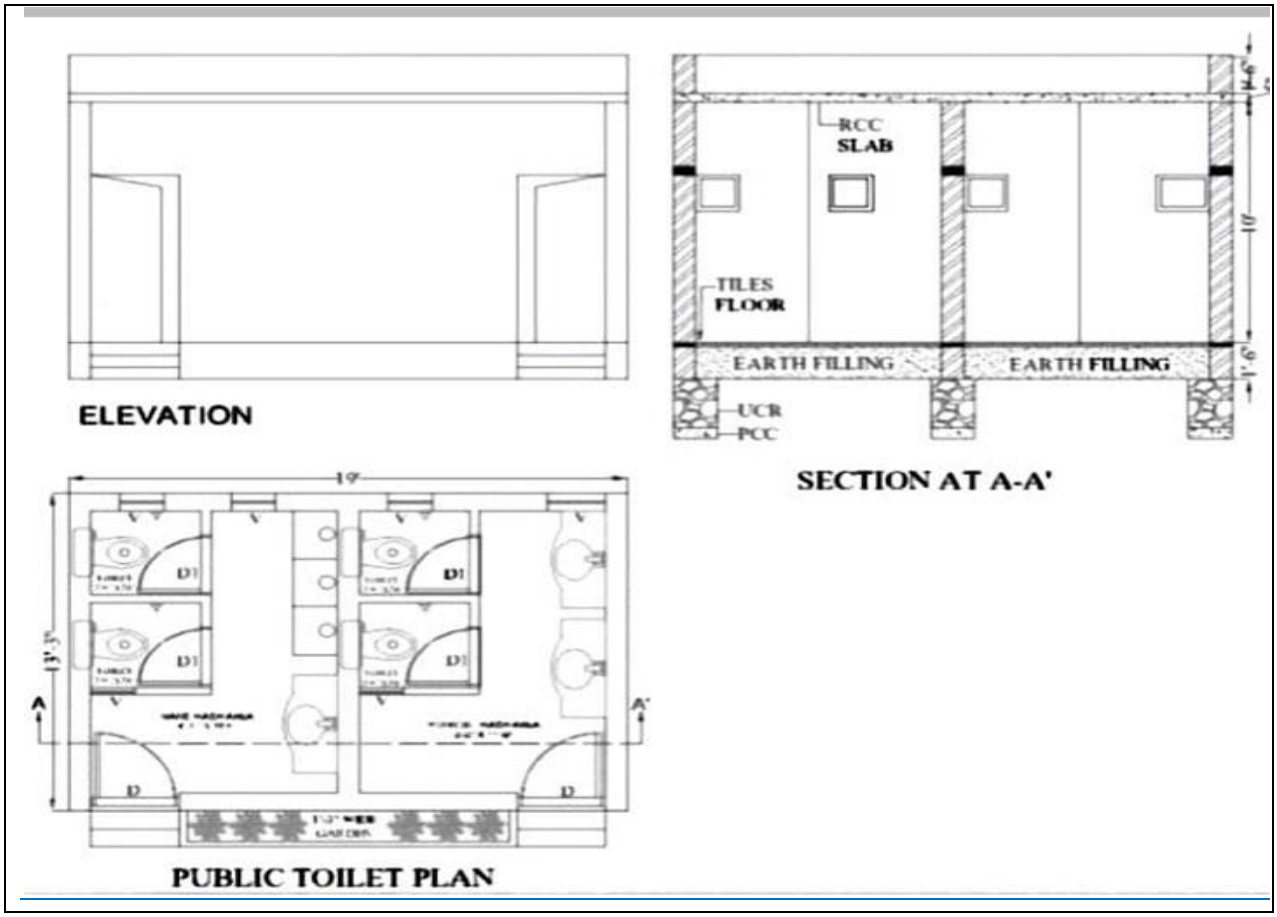
તલાટી કમ મંત્રી
મોરચંદ ગ્રામ પંચાયત
તા. ઘોઘા, જી. ભાવનગર

Chapter – 13:

13.1 – design proposal

- In Primary and technological-economy survey we collected information regarding to facilities like a primary facilities, social facilities, educational facilities and sanitations facilities etc.
- Form we collect a data and observations, the information of new proposal as follows.

13.1.1 – sustainable design



MEASURMENT SHEET								
SR	**DESCRIPTION**	**NO**	**L**	**B**	**H**	**QTY.**	**T.QTY**	**UNIT**

1	Excavation for foundation upto 1.5 m depth							
		2	5.790	0.6	1	6.948		
		3	2.830	0.6	1	5.094		
							12.042	M^3
2	Providing and laying cement concrete 1:4:8 and curing complete excluding cost of formwork							
		2	5.790	0.6	0.15	1.042		
		3	2.830	0.6	0.15	0.764		
							1.806	M^3
3	Uncoursed rubble masonary with hard stone of approved quality in foundations and plinth in cement mortar 1:6							
		2	5.790	0.6	1.35	9.380		
		3	2.830	0.6	1.35	6.877		
							16.257	M^3
4	Providing and laying cement concrete 1:2:4 and curing							
		2	5.790	0.6	0.15	1.042		
		3	2.830	0.6	0.15	0.764		
							1.806	M^3
5	White stone bela masonary block in course in super structure with stone of approved quality in cement mortar1:6							
		2	5.790	0.23	3.05	8.123		
		3	3.580	0.23	3.05	7.534		
		2	2.100	0.1	3.05	1.281		

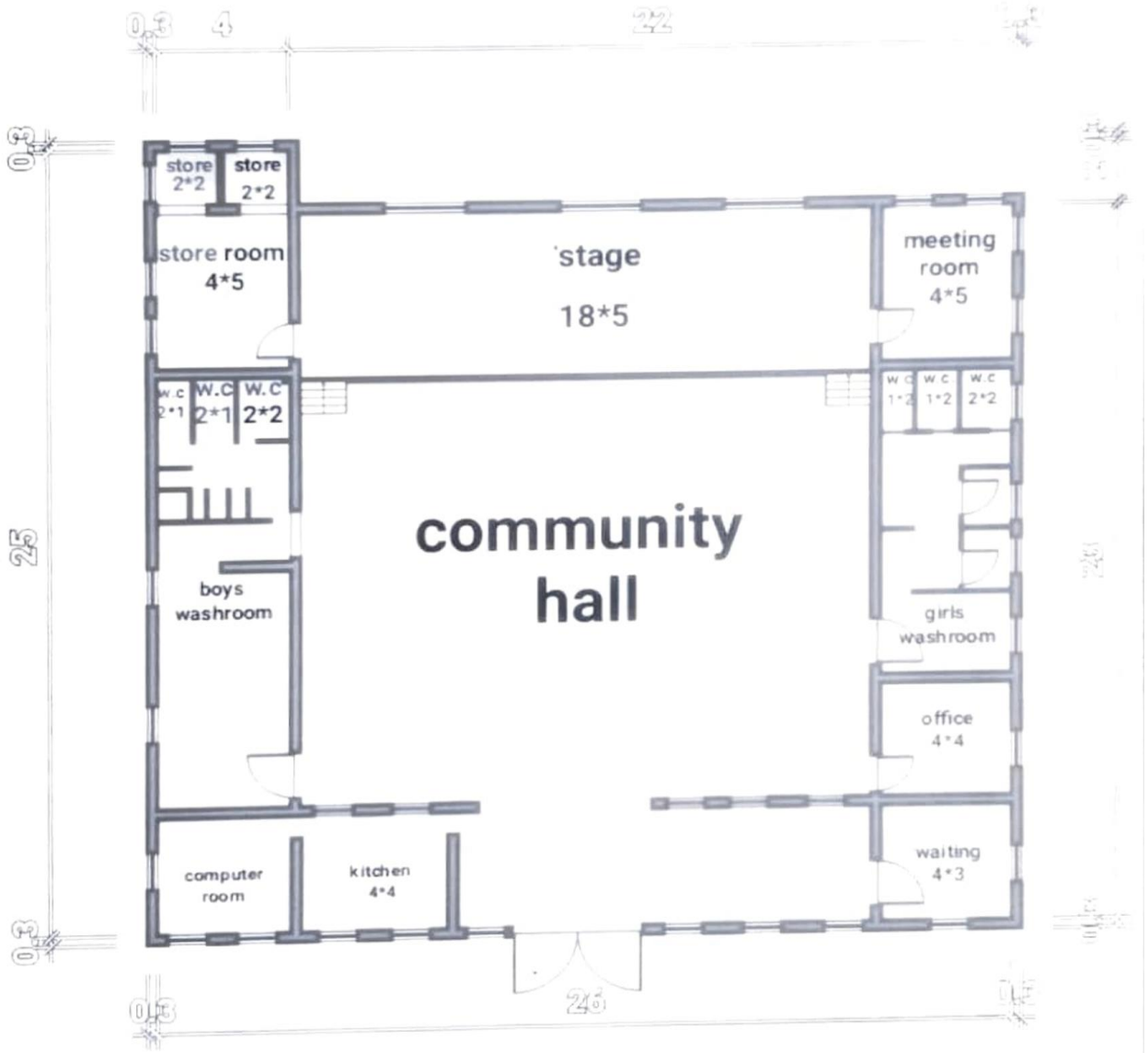
		4	1.140	0.1	3.05	1.391		
							18.329	M^3
	Deduction for openings							
		2	0.91	0.23	2.1	0.879		
		4	0.76	0.23	2.1	1.468		
		6	0.45	0.23	0.45	0.279		
							2.627	M^3
	NET QTY.						15.702	M^3
6	Filling in foundations and plinth with murum or selected soil in layer of 20 cm thickness including consolidating each deposited layer by ramming and watering.							
		2	2.51	3.58	0.6	10.783		
							10.783	M^3
7	Providing and fixing 35 mm thick shutter for doors and windows							
		2	0.91		2.1	3.822		
		4	0.76		2.1	6.384		
		6	0.45		1.2	3.240		
							13.446	M^3
8	Providing and laying ordinary cement concrete 1:2:4 and finish smooth with curing							
		1	5.79	4.03	0.15	3.500		
							3.500	M^3
9	Providing H.Y.S.D bar reinforcement for R.C.C. work including bending bidding and placing.							
		3.5	100	0.8	1	280		
							280	Kg
10	Providing mild steel reinforcement for R.C.C.							

	work including bending bidding and placing							
		3.5	100	0.2	1	70		
							70	Kg
11	Providing and 15 mm thick cement plaster in single coat on brick walls for interior plastering upto floor two level and finished even and smooth							
		2	5.56		3.05	33.916		
		4	3.58		3.05	43.676		
		4	2.1		2.1	17.640		
		8	1.14		2.1	19.972		
		2	2.51	3.58		17.972		
							132.35	M^2
	DEDUCTION FOR DOOR AND WINDOW							
	QTY ASPER IT.NO. 5			1	2.627	2.627		
	NET QTY.						129.72	M^2
12	Providing and fixing pvc and rain water pipe of 50mm dai							
		2	2.51	3.58		17.972		
							17.972	M^2
13	Providing Indian type water closet in toilet block							
		4				4		
							4	Nos
14	Providing and fixing vitriuos tiles of size 600mm x 600mm in single piece fixing in flooring							
		2	2.51	3.58		17.972		
							17.972	M^2

ABSTRACT SHEET					
SR. NO	DESCRIPTION	QTY	RATE	PER	AMOUNT
1	Excavation for foundation upto 1.5 m depth	12.042	100	M^3	1204.200
2	Providing and laying cement concrete 1:4:8	1.806	1200	M^3	2167.200
3	Uncoarsed rubble masonary with hard stone of approved quality in foundation and plinth in cement mortar	16.257	1500	M^3	24385.500
4	Providing and laying cement concrete 1:2:4	1.806	2000	M^3	3612.000
5	White stone bela masonary block in super structure with stone of approved quality in cement mortar 1:6	15.702	3000	M^3	47106.000
6	Filling in foundation and plinth with morum or selected soil in layer of 20cm thckness	10.783	125	M^3	1347.875
7	Providing and fixing 35 mm thick shutter for door windows including black enameled	13.446	2500	M^3	33615.000
8	Providing and laying ordinary cement concrete 1:2:4 for R.C.C. work	3.500	2000	M^3	7000.000
9	Providing H.Y.S.D. bar reinforcement for R.C.C. work including bending. Binding and placing in position complete upto floor two level	280.00	50	Kg	14000.000
10	Providing mild steel reinforcement for R.C.C. work including bending. Binding and placing in position complete upto floor two level.	70	50	Kg	3500.000
11	Providing 15 mm thick cement plaster in single coat on walls for interior plastering upto floor two	129.729	125	M^2	16216.125

	level and finished even and smooth				
12	Providing and fixing pvc rain water pipe of 50 mm dai etc	1.200	50	Rmt	60.000
13	Providing Indian type of water closet in toilet block	4	1200	Nos	4800.000
14	Providing and fixing vitrious tiles of size 600mm x 600mm in single piece fixing in flooring as per drawing	17.972	500	M^2	8986.000
	TOTAL				**167999.900**
	ADD 5% OF ELECTRIFICATION				**8399.995**
	ADD 5% OF PLUMBING				**8399.995**
	ADD 1.5% OF WATER SUPPLY				**2519.998**
	ADD 10% CONTRACTORS PROFIT				**16799.990**
	Say Rs.				**204119.878**
	(rupees two lacks four thousand one hundred nineteen only)				

13.2 community hall

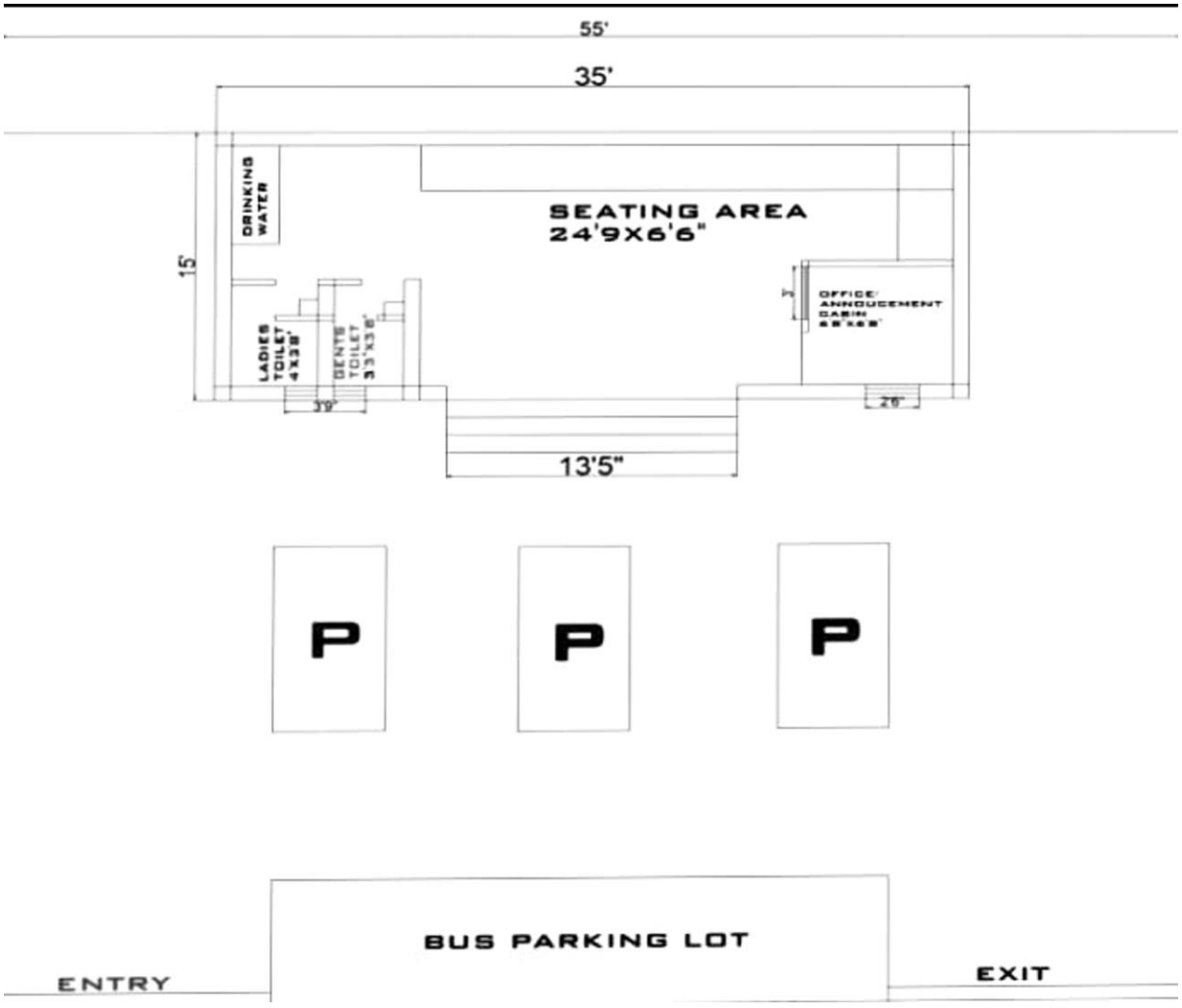


MEASUREMENT SHEET							
ITEM NO	DESCRIPTION	NO	L	B	H	QNT	UNITS
1	EXCAVATION FOR FOUNDATION	1	196	0.9	1.2	211	CU.M
2	C.C WORK IN FOUNDATION	1	196	0.9	0.2	35.28	CU.M
3	Brick masonary work in foundation 1st step	1	199	0.6	0.1	11.94	Cu.m
	2nd step	1	200	0.5	0.1	10	Cu.m
	3rd step	1	201	0.4	0.1	8.04	Cu.m
	Total					72.4	Cu.m
4	Brick masonry work in super structure	1	205	0.3	4	246	Cu.m
	Deduction for door and windows						
	Doors	14	1.2	0.3	2.1	10.58	Cu.m
	Door-1	9	0.9	0.3	2.1	5.103	Cu.m
	Door -2	1	4	0.3	2	2.4	Cu.m
	Ventilator	9	0.6	0.3	0.6	0.972	Cu.m
	Deduction for lintel						
	Doors	14	1.2	0.3	0.1	0.504	Cu.m
	Door-1	9	0.9	0.3	0.1	0.243	Cu.m
	Door -2	1	4	0.3	0.1	0.12	Cu.m
	Ventilator	9	1.2	0.3	0.1	0.324	Cu.m
	Total					20.24	
5	Brick masonry work Step -1	1	4	0.6	0.25	0.6	Cu.m
	Step -2	1	4	0.3	0.25	0.3	Cu.m
	Total					0.9	Cu.m
6	D.P.C at plinth level						
	For 200 mm thick wall	1	8	0.7	0.6	3.36	Cu.m
	For 300 mm thick wall	1	205	0.9	0.9	166.05	Cu.m
	Total					169.05	Cu.m
7	Earth filling	2	4	5	0.5	24	Cu.m
		1	16	14	0.6	134.4	Cu.m
		1	16	5.30	0.6	50.88	Cu.m

		1	4	4.58	0.6	11	Cu.m
		1	4	3	0.6	7.2	Cu.m
		1	4	3.98	0.6	9.55	Cu.m
		1	4	8	0.6	19.2	Cu.m
		1	4	7	0.6	16.8	Cu.m
	Total					273.03	
8	Internal plaster	14	4			84	Sq.m
		5	5			25	Sq.m
		5	6			30	Sq.m
		3	3		4	36	Sq.m
		16	6		4	384	Sq.m
		5	5		4	100	Sq.m
		5	5		4	100	Sq.m
	Total					754	Sq.m
9	White wash per above					754	Sq.m
10	R.C.C. work for slab	1	25.2	24.18	0.15	91.4	Cu.m

ABSTRACT SHEET					
SR.NO	**ITEM DESCRIPTION**	**QUANTITY**	**RATE**	**PER**	**AMOUNT**
1	Excavation work	211	155	Cu.m	32705
2	P.C.C	35.28	3000	Cu.m	105840
3	Brick work in foundation	72.4	3200	Cu.m	2,31,680
4	Brick work in super structure	225	3500	Cu.m	7,87,500
5	Plastering	754	150	Sq.m	113100
6	Painting	754	25	Sq.m	18850
7	R.C.C. work for slab	91.4	4900	Cu.m	4,47,860
	Total				**17,37,535**
	Add 5% electrification				86876
	Add 5% tiles fitting				86876
	Add 2% water charges				34750
	Add 10% contractor's profit				173753
	Add 5% conti……				86876
	Say total rupees				**2206666**

13.3 bus stop design



MEASUREMENT SHEET						
Sr. no	**Item description**	**No**	**L**	**B**	**H**	**Qnt(m^3)**
1	Excavation in foundation	1	36.4	0.9	1.5	49.14
2	Plain cement concrete in foundation in 1:3:6	1	36.4	0.9	0.3	9.82
3	Birck work in foundation upto plint Step -1	1	37	0.6	0.2	4.44
	Step -2	1	37.2	0.5	0.2	3.72

	Step -3	1	37.4	0.4	0.2	2.99
	Step -4	1	37.6	0.3	1.2	13.53
						24.68
4	Brick work in super structure in cement mortar 1:6	1	37.6	0.3	3	33.84
5	R.C.C. in slab	1	12.03	7.3	0.12	10.53
6	Smooth plaster inside the wall and celling in C.M.(1:3)	1	11.43		4	45.72
		2	4.27		4	34.16
		1	2.13		4	8.52
		1	11.43	4.27		48.80
		5	2.13		4	42.6
		1	2.13	2.13		4.5369
		3	2.44		4	29.28
		3	1.98	2.44		4.83
	Total					242.21

ABSTRACT SHEET					
Sr. no	**Item description**	**Quantity**	**Rate**	**Per**	**Amount**
1	Excavation in foundation	49.14	85	M^3	4176.9
2	Brick bat cement concrete in foundation	9.82	3200	M^3	31424
3	First class brick work upto plint	24.68	3200	M^3	78976
4	Brick work in super structure	33.84	3500	M^3	118440
5	R.C.C work for slab	10.53	8800	M^3	92664
6	Smooth plaster inside the walls	242.21	150	M^2	36331.5
	Total				**362011.5**
	Add 5% conti……..				18100.57
	Add 5% electrification				18100.57
	Add 2% water chage				7240.23
	Add 10% contractors profit				36201.15
	Gross total				**441654.02**

13.4 - R.C.C ROAD DESIGN

PROPOSED ROAD DESIGN AREA FOR R.C.C

R.C.C ROAD DESIGN

LENGTH = 2K M

WIDTH =8M

20 CM THCIK CONSOLIDATED GRAVEL

15 CM THICK SUB BASE

MEASUREMENT SHEET						
Sr.no	Description of item	No	L	B	H	Qty
1	Box cutting in road crust& consolidating &dressing to the specified grade and camber	1	2000	8	0.35	5600
2	Supplliying consolidated soil gravel &stacked a road side at regular interval	1	2000	8	0.30	4800
	Labour for spreding & consolidate soil gravel	1	2000	8	0.30	4800
3	Cement concrete(1:2:4) with 20 mm aggregate for road slab incuding	1	2000	8	0.15	2400

	booming ,edging etc					
4	Providing necessary joints					
	For longitudinal joint	1	2000			2000
	Transeverce joints	200		8		1600

ABSTRACT SHEET					
Sr.no	**Item description**	**Qty**	**Rate**	**Unit**	**Amount**
1	Box cutting in road crust& consolidating &dressing to the specified grade and camber	5600	40	M^3	224000
2	Supplliying consolidated soil gravel &stacked a road side at regular interval	4800	150	M^3	720000
3	Labour for spreding & consolidate soil gravel	4800	20	M^3	96000
4	Cement concrete(1:2:4) with 20 mm aggregate for road slab incuding booming ,edging etc	2400	600	M^3	1440000
	Providing necessary joints	3600	10	Rm	36000
	Total				2516000
	Add 5% for conti…..				125800
	Add 10% contractors profit				251600
	Add 2% water charge				50320
	Gross total				**2943720**

13.5 design of street light network

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 of projects.
- It gives a pleasant atmosphere during night.

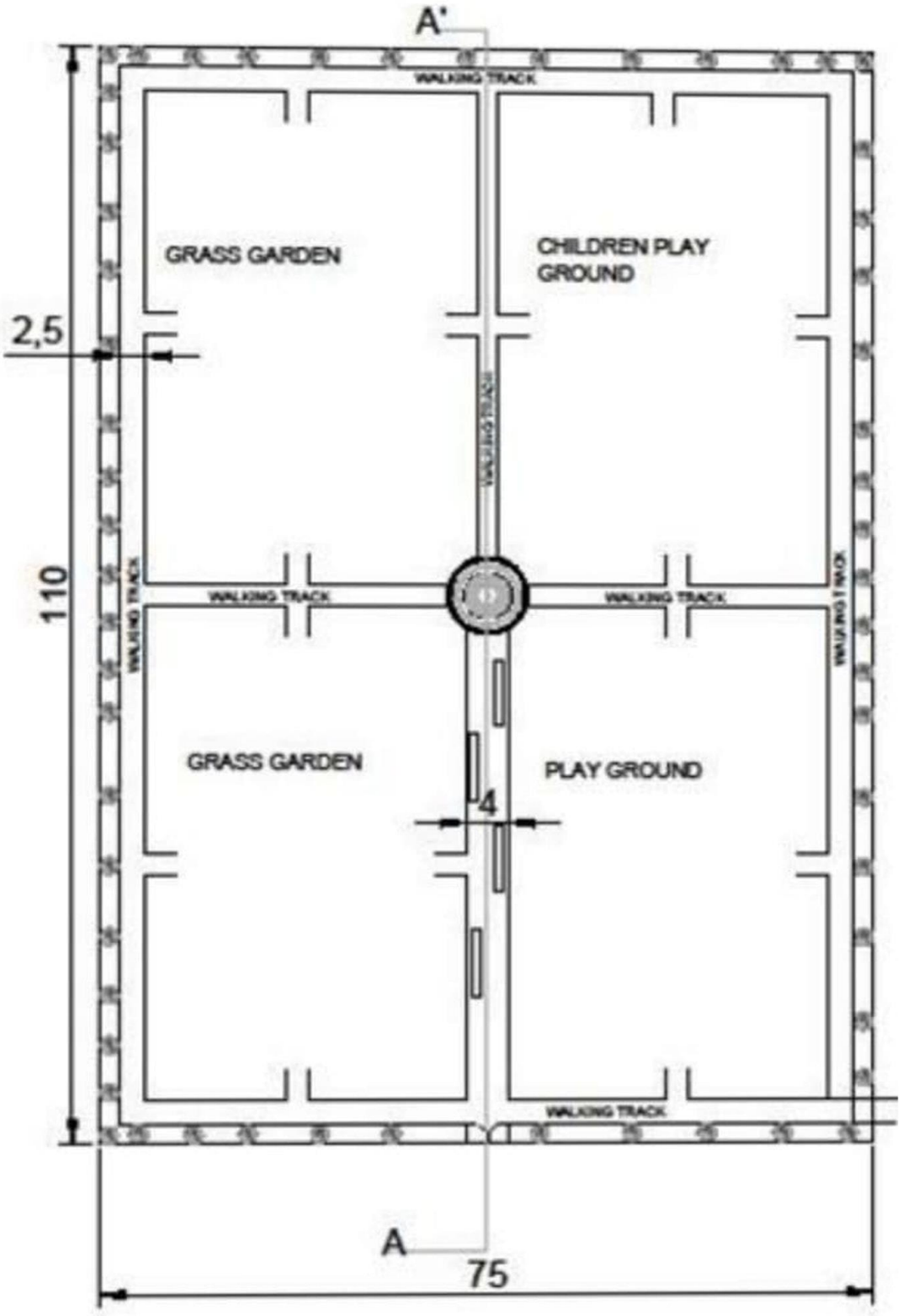
PROPOSED ROAD AREA FOR STREET LIGHT EXPANSION

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.

MEASUREMENT SHEET						
SR.NO	ITEM DESCRIPTION	NO	L	B	H	QTY
1	EXCAVATION	315	1.2	0.3	0.3	34.02
2	P.C.C.	315	1.2	0.3	0.3	34.02
3	STREET LIGHT POLES	315	-	-	-	315
4	LAMP	315	-	-	-	315
5	WORKER	70	-	-	-	70

ABSTRACT SHEET					
Sr. no	Item description	Qty	Rate	Unit	Amount
1	EXCAVATION	34.02	120	M^3	4082.4
2	P.C.C.	34.02	3800	M^3	129276
3	STREET LIGHT POLES	315	2000	nos	630000
4	LAMP	315	1200	nos	378000
5	WORKER	70	700	day	49000
	Total				**1190358.4**
	Add 2% water charges				23807.16
	Add 10% contractors profit				119035.84
	Gross total				**1333201.4**

13.6 sports ground for children's



MEASUREMENT SHEET						
Sr.no	Item description	No	L	B	H	Qty
1	Providing iron jali in perifary of boundary wall	2	38	1	2.1	1554 sq.m
2	Providing walking track in sports ground periphery	1	530	355	1	188150 sq.m
3	Providing sand pit in the ground	1	10.86	-	1	10.86 sq.m
4	Paver block	1	32	49.5	-	1584sq.m
5	Filling morum for grass in groung	2	32	49.5	0.15	237.6 cu.m
6	Providing r.c.c seating benches in ground	15	-	-	-	15 nos
7	Providing iron strip gate	1	-	-	-	1 nos
8	Providing tigard plants of periphery of the ground	80	-	-	-	80 nos

ABSTRACT SHEET					
Sr.no	Item description	Qty	Rate	Per	Amount
1	Providing iron jali in perifary of boundary wall	1554	150	Sq.m	233100
2	Providing walking track in sports ground periphery	188150	0.10	Sq.m	18815
3	Providing sand pit in the ground	10.86	2	Sq.m	2172
4	Paver block	1584	72	Sq.m	114048
5	Filling morum for grass in groung	237.6	10	Cu.m	2376
6	Providing r.c.c seating benches in ground	15	1200	nos	18000
7	Providing iron strip gate	1	5000	nos	5000

8	Providing tigard plants of periphery of the ground	80	500	nos	4000
	total				**393511**
	Add 2% water charges				**7870.22**
	Add 5% conti…….				**19675.55**
	Add 10% contractors profit				**39351.1**
	Gross total				**460407.87**

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

1. 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	

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.

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.

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.

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,

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 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.

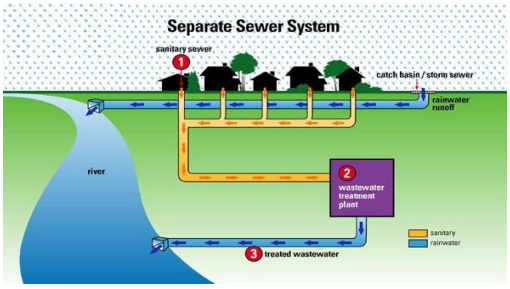
Separate sewerage system

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.

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.

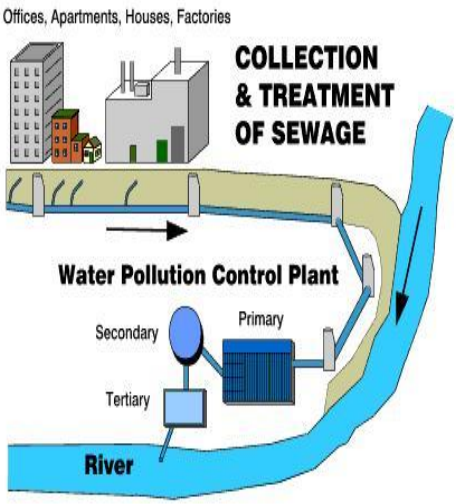
Combined sewerage system

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 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

strata of the selected treatment site

Ambil stream encircling the Indradhanushya Centre, Pune

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 intake well	Twice month	
3	Trimming /uprooting 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.

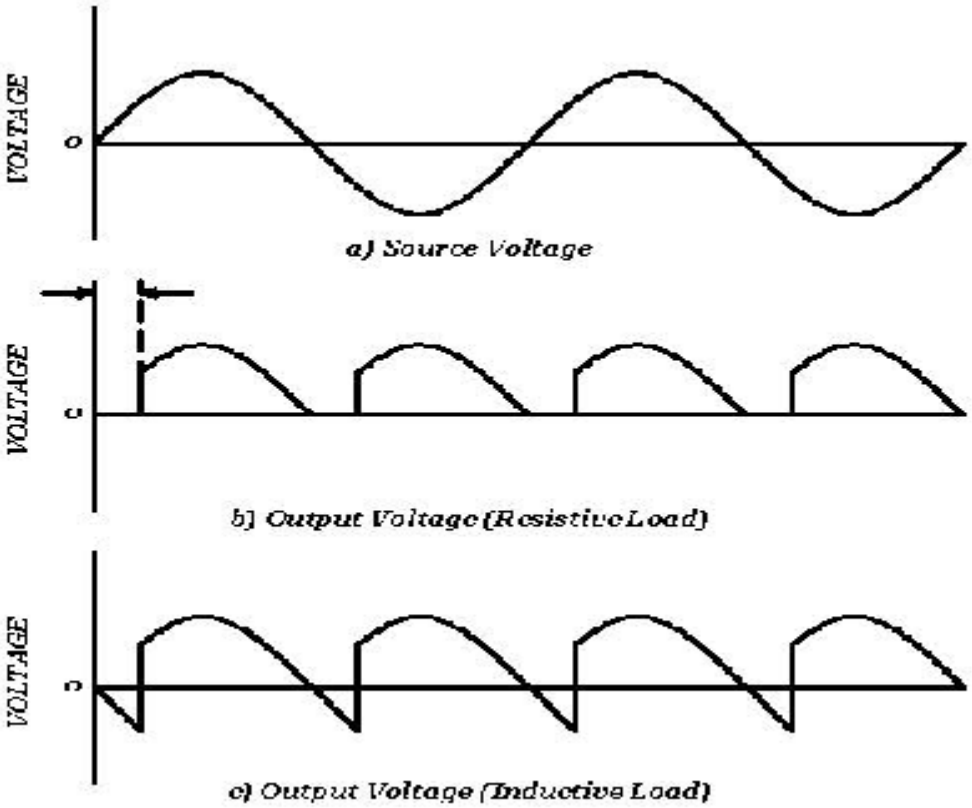
Dual Converter

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.

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.



Fir

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.

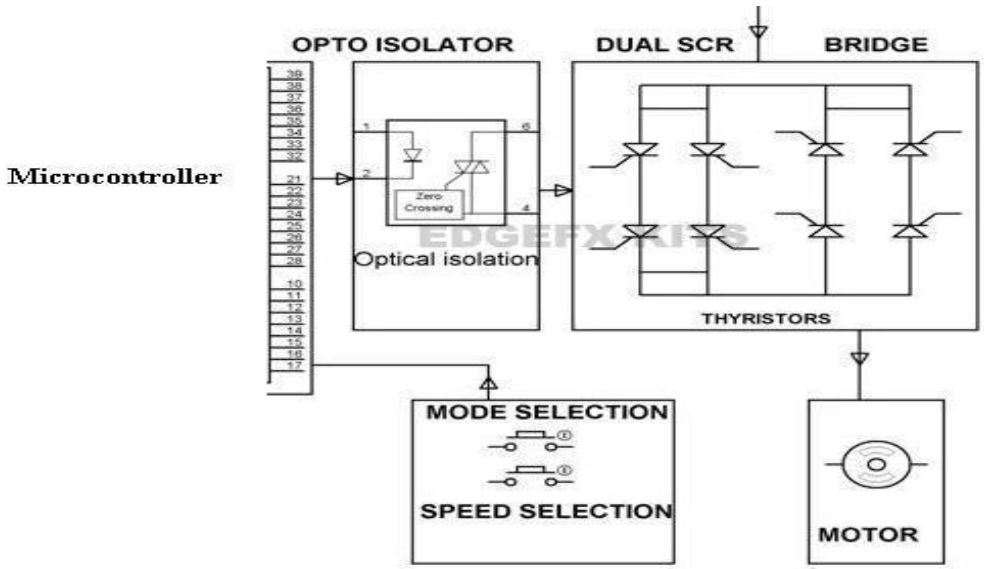
Applications of single phase dual converter

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.

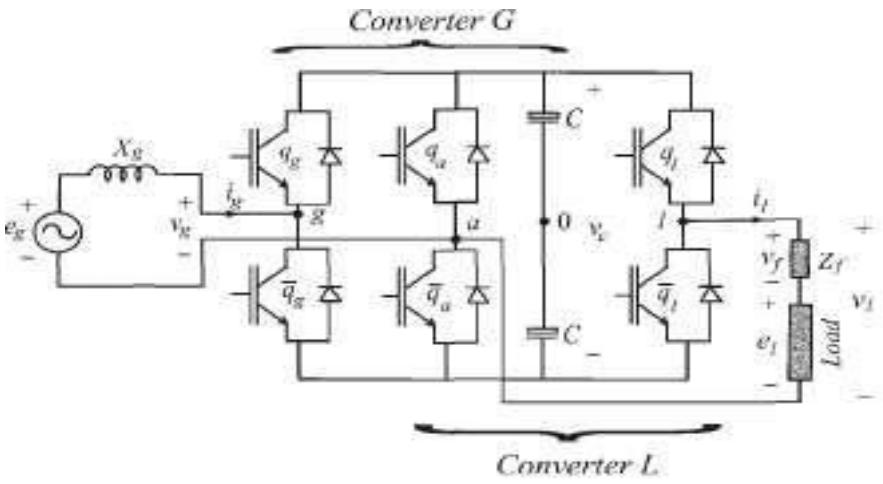
Single Phase – Three Leg AC/AC Converter

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.

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.

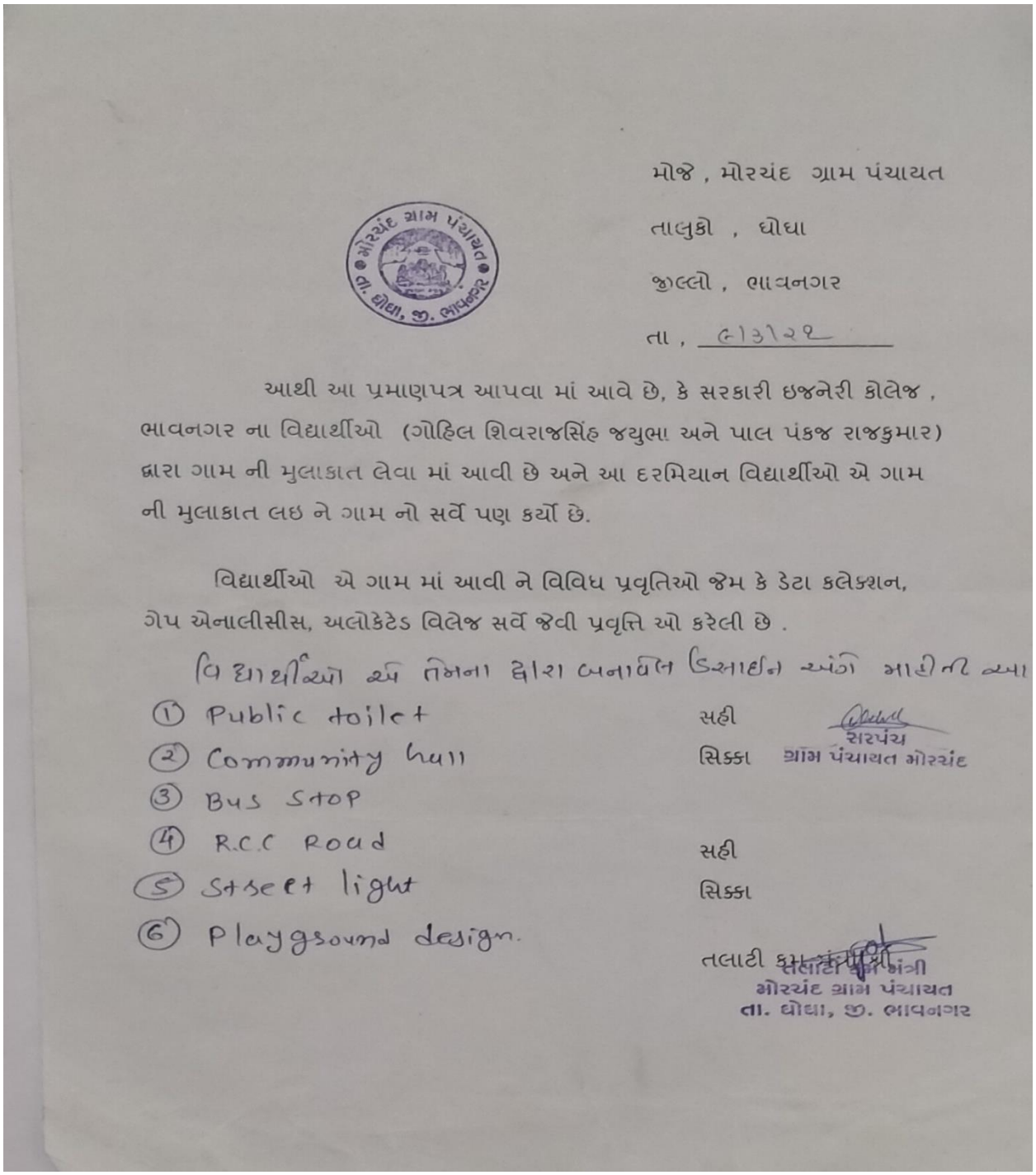
Chapter -15

15 smart and/or sustainable features of chapter 8&13 design impact on society

No	Design	Impact on society	Benefits period
1	Aganwadi	Childerns are get the right education and the mid day mill. It will help for their phyiscal growth	Immediate
2	Agriclutre products market building	It will help the villagers to increse their income with help of selling their vegitables of farm.	Immediate
3	Library	It will help to the students of the village to improve their knowledge	Within 1 year
4	Hostel	It will help the out side student who will come to study their they will be able to stay their. It will help the villagers also	Long term
5	School	It will help the village students to study at their own village	Long term
6	Bank	It will very useful to the villagers to have a bank in their own village they will easily do the transaction of money form their own village	immediate
7	Public toilet	It will provide the proper sanitation to the village	Long term
8	Community hall	It will provide the social gathering to the villagers	Immediate
9	Bus stop	It will provide safe and convenient transport to the villagers	Long term
10	R.C.C road	It will improve the villagers transport facility	Long term
11	Street light	It will improve the night vision in the village and helpful to travel in the night and it will reduce the night crime	Long term
12	Sports ground	It will helpful to the villagers to do activity related to sports	immediate

Chapter- 16

16.1 survey by interviewing with talati and /or sarpanch



મોજે , મોરચંદ ગ્રામ પંચાયત

તાલુકો , ઘોઘા

જીલ્લો , ભાવનગર

તા , ૯/૩/૨૧

આથી આ પ્રમાણપત્ર આપવા માં આવે છે, કે સરકારી ઇજનેરી કોલેજ , ભાવનગર ના વિદ્યાર્થીઓ (ગોહિલ શિવરાજસિંહ જયુભા અને પાલ પંકજ રાજકુમાર) દ્વારા ગામ ની મુલાકાત લેવા માં આવી છે અને આ દરમિયાન વિદ્યાર્થીઓ એ ગામ ની મુલાકાત લઇ ને ગામ નો સર્વે પણ કર્યો છે.

વિદ્યાર્થીઓ એ ગામ માં આવી ને વિવિધ પ્રવૃતિઓ જેમ કે ડેટા કલેક્શન, ગેપ એનાલીસીસ, અલોકેટેડ વિલેજ સર્વે જેવી પ્રવૃત્તિ ઓ કરેલી છે .

વિદ્યાર્થીઓ એ તેમના દ્વારા બનાવેલ ડિસાઈન અંગે માહીતી આપી

(1) Public toilet
(2) Community hall
(3) Bus stop
(4) R.C.C Road
(5) Street light
(6) Playgsound design.

સહી
સિક્કા
સરપંચ
ગ્રામ પંચાયત મોરચંદ

સહી
સિક્કા

તલાટી કમ મંત્રી
મોરચંદ ગ્રામ પંચાયત
તા. ઘોઘા, જી. ભાવનગર

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

Chapter :- 18

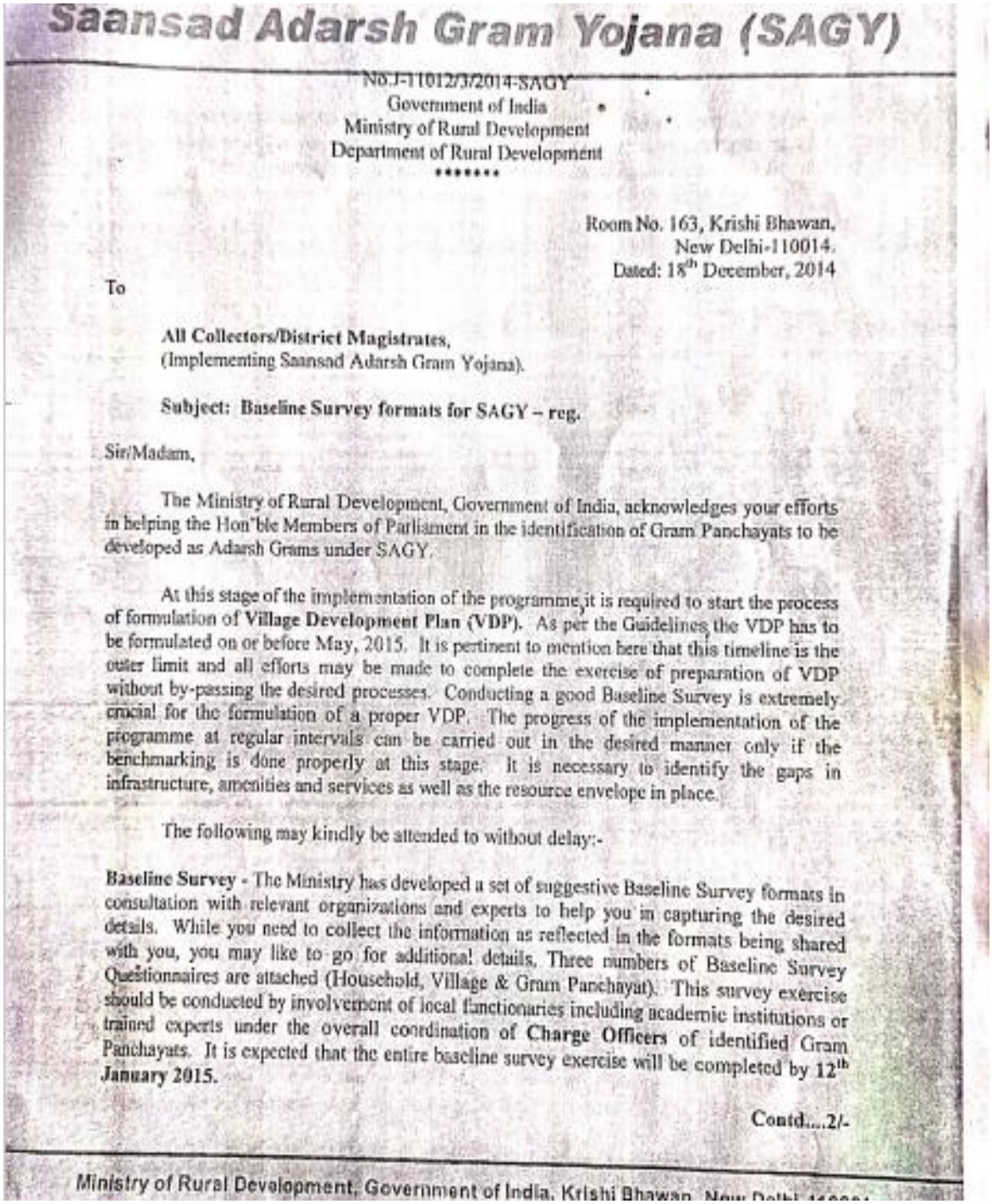
18. Social Activities – Any Activates Planned By Students

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 :- 19

19. SAGY Questionnaire Survey form with the Sarpanch Signature



Saansad Adarsh Gram Yojana (SAGY)

No.J-11012/3/2014-SAGY
Government of India
Ministry of Rural Development
Department of Rural Development
****

Room No. 163, Krishi Bhawan,
New Delhi-110014.
Dated: 18th December, 2014

To

All Collectors/District Magistrates,
(Implementing Saansad Adarsh Gram Yojana).

Subject: Baseline Survey formats for SAGY – reg.

Sir/Madam,

The Ministry of Rural Development, Government of India, acknowledges your efforts in helping the Hon'ble Members of Parliament in the identification of Gram Panchayats to be developed as Adarsh Grams under SAGY.

At this stage of the implementation of the programme, it is required to start the process of formulation of **Village Development Plan (VDP)**. As per the Guidelines, the VDP has to be formulated on or before May, 2015. It is pertinent to mention here that this timeline is the outer limit and all efforts may be made to complete the exercise of preparation of VDP without by-passing the desired processes. Conducting a good Baseline Survey is extremely crucial for the formulation of a proper VDP. The progress of the implementation of the programme at regular intervals can be carried out in the desired manner only if the benchmarking is done properly at this stage. It is necessary to identify the gaps in infrastructure, amenities and services as well as the resource envelope in place.

The following may kindly be attended to without delay:-

Baseline Survey - The Ministry has developed a set of suggestive Baseline Survey formats in consultation with relevant organizations and experts to help you in capturing the desired details. While you need to collect the information as reflected in the formats being shared with you, you may like to go for additional details. Three numbers of Baseline Survey Questionnaires are attached (Household, Village & Gram Panchayat). This survey exercise should be conducted by involvement of local functionaries including academic institutions or trained experts under the overall coordination of **Charge Officers** of identified Gram Panchayats. It is expected that the entire baseline survey exercise will be completed by **12th January 2015.**

Contd....2/-

Ministry of Rural Development, Government of India, Krishi Bhawan, New Delhi-110001

-2-

Uploading of the data collected through Baseline Survey- After the collection of data, the same should be entered into the online portal at http://www.saanjhi.gov.in . You (District Collector/DM) being the Nodal Officer will ensure that the data is correctly compiled and uploaded on to the website latest by **20th January, 2015.**

The Ministry will be sharing with you the **structural framework of VDP** very shortly, which will give you an idea as regards the desired processes and structure of a VDP. We will be holding a dialogue with you through video conferencing facility in the near future for assessing the progress of baseline survey exercise and formulation of the VDP.

(Aparajita Sarangi)
Joint Secretary
19/12/14

Copy to:

Principal Secretaries/Secretaries (RD Department)/State Nodal Officers (SAGY)

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: morchand Gram Panchayat: morchand Ward No.

Block: ghoghla District: Bhavnagar

State: Gujarat 5 Constituency: Bhavnagar

1. Family Identity and Size

Name of Head of Household	762 gohil Nirubha Jesha Gha							Male/ Female	
SECC Survey ID:		Family Size	7	Over 18	7	to 18	—	Under 6	—

2. Category & Entitlement Details (Tick as appropriate)

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

2. Adults (above 18 years)

Name	Age	Sex M/F/O	Disability Status Y/N	Marital Status[3]	Education Status[4]	Adhaar Card (Y/N)	Bank A/C (Y/N)	Social Security Pension[5]
gohil shivyanisinh	21	M	N	Unmarried	graduate	Y	Y	No
gohil Arjunsinh	23	M	N	"	Diploma	Y	Y	No
gohil Gajendrasinh	23	M	N	"	Gra. UG	Y	Y	No
Gohil Vishal sinh	24	M	N	"	UG	Y	Y	No

3. Children from 6 years and up to 18 years

Name	Age	Sex M/F/O	Disability Y/N	Marital Code*	Level of Education: Code#	Going to School /College (Y/N)	Current Class	Computer Literate Y/N
Gohil Rudra Raj sinh	7	m	No	No	2	school	2	No
Gohil bhavdip sinh	17	M	No	No	12th	school	12th	yes
Gohil Gangheyasinh	15	M	No	No	10th	school	10th	yes

4. Children below 6 years

Name	Age	Sex M/F/O	Disability Yes/No	Going to School (Y/N)	Going to AWC Y/N	De-worming Done	Fully Immunised Y/N	Mother's Age at the time of Child's Birth
Gohil Rajveersinh	3	M	No	No	Y	Y	Y	
Gohil Virubha ba	4	F	No	No	Y	Y	Y	
Gohil Pruthvirajsinh	3	M	No	No	Y	Y	Y	

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

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

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

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

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

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

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

6. Use of Mosquito Net
Children: Yes / No Adults: Yes / No

7. Do members take Regular Physical Exercise

	Yoga	Games	Other Exercises
Adults	Yes / No	Yes / No	Yes / No
Children	Yes / No	Yes / No	Yes / No

8. Consumption of Tobacco

	Smoking	Chewing
Adults		✓
Children		

9. House & Homestead Data

Own House: Yes / ~~No~~	No. of Rooms: 2–3
Type: ~~Kutcha~~ / Semi Pucca / ~~Pucca~~	
Toilet: Private / ~~Community~~ / ~~Open Defecation~~	
Drainage linked to House: Covered / ~~Open~~ / ~~None~~	
Waste Collection System	~~Door Step~~ / Common Point / ~~No Collection System~~
Homestead Land: Yes / ~~No~~	Kitchen Garden : ~~Yes~~ / No
Compost Pit: ~~Individual~~/ ~~Group~~/ None	Biogas Plant: ~~Individual~~/ ~~Group~~/ None

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

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

11. Source of Lighting and Power

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

12. Landholding (Acres)

1. Total	2023	2. Cultivable Area	1500

13. Principal Occupations in the Household

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

14. Migration Status
Does any member of the household migrate for Work: Yes / No If Yes Entire Year / Seasonal
Does anyone below 18 years migrate for work: Y/N

15. Agriculture Inputs

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

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

Name	Unit	Quantity
Groundnut	Kg/Bardal	1000
Cotton	Kg/Bardal	8000
Bajri	Kg/Bardal	500

17. Livestock Numbers

Cows: 500	Bullocks: 200	Calves: 300
Female Buffalo: 800	Male Buffalo: 4	Buffalo Calves: 400
Goats/ Sheep: 300	Poultry/ Ducks: No	Pigs: No
Any other: Type No		No.
Shelter for Livestock: Pucca / Kutcha / None		
Average Daily Production of Milk(Litres): 2000		

18. What games do Children Play
Cricket, Pakdam-Pakdam, etc.

19. Do children play musical instrument (mention)

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: morchand

b. Block: ghogha

c. District: Bhavnagar

d. State: Gujrat

e. Lok Sabha Constituency: Bhavnagar Rural

f. Number of Wards in the Gram Panchayat: 10

g. Number of Villages in the Gram Panchayat: morchand

h. Names of Villages: morchand.

Demographic Information

Number of Households 762 Total Population 4,492 Male 2307 Female 2185

SC HHs 15 ST HHs 3 OBC HHs 450 Other HHs 700

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	No	
b.	Nearest Primary Health Centre (PHC)	Yes	
c.	Nearest Community Health Centre (CHC)	No	
d.	Nearest Post Office	Yes	
e.	Nearest Bank Branch (Any)	No	5 km
f.	Nearest Bank with CBS Facility	No	
g.	Nearest ATM	No	
h.	Nearest Primary School	Yes	
i.	Nearest Middle School	No	5 km
j.	Nearest Secondary School	No	5 km
k.	Nearest Higher Secondary School / +2 College	No	21 km
l.	Nearest Graduate College	No	21 km
m	Nearest ITI / Polytechnic Centre	No	(N) 21 km
n	Kisan Seva Kendra	No	

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		
p	Nearest Agro Service Centre		
p	MSP based Government Procurement Centre		
q	Milk Cooperative /Collection Centre	Yes	
r	Veterinary Care Centre	No	
s	Ayurveda Centre	No	
t	E – Seva Kendra	No	15km
u	Bus Stop	Yes	
v	Railway Station	No	42 km
w	Library	No	
x	Common Service Centre	No	15 km

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total No Public — Private —

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

V. Education, ICDS

a. Number of Angan Wadi Centres: 3

b. Number of villages without Angan Wadi Centres No

Names of such villages: _____

c. Schools (Number)

Primary Private: No Primary Govt.: Yes

Middle Private: No Middle Govt.: Yes

Secondary Private: No Secondary Govt.: Yes

Higher Secondary Private: No Higher Secondary Govt: No

VI. Public Distribution System

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

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 Yes Not Covered No	Morchand, Chuga Padva, Bhavani Pura	—
b.	Hand Pump Coverage in Villages:	Covered No Not Covered No	—	—
c.	Coverage under Covered Drains:	Covered Yes Not Covered No		
d.	Coverage under Open Drains:	Covered No Not Covered No		
e.	Villages with Household Electricity Connection (Numbers)	Connected Yes Not Connected Yes		

VIII. Land and Irrigation

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

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	
e)	Number of eligible HHs having ration cards	
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	
h)	Number of active Job Card holders under MGNREGA	
i)	Number of Job Card holders who completed 100 days of work during 2013-14	
j)	Number of shops selling alcobol	
k)	Number of BPL families	
l)	Number of landless households	
m)	Number of IAY beneficiaries	
n)	Number of FRA[2] beneficiaries	
o)	Number of Community Sanitary Complexes	
p)	Number of Households headed by single women	
q)	Number of Households headed by physically handicapped persons	
r)	Total number of Persons with Disability in the village	
s)	Number of SHGs	
t)	Number of active SHGs	
u)	Number of SHG Federations	
v)	Number of Youth Clubs	
w)	Number of Bharat Nirman Volunteers	

Name and Signature of Surveyor and Respondent'

S.J. Gohil P.R.Pul Surveyor	સરપંચશ્રી PRI Respondent (Preferably Gram Panchayat Chairperson)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

This questionnaire should be filled for each of the villages in the selected Gram Panchayat

I. Basic Information

a. Village: MORCHAND

b. Ward Number: -

c. Gram Panchayat: MORCHAND

d. Block: GHOGHA

e. District: BHAVNAGAR

f. State: GUJARAT

g. Lok Sabha Constituency: BHAVNAGAR

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

i Names of Habitations / Hamlets:

Demographic Information

Number of Households 762 Total Population 4,492 Male 2307 Female 2185

SC HHs 15 ST HHs 3 OBC HHs 450 Other HHs 700

II. Access to Infrastructure/Amenities etc.

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

and relevant government officia

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

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

ii. Road Connectivity

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

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

iii. Drinking Water Facilities

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

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

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

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

iv. Coverage of Habitations under Waste Management System

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

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

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

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

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

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

v. Coverage of Habitations under Electrification

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

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

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

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

vi. Sports Facilities in the Village

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

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

vii. Education, ICDS

a. Number of Anganwadi Centres: _____

c. Schools (Number)

Primary Private: ____ Primary Govt.: ____

Middle Private: ____ Middle Govt.: ____

Secondary Private: ____ Secondary Govt.: ____

Higher Secondary Private: ____ Higher Secondary Govt: ____

2

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

viii. Land Category		Area in Acres		Land Category	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land		d.	Pasture / Grazing Land		g.	Check Dam	
b.	Irrigated Land		e.	Forests/ Plnatations		h.	Wells/Bore Wells	
c.	Un-irrigated Land		f.	Other Common Land		I	Tanks /Ponds	

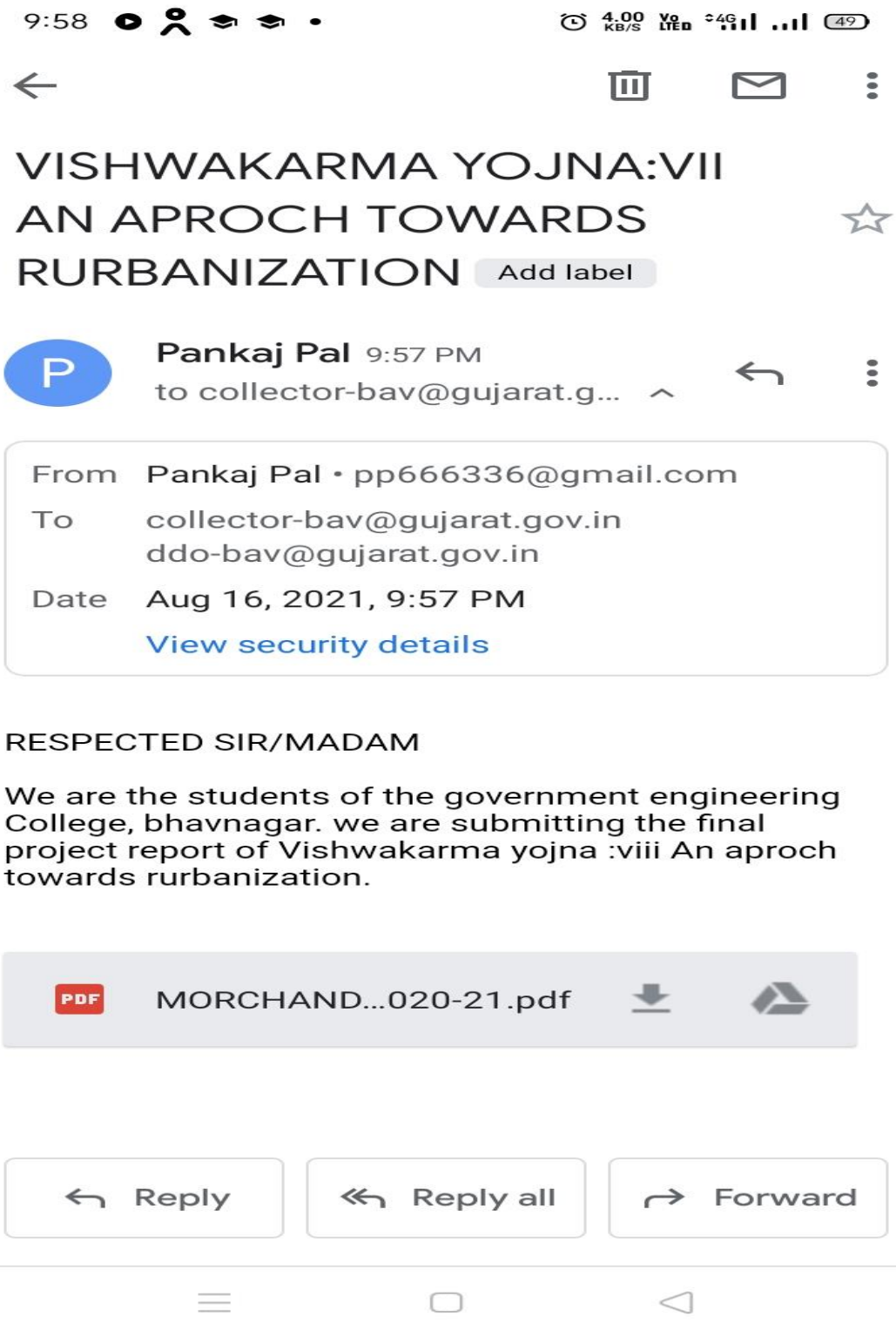
ix. Entitlement Related Parameters		
1	Number of active Job Card holders under MGNREGA	
2	Number of active Job Card holders who have completed 100 days of work	
3	Number of shops selling alcohol	
4	Number of BPL families	
5	Number of landless households	
6	Number of IAY beneficiaries	
7	Number of FRA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

Name and Signature of Surveyor and Respondent'

S.J.GOHIL Surveyor	સરપંચશ્રી મોરચંદ ગ્રામ પંચાયત તા. ઘોઘા, જી. ભાવનગર PRI Respondent (Preferably a ward member from a ward that is fully or partially covered under the Village)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey

Chapter :- 20

21. sending the soft copy of file to TDO/DDO



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:	(1) Enrollment No.:	170210106016	(1) Name	Gohil shivrajsinh j
Morchand	(2) Enrollment No.:	170210106035	(2) Name	pal pankaj rajkumar

Probelm Definition and Design Details			
Sr. No.	Problem Definition	Capacity (mention unit)	Estimated cost (in Rs.)
Design - 1	design of anganwadi building	20 kids	471751
Design - 2	design of agricultural product market building	15 stalls	516029
Design - 3	design of secondary school building	5 class rooms, 4 labs, 1 assembly	2071331
Design - 4	design of hostel building	30 student	2521503
Design - 5	design of bank building	30×20 m^2	1548254
Design - 6	design of library building	24×26 m^2	3523369
Design – 7	Design of public toilet	5x6 m^2	204119
Design – 8	Design of community hall	20x26m^2	2206666
Design – 9	Design of bus stop	24x30m^2	441654
Design -10	Design of RCC road	2km	2943720
Design – 11	Design of street light network	2km	1333201
Design – 12	Design of public sports ground	75x110m^2	460407

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.*"