DETAILED PROJECT REPORT

VISHWAKARMA YOJANA: VIII
AN APPROACH TOWARDS RURBANISATION
Chichwada Village

Valsad District

PREPARED BY

STUDENT NAME	BRANCH NAME	ENROLLMENT NO
Shewale Gaurav Bhikhubhai	Civil	170190106057
Bagle Hiren Jagdishbhai	Electrical	180193109002

GOVERNMENT ENGINEERING COLLEGE, VALSAD

Prof. Dhaval. T. Barot
(NODAL OFFICER)

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 : Chichwada

District : Valsad

Under

Vishwakarma Yojana: Phase-VIII

in partial fulfillment of the project offered by

GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA

During the academic year 2020-21.

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

STUDENT NAME	BRANCH NAME	ENROLLMENT NO
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VY-Nodal Officer Name and Signature:	**Prof. Dhaval T. Barot**
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College Name:	**Government Engineering Collage, Valsad**
College Stamp:	

ABSTRACT

Vishwakarma Yojana is one such initiative towards Rurbanization of villages by Government of Gujarat that hinders such migrations. This Yojana aims at developing the village by providing all the urban facilities that a town could have, nevertheless maintaining the agricultural soul. this will be achieved by considering varied aspects like Physical, Social, and Renewable infrastructural facilities. The construct of Rurbanization at regeneration and revitalisation of each the physical additionally as social surroundings in villages through a considered and consumption of resources is that the thought for betterment or the villages. it's designed to cut back and take away the rural-urban divide and to steer to method of rural transformation that's not consumptive. Vishwakarma Yojana is AN approach towards Rurbanization, it's been projected to produce the advantage of planet expertise to engineering students and apply their technical information within the designing, development and management of rural infrastructure facilities. Rurbanization suggests that urban facilities and amenities in geographical area, developing village with facilitate of rural soul and concrete amenities. during this village on one hand some essential infrastructural facilities like installation, Road Network and electricity, grammar school, secondary and better middle school etc. are sensible and ample on the opposite hand lacking of infrastructural facilities like drain, privy, and public garden. underneath this theme the villages of Rurban areas are going to be adopted by varied engineering schools underneath the Gujarat technological University. The engineering schools would study the known villages and create recommendations to realize integrated and comprehensive development through technology application and project preparation and management.

The name of the allotted village is Chichwada placed in Valsad taluka of Valsad district. This village has contains of 238 homes. it's a complete population of 1025 with 488 feminine population against 537 males according census 2011 knowledge. the most aspects for development of this village ar waste product, public bathrooms, community hall, etc. a number of the physical infrastructure like Water Tank, Aaganwadi, Sub PHC Center, and well exist within the village and ar properly maintained and used. additional over tank is gift in good shape.

On the idea of survey knowledge we've discovered that there ar some physical infrastructures like tank, Aganwadi, Sub PHC Center, etc. however among them some don't seem to be in usable condition that creates issues for villagers. The work of Sarpanch and Talati is nice as per the feedback given by villagers. Clinic facility is additionally not on the market. Construction of roads ar in higher condition and usable. additional such issues ar known and ar to be designed and restored within the project phases.

In part one on the idea of survey knowledge, that we've collected from Chichwada village and interaction with villagers, Sarpanch and Talati, we've finalized some styles for the additional development of the village as, Community hall, Village entrance gate,Public Toilet By introducing higher than mentioned amenities all the facilities may be created on the market to villagers which can cut back the migration. this can sustain the culture of cooperative living. Socioeconomic development can occur giving a way of living to the dwellers nevertheless maintaining the essence of a village. And partially a pair of we've set some styles for future scope of the village development as, grammar school, PHC Center, Bus Stop.

ACKNOWLEDGEMENT

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

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

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

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

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

We are also thankful to **Dr. Viny .S. Purani, Principal, Government Engineering Collage, Valsad** and aslo faculties of our colleges for their encouragement and support to complete this project work.

An act of gratitude is expressed to our internal guide **Prof. Dhaval T. Barot and Prof. Devendra N. Tandel, Nodal officer Prof. Dhaval T. Barot from Government Engineering College, Valsad** for their invaluable guidance, constant inspiration and active involvement in our project work.

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

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

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

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ABBREVIATION

Short Name/Symbol	Full form
GDP	Gross Domestic Product
GEB	Gujarat Electric Board
LED	Liquid Emitting Display
NGO	Non-Government Organization
PHC	Primary Helth Center
PPP	Public Distribution System
RCC	Reinforced Concrete Structure
SC	Schedule Cast
ST	Schedule Tribe
VY	Vishwakarma Yojna
WI-FI	Wireless Fidelity

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

1.1 Background & Study Area Location

As a district of Vishwakarma Yojana one must visit associate Ideal village, as significantly strained to the guidelines village of Gujarat is to be chosen. This can be one of the crucial study and observation stage that must be drained order to induce the image of what a perfect village feels like. This visit of ideal village helps one to check the assigned village to ideal village, so the gaps will be acknowledged. For the study of a perfect village we tend to chosen Baben village, settled within the Surat district of Gujarat. The amount of development that this village has achieved is far over any standard village in our country.village got the most effective gram punchayet of the year award in 2011 from the government. Baben village could be a Bench mark for the event of different villages in Asian country. These Baben village had received Swarnim gram award within the year 2012. It had additionally received several such awards from the year 2007-2016. As per the census 2011 Baben has population of fifteen,610 of that eight,642 area unit males, whereas, six,968 area unit females as per report discharged by Census Asian country 2011. Population of youngsters with age of 0-6 is 2121 that is thirteen.59 you look after total population of Baben. Talking regarding the feminine Sex magnitude relation, it's of 806 against state average of 919. Moreover, kid sex magnitude relation in Baben is around 822 compared to Gujarat state average of 890. Accomplishment rate of Baben town is seventy-five.70 nada under state average of seventy-eight.03 %. In Baben, Male accomplishment is around eighty-two.55 take some time feminine accomplishment rate is sixty-seven.18 %. The village possesses all basic facilities like sanitation, irrigation, transportation, health care, etc… The village possesses pakka homes. The road's area unit all weather with streetlights. The quality of living of this village is far higher than the normal village individuals. Farmers possesses non-public bore wells, accomplished with trendy farming techniques.

Location

Baben is a village panchayat located in the Surat district of Gujarat state,India. The latitude 21.1378786 and longitude 73.0966019 are the geocoordinate of the Baben. Baben is located around 29.5 kilometer away from its district head quarter Surat.

Baben's nearest town/city/important place is Bardoli located at the distance of 2.1 kilometer. Baben is a village panchayat located in the Surat district of Gujarat state,India. The latitude 21.1378786 and longitude 73.0966019 are the geocoordinate of the Baben. Gandhinagar is the state capital for Baben village. It is located around 245.2 kilometer away from Baben.. The other nearest state capital from Baben is Daman and its distance is 84.5 KM. The other surrouning state capitals are Daman 84.5 KM., Mumbai 243.9 KM., Bhopal 500.9 KM.

- **Village:** Baben
- **Taluka:** Bardoli
- **District:** Surat
- **Pin:** 394601
- **State:** Gujarat
- **Nearest Railway Station:** Bardoli Railway Station (1km)
- **Air Port:** Surat Airport (36.8 km)
- **Town/City:** Bardoli (2.1 km)
- **District:** Navsari (27.0 km)

Fig. 1.1 Map of Baben village

- In figure satellite map of Baben village. which is grab by Google Map. In this hospitals, Panchayt house, Market and etc, are shown of Baben village.

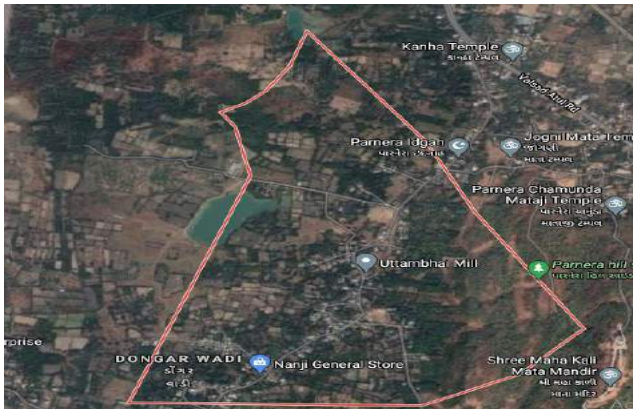


Fig. 1.2 Satellite Map of Baben village

1.2 Concept: Ideal Village, Normal Village

An ideal Indian village will be so constructed as to lend itself to perfect sanitation. It will have cottages with sufficient light and ventilation built of a material obtainable within a radius of five miles of it. The cottages will have courtyards enabling householders to plant vegetables for domestic use and to house their cattle. The village lanes and streets will be free of all avoidable dust. It will have wells according to its needs and accessible to all. It will have houses of worship for all, also a common meeting place, a village common for grazing its cattle, a co-operative dairy, primary and secondary schools in which industrial education will be the central fact, and it will have Panchayats for settling disputes. It will produce its own grains, vegetables and fruit, and its own Khadi. This is roughly my idea of a model village. In the present circumstances its cottages will remain what they are with slight improvements. Given a good zamindar, where there is one, or co-operation among the people, almost the whole of the programme other than model cottages can be worked out at expenditure within means of the villagers including the zamindar or zamindars, without Government assistance. With that assistance there is no limit to the possibility of village reconstruction. But my task just now is to discover what the villagers can do to help themselves if

they have mutual co-operation and contribute voluntary labour for the common good. I am convinced that they can, under intelligent guidance, double the village income as distinguished from individual income. There are in our villages inexhaustible resources not for commercial purposes in every case but certainly for local purposes in almost every case. The greatest tragedy is the hopeless unwillingness of the villagers to better their lot. The very first problem the village worker will solve is its sanitation. It is the most neglected of all the problems that baffle workers and that undermine physical well-being and breed disease. If the worker became a voluntary Bhangi, he would begin by collecting night-soil and turning it into manure and sweeping village streets. He will tell people how and where they should perform daily functions and speak to them on the value of sanitation and the great injury caused by its neglect. The worker will continue to do the work whether the villagers listen to him or no.

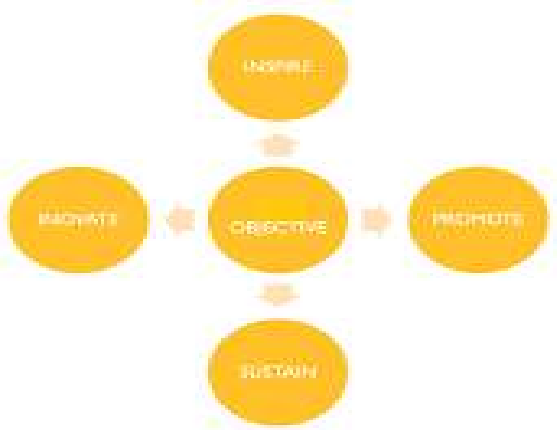


Fig. 1.3 Ideal village features

1.2.1 Objectives

A model village project has the following important objectives:

- 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.

Below shows various aspects of a model village or ideal village:

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

All over India there are many ideal villages. Each village is a live example of ideal village looks like. This section involves a study of few ideal villages of India.

A survey of Pride India says that about 15 villages of India can be said as the Ideal villagesand aim is to make 180 villages come into this category.

Few of the ideal villages are selected for the study and each village have its own key features which are discussed below. Among these villages one of the villages is studied is described in detail.

Below are the few Ideal villages:

1. Punsari village Gujarat

Fig. 1.4 Punsari village

Fig. 1.5 Punsari village Bank

Located in Gujarat's Sabarkantha district, Punsari village has emerged as a model village with modern urban amenities such as 24X7 power supply, Wi-Fi connectivity, CCTV cameras to ensure security, and pucca roads connecting the village with other villages and towns.

Other important features of the village include:

- A reverse osmosis plant which supplies 20 liters of water to each household at Rs 4.
- Use of solar power for agricultural purposes
- Accidental Insurance cover to one member of every household
- Air-conditioned primary schools with no dropouts
- Bus facility for all households
- Focus on behavioral change through campaigns and awareness drives. For this purpose, 120 loudspeakers have been installed in different parts of the village

Punsari was awarded with the Best Gram Panchayat Award from the Centre and the State in 2011.

2. Hiware-Bazaar, Maharashtra

Fig. 1.6 Hiware-Bazar village

Fig. 1.7 Hiware-Bazar village Primary School

Hiware-Bazaar, Maharashtra from the 1990s onwards, things began to change. The village Panchayat adopted a holistic focus on a variety of activities, with community groups responsible for various aspects of the village economy and social development. Women thrift groups, Milk Dairy Society and Youth Clubs are examples of such community-based organizations. The village Panchayat also focused on family planning and reforestation, for which awareness programs and drives have frequently been organized in the village. The village Gram Sabha also launched a watershed development program, and an annual water audit is being conducted in the village since 2004 for more efficient and equitable management of water resources. It has also contributed to greater agricultural productivity.

3. Ankapur, Telangana

Fig. 1.8 Ankapur village

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

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

- Peasant Association of the village coordinates various agricultural interventions
- The decision-making process is inclusive and based on consensus-building. Women have a dominant role in the utilization and supervision of labor.
- Focus on new sources of income, such as commercial cultivation of seeds, scientific crop rotation techniques.
- Sustainable agriculture with greater use of farmyard manure and lesser use of chemical fertilizers.
- Village Market Yards facilitate the sale of agricultural produce with minimal wastage Since agriculture accounts for almost the entire economic output from many villages in India, participatory agriculture, with equal focus on irrigation, watershed management and technology-led cultivation should be the way forward.

4. Kumbalangi village, Kerala – a model for eco-tourism

Fig. 1.10 Kumbalangi village

Fig. 1.9 Kumbalangi village

Kumbalangi is essentially a fishing hamlet which has been developed as a unique rural tourist destination in Kerala's Ernakulam district. The Kumbalangi Integrated Tourism Village Project was launched in 2004, with a focus on ecotourism, 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 subsidies for setting up mini biogas plants in their households.

The Kumbalangi approach could be adopted by other coastal villages to boost tourism and provide livelihood to local communities.

1.2.3 The Idea of a model/Smart Village

A lot has been said and heard about the Saansad Adarsh Gram Yojana (SAGY). A common refrain is that it does not have special funds for its effective implementation. Media reports say that some MPs are unwilling to adopt any village under the SAGY to avoid any notion of preference for one or another village and thus avoid wrathful response of other villagers at the time of elections. But nobody perhaps said that money alone does not convert a village into a model village or 'adarsh gram'. Then what is that element which works towards the making of a model village? It is our understanding of the term 'adarsh'.

If one takes the literal meaning of a 'model', it means the design of an activity or situation which is considered an excellent example for replication. It helps in determining the positive aspects of any given situation, which can be considered for its replication to show an impact at a wider scale. A conceptual model village is one where villagers act as decision makers, partners and beneficiaries with multi-sectoral, multifunctional and integrated development to achieve holistic and sustainable development backed up by futuristic and progressive skills leading to higher levels of productivity and improvement in overall quality of life. For Drishtee, a social enterprise, "a model village is a sustainable community that is able to generate and maintain the resources necessary to improve its level of well being by strengthening the sustainability pillars of livelihood, infrastructure and services."

The commonly understood meaning of the term 'adarsh' in context of the model village scheme is a village which is endowed with all the modern facilities including infrastructures. But this is an ongoing exercise and no amount of money will ever be sufficient. This is so because the meaning of 'adarsh' will change with the change of time and our perception of modernity.
However, there are certain elements that constitute the core of a village community, and if taken cognisance of, can contribute towards creating sustainable conditions for emergence of a model or 'adarsh' village. It is their humanistic values towards gender justice, education, health and disadvantaged sections. Making sustained advancements in these areas do not require fund, but a community which is mobilised enough to take up these humanistic values as their immediate and long-term goals.
It has to be appreciated that villages would not become 'model' villages just by creating good social and physical infrastructure in a blueprint approach. A village becomes a model if it has developed or created some unique characteristics which are worth emulating in the adjoining regions, and provinces and even at the national level. The model evolves over a period of time by adopting a 'process approach' in which the villagers launch a new initiative for the benefit of the entire village community, move ahead, falter and tumble down, learn from their mistakes and finally achieve the shared goal.
It is not necessary that a village becomes a model when it has a set of unique features. Even one unique characteristic can make a village a model village. Some examples here will be in order. A village may become a model village if it has: no child labour, 100% free from open defecation, 100% registration of deaths and births, 100% institutional deliveries, 100% immunisation of children, 100% registration of pregnant women and their regular monitoring, 100% supply of assistive devices to all the persons with disabilities, 100% enrolment of children in schools, zero cases of untouchability and atrocity against the dalits, 100% financial inclusion, etc.
Each of these elements, even if achieved in one village, would give the label of a 'model' to that village. What is important to realise is that a village is not made a model in a given time-frame. It evolves gradually into a model village by adopting practice(s) worthy of emulation in other places. Who would not like to see a village which is free from child labour? But this requires constant persuasion of the parents of the working children by the village community for sending their children to school and not for work. Likewise, all other elements mentioned above can be sustainably achieved if the village community is mobilised enough to adopt these elements as their goals. The good thing is that all these goals can be accomplished without special funds.

When it comes to selecting a village under the SAGY, the MP should select that village where the village community is mobilised enough to come forward on its own and request for the adoption of their village under the SAGY. The village community must demonstrate that the people in their village are ready to commit themselves to certain values, as mentioned earlier, and are eager to fulfil their goals without any financial implications, and support the convergence approach. To avoid any scope for discriminatory feeling in the selection of villages under the SAGY, the MP must circulate a set of value(s) based guidelines, and the final selection of a village under the SAGY should be based on the scrutiny confirming complete conformity to the guidelines.
There are funds already available at villages and gram panchayat level in different sectors. It is important to converge these funds with the adopted community's values and goals. Additionally, what is crucial for accomplishment of the village community's goals is the community's involvement. It is at this juncture when our MPs can make significant contributions by involving the community in identifying their goal(s) and accomplishing them through their catalytic support from

their MPLAD (member of parliament local area development scheme) fund, and other funds available including the corporate social responsibility allocations. Alternatively, the SAGY can adopt the funding pattern of the Pradhan Mantri Adarsh Gram Village in which each selected pilot village gets a gap filling fund of '20 lakh from the ministry of social justice and empowerment.
The model village should showcase the development programmes as effective instruments for rural development and panchayati raj governance through a process of prioritised implementation and optimised management which would reflect in the development of the village concerned as beacon lights and success stories for others to see and emulate. Such a village should also create a positive attitude/behaviour to bring about necessary attitudinal and behavioural changes in the rural mindset through community mobilisation so that real and meaningful change in quality of life, lifestyle and community participation in local development works and governance become feasible and get realised to the desired degree. The model village must show demonstration effect to achieve holistic development as a model which can be replicated. Field visits to a model village by villagers from neighbouring areas should expose them to the best practices in rural development and local governance and motivate them to implement these viable strategies and doable interventions to uplift the quality of life in their own case too.

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

Ancient Civil concepts about Indian Villages:

Electrical Concept:

Ancient Electrical concepts about Indian Villages:

For the past years, India has had a strong program in place to promote rural electrification. The result has been dramatic progress in extending electricity service to the country's vast population. The past decade, in particular, has witnessed accelerated household adoption rates in poorer rural areas. This long-term growth in rural electrification has been accompanied by institutional problems that generally plague India's electricity sector. These include the poor financial condition of the state electricity companies, poor revenue recovery from agricultural pumping, lack of enough investments in operation and maintenance, and meddling by politicians in electricity expansion and service plans. These problems are fairly common, and have been experienced by many countries strongly committed to expansion of rural electrification.

The government considers a village to be electrified if the number of households electrified is at least 10% and electricity is provided to public buildings including schools, health centers, dispensaries, community centers and village councils. So, by definition, all Indian villages have now been electrified. Remote and inaccessible villages have always proved to be a major challenge in the country's electrification drive. Though most Indian villages have some electrical connection today, connecting the last remote households in the surrounding areas can be expensive. Additionally, state-owned power distribution companies are struggling with debt and poor demand, which has made it difficult to practically electrify every Indian household.

Evolution of Rural Electrification in India:

Prior to the late 1960s, India's growth in rural electrification was extremely slow. At the time of the country's independence in 1947, only 1,500 villages had electricity. With the enactment of the Electricity Supply Act in 1948, power was extended to semi-urban and rural areas through the creation of the electrical grid system. But during that time, no mention was made of rural electrification. By the early 1950s, the focus of rural electricity supply had shifted to irrigation projects and village-level electrification. The goal was to provide electricity to 1 out of every 200 villages . The latter half of the 1950s saw a continued focus on village electrification. Also, special emphasis was placed on covering all towns with populations of 10,000 or above. By the end of the decade, coverage had been extended to 18,689 villages; however, only 350 of the originally targeted 856 towns had been provided with electricity.

Researches pointed out that while many supportive policies have been put in place, cost for providing electricity to remote villages remains high. Furthermore, both energy resources and demand in these areas can be very volatile, making it difficult to plan appropriately. Another issue is that village location was determined historically based on soil, water, storage, etc., and might not be optimal for renewable energy generation.

To mitigate these issues, the **Networked Rural Electrification Model** has been proposed. In this model, villages in a selected area are linked up via an optimal network, which in turn connects to a few centralized generation facilities located at spots with better renewable energy resources. As such, each village is partially supplied by small local facility, and partially by the centralized facilities. This improves energy resources utilization as well as overall system flexibility and reliability. Viability of this model depends on the cost of building the optimal network. Based on multiplier-accelerated .Algorithm, the researchers have devised an effective method for evaluating all possible connections under complex geographical structure and hence practically optimize network design. Economic justification follows.

Timeline in the Evolution of India's Rural Electrification:

Below is a snippet from a world bank study, Power for All: Electricity Access Problems in India, showing the timeline in the evolution of India's Rural Electrification:

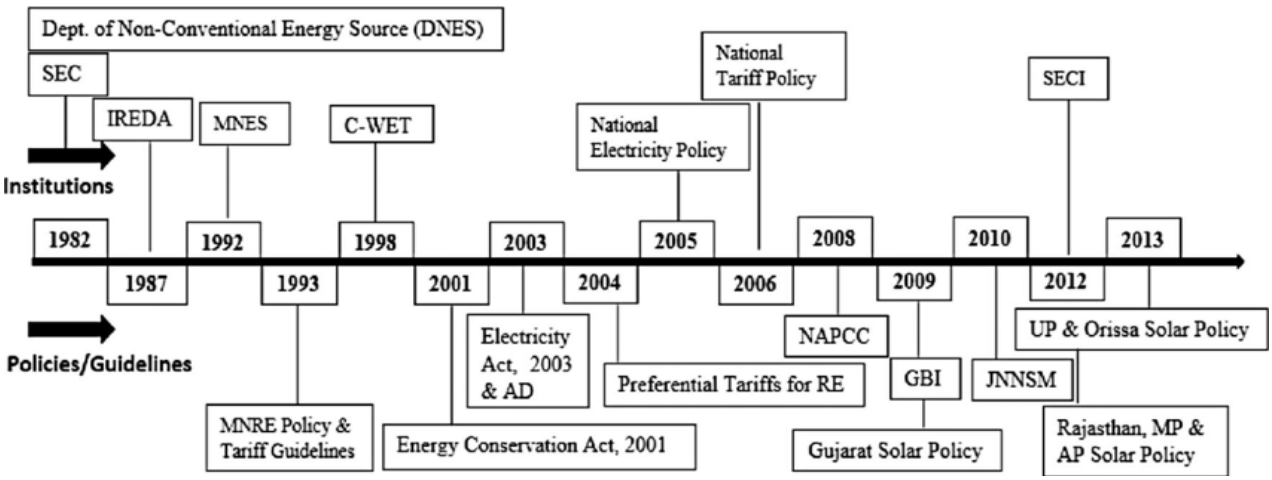


Fig. 1.11 Timeline in the Evolution of India's Rural Electrification

As of August 2017, about 1% of the villages in India remain un-electrified (3,146 villages). However, with regard to households, around 23% (4.1 crore households) are yet to be electrified.

Evolution of Rural Electrification Around World:

This graph shows the world rural electrification rate along with the electrification growth rate from 1990-2016 and synthesizes data from the World Bank

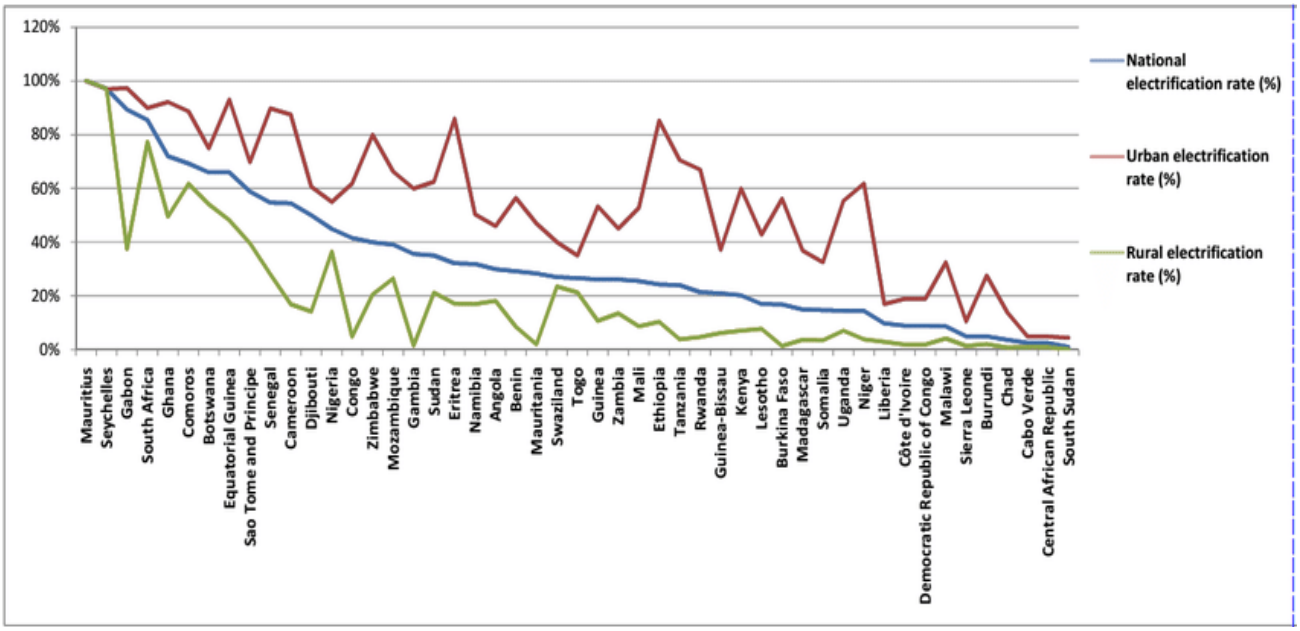


Fig. 1.12 World Rural Electrification Rate & Electrification

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

We surveyed the Baben(Ideal) village located in the Surat district of Gujarat. Below is detailed study of various dimensions of village such as Socio economic, physical, demographic and infrastructure.

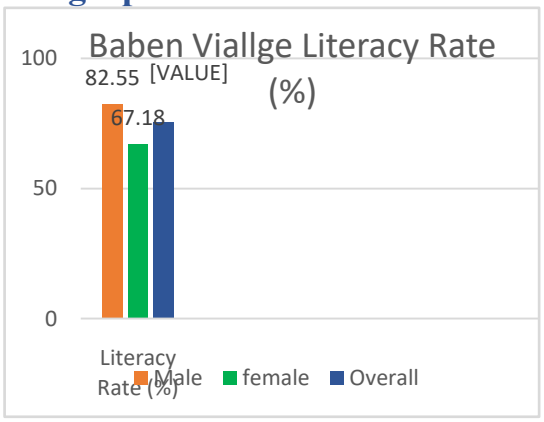


Fig. 1.13 % literacy distribution of Baben village (2011 census)

Socio economic Details:

The Socio-economic details include a vast array of information on health and disease, literacy and education, standard of living and poverty, labour force and employment, status of women and gender empowerment, population parameters relevant to

fertility, mortality and migration, ecology and environmental protection.

It is essential to do a socio-economic survey of the village to understand various social dimensions and their relation with the economic conditions of the village.

Literacy:

Literacy is directly proportional to the development of a village. Literacy plays a major role in social as well as economic aspects of village.
As Shown above the Male literacy is around 82.55 % while female literacy rate is 67.18 %.So, taking the average Baben has an average of 75.70 % that is less than the state literacy which is 78.03 % as per 2011 census.

Analyzing the above data, it can be said that the literacy rate of women is less as compared to men. There is difference of 15.37 % between the men and women literacy rate.

There is a need to work upon the literacy of women as indicates gender inequality. In developing countries, it is essential to focus over the literacy of each and every individual irrespective of the gender.As, it is said that mother are the first guru to their children, so we need to ensure that all the women are educated.The literacy rate of the village, is about75.70% which is less than the state average. This is because the women literacy rate is very less as compared to men.

The village has good educational infrastructure such Anganwadi and primary, secondary, higher secondary schools. The village also has a Engineering college.

Health:

Health is determined by many factors, including income, environmental conditions - such as access to adequate sanitation and safe water supplies - individual behavior, and health services.

The village has overall good sanitation facilities, consisting of 8 public toilets, community toilet with bath facilities and waste collection from road facility.
The village also have good drinking water. Good tap water is available or the people of village. This ensures that they have access to safe drinking water.

The village consists of a Sub-Centre PHC in the village along with private clinic/ hospital. So the people of this village has health care facilities available at there nearest place i.e. in their village itself.

The overall village health can be concluded as good from the fact that it consists of proper sanitation, access to safe drinking facilities and a good health care facilities.

Baben Work Profile:
As per 2011 census out of total population, 6,628 were engaged in work or business activity. Of this 5,152 were males while 1,476 were females. In census survey, worker is defined as person who does business, job, service, and cultivator and labour activity. Of total 6628 working population,

89.85 % were engaged in Main Work while 10.15 % of total workers were engaged in Marginal Work.

Religion Data 2011:

Population	Hindu	Muslim	Christian	Sikh	Buddhist	Jain	Others	Not sated
15,610	89.27%	10.10%	0.43%	0.01%	0.04%	0.10%	0.00%	0.04%

Table 1.1 Baben VillageReligion data of Baben Village (2011 census)

Physical Details:

Physical characteristics include the natural environment, such as landforms, elevation, water features, climate, soil, natural vegetation, and animal life.

Below Table shows physical features of the village:

DESCRIPTION	INFORMATION/DETAIL
Area of Village	466 Hec.
Forest Area	-
Agricultural Land	282 Hec.
Residential Area	140 Hec.
Other Area	41 Hec.
Water Bodies	-
Nearest Town	Bardoli (1km)

Table 1.2 Baben VillagePhysical data of Baben Village (2011 census)

Climate:

The village is located in Bardoli taluka. So, the climate and whether report of Bardoli can be referred as of the Baben.

Average Rainfall:

The average rainfall for the Bardoli district is 1466.1 mm per year.

Elevation:

The elevation of the district Bardoli is 29 m above the sea level.

Infrastructure Details:

Infrastructure facility Similarly, as social infrastructure Socio-Cultural Infrastructure Facilities are also essential for any village to compete with the urban area and any village must have all the above-mentioned facilities so that the residents of village may not get forced to migrate to the urban areas.

Baben is a village facilitated with bituminous and R.C.C. roads for main village roads as well as society streets. The roads are facilitated with sign boards, markings and signals for proper functioning of the vehicular traffic as well as pedestrian's traffic.

The village is facilitated with 32 CCTV cameras for proper monitoring and protection from thefts, damages etc. to the village. The roads are also facilitated with proper street lights for 33 night travel.

Pure Drinking Water for morning and evening peak hours is also provided door to door with the help of 6 over head water tanks which range from 15000L to 25000L which are cleaned at regular intervals to maintain hygienic conditions.

Along with the facility of pure drinking water the facility for the removal of waste water is also provided. Drainage network for the whole town is constructed from door to door and is connected to the main sewage line at Bardoli Taluka. Along with sewage disposal solid waste management is also given a wide importance and is collected from door to door with the help of 3 collecting vans and is given to the Bardoli Nagarpalika for disposal and treatment.

5 public toilets are also constructed with the help of government grant and by the fund collected from the local residents which had led the people to leave a better life than before.24hrs electricity supply is also provide to the residents from GEB.

The village Baben has all the socio-cultural facilities such as playground, library, garden, recreation facilities, community hall etc. A project named AVADH LAKE CITY has led the development of the village to a greater extent which is located in the central part of the village and works as a recreational hub for the residents as well as outsiders. Other than the above facilities 1 CNG Pump, 1 Petrol Pump, 12 Temples and 2Masjids are also located in the premises of Baben. This leads to the growth of town to a greater extent.

24hrs electricity supply is also provide to the residents from GEB.

1.4 SWOT analysis of Ideal village / Smart Village

SWOT Analysis is a framework for identifying and analyzing the internal and external factors that can have an impact on the viability of a project, product, place or person and useful technique for understanding the Strengths and Weaknesses, and for identifying both the Opportunities and Threats.

Strengths	Weaknesses
• Ponds and sidewalks • Lake site • Local businesses • Schools and colleges • **Religious places (temples**/masjid) Excellent water quality • Easy access to highway • parking facilities • Police / fire	• No facility of clubs for adults and seniors • Need to upgrade village parks and playgrounds
Opportunities	**Threats**
• Opportunity for more events in parks, ponds and open space • Construction of public library • Construction of movie theatre • Opportunities for local business	• Algae in ponds • Accidents due to rough driving by college students • High commercial rents

1.5 Future prospects of the ideal village

Baben village can be developed as an educational and recreational hub due to development of Avadh lake city and other upcoming infrastructure projects near the village and due to Vidyabharti college campus in the premises of Baben village. Local business and employment opportunities can also be improved with regards to increase in the physical and social development of the village. As the Baben is surrounded with industrial facilities like Bardoli sugar factory the expansion of this sugar industry may possible in future.

1.6 Benefits of the visits of Ideal village / Smart Village

1.Help Understand Model of an ideal village: In order to accomplish the goal of converting a rural village to a ideal village it is very important for us to visually and consciously understand what an ideal village looks like. Ideal village visit helps us to understand the structure of a modern village.

2.Picture of Existing Technology: It helps us to get the picture of technological advancement in the villages. Ideal villages can be looked up for the most advanced technologies prevailing in the villages. We can get the real time analysis of the efficiency and usability of the technologies especiallyin field of agriculture. If these technologies works fine for them they can be implemented in other villages.

3. Life experiences of Villagers: It gives us a brief idea of village life of a ideal village which helps us to analyze what goes through their mind and level f satisfaction they have.

4. Learn from their mistakes: The process of development is itself very important to make ensure right thing is done at right time. Interacting with them and knowing the development journey can help us to know the mistakes and make sue we don't do it.

Fig. 1.14 DGVCL Office Baben Village

5. Finding scope of improvement in model villages: Development is life long process and survey ideal villages can create a room for finding the improvement areas.

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

Baben is village with basic power infrastructure such as transformer and distribution line provided to inhabited locality too and the electricity is for any purpose in its revenue boundary. Hence, we can say this village as Electrified village. Electricity provided to public places like schools, panchayat ofices etc. The community hall has Television Facility. The village is facilitated with 32 CCTV cameras for proper monitoring and protection from thefts, damages etc.

The roads are also facilitated with proper street lights for night travel. The Baben village has underground system for transmission of power supply for the half of the village. The remaining village will be underground electrified in future according to Sarpanch Bhavesh Patel. DGVLC BARDOLI DIVISION OFFICE, which supplies electricity to the whole baben village. DGVCL is only 5km away from this village. 24hrs electricity supply is also provide to the residents from GEB.

CHAPTER 2: Literature Review (Civil & Electrical Concept)

2.1 Introduction: Urban & Rural village concept

The concept of "Urban" and "Rural" is different for different governments/ countries. Each government/country identifies settlements as "Urban" or "Rural" based on some criteria. We will be talking particularly about India.

Urban Village concept:

State government definition:

Governor of the state declares by public notification an area as "urban" based on certain parameters, such as population of the area, the density of the population therein, the revenue generated for local administration, the percentage of employment in non-agricultural activities, the economic importance or such other factors.

National government (census office) definition:

All administrative units that have been defined by statute (i.e., settlements declared based on state government definition).

Administrative units satisfying the following three criteria:

(i) A minimum population of **5,000 persons**.

(ii) 75 percent and above of the male main working population being engaged in non–agricultural pursuits.

(iii) A density of population of at least 400 persons per sq. km. (1,000 per sq. mile).

Rural Village concept:

- An area which has low population density and less human settlement but are predominantly with agriculture activity.
- According to the Planning Commission, a town have not more than 15,000 population is considered rural in nature. In these areas the panchayat makes all the decisions.
- The National Sample Survey Organization (NSSO) defines rural as follows:
- An area with a population density of up to 400 per square kilometer.
- Villages with clear surveyed boundaries but no municipal board.
- A minimum of 75% of male working population involved in agriculture and bounded with other activities.
- RBI defines rural areas as those areas with a population of less than 49,000

2.2 Importance of the Rural development

- More than 60% of population of India lives in villages.
- For most of the time it is a fact that villages don't receive even basic facilities. More over due to less income sources people of villages are forced to move to city areas.

- Hence need of village development is necessary to do stop migration.
- Rural developments also bring in agricultural advancements.
- Development increases job opportunities.
- Better life for village people.
- Development of education institutes in villages is crucial job as it shapes the future of our country.
- Development bring in the Medical facilities which, most of the villages does not have.
- Development also connects the backward villages to the todays modern world which is necessary.
- It is also to protect our village life i.e our traditions and culture.

2.3 Ancient Villages / Different Definition of: Rural Urban Villages

The National Sample Survey Organization (NSSO) defines rural as follows:

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

RBI defines rural areas as those areas with a population of less than 49,000.

2.4 Scenario: Rural / Urban village of India population Growth

In India out of the total population of 1210.2 million as on 1st March, 2011, about 377.1 million are in urban areas. The net addition of population in urban areas over the last decade is 91.0 million.

The percentage of urban population to the total population of the country stands at 31.6. There has been an increase 3.35 percentage points in the proportion of urban population in the country during 2001-2011.

The provisional results of Census 2011 reveals that there is an increase of 2774 towns comprising 242 Statutory and 2532 Census towns over the decade. Growth rate of population in urban areas was 31.8%.

Further the number of million plus cities/urban agglomeration UA has increased from 35 in Census 2001 to 53 in Census 2011. The new entrants are Srinagar UA Jam-mu and Kashmir,Union Territory of Chandigarh UA, Jodhpurs UA and Kota Rajas than, Ghaziabad UA Uttar Pradesh, Ranchi UA Jharkhand, Raipur UA and Durg-Bhilainagar UA Chattisgarh, Gwalior UA Madhya Pradesh, Vasai Virar and Aurangabad UA Maharashtra, Kozhikode UA, Thrissur UA, Malappuram UA, Thiruvananthapuram UA, Kannur UA and Kollam UA Kerala, and Tiruchirappalli US Tamil Nadu. So while the States of Jammu and Kashmir and Chhattisgarh now also have million plus city/UA, Kerala now has as many as 7 million plus cities/UA, a quantum jump from the situation in 2001 when just Kochi UA was a million plus city/UA

Persons in million numbers			Decadal growth in population %	
	2001	2011	1991-2001	2001-2011
Total	1029	1210	21.5	17.6
Rural	743	833	18.1	12.2
Urban	286 27.81%	377 31.16%	31.5	31.8 +0.3%

Table 2.1 Population of Urban Vs Rural (India)

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

Gujarat Urban Population 2011

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 42.6 %

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.

Gujarat Rural Population 2011

Of the total population of Gujarat state, around 57.40 percent live in the villages of rural areas. In actual numbers, males and females were 17,799,159 and 16,895,450 respectively. Total population of rural areas of Gujarat state was 34,694,609. The population growth rate recorded for this decade (2001-2011) was 57.40%.

In rural regions of Gujarat state, female sex ratio per 1000 males was 949 while same for the child (0-6 age) was 914 girls per 1000 boys. In Gujarat, 4,824,903 children (0-6) live in rural areas. Child population forms 13.91 percent of total rural population.

In rural areas of Gujarat, literacy rate for males and female stood at 81.61 % and 57.78 %. Average literacy rate in Gujarat for rural areas was 71.71 percent. Total literates in rural areas were 21,420,842.

Below table shows the data of Gujarat for the census 2011 :

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 2.2 Population of Urban Vs Rural (Gujarat)

2.6 Rural Development Issues - Concerns – Measures

Rural development is the process of improving the quality of life and economic well-being of people living in rural areas, often relatively isolated and sparsely populated areas.
There are some issues which are in the path of rural development. Some which are as follows :

1. Lack of Education: Education plays a vital role in any society, this is because education is what differentiates a backward and forward society. Education helps the people to get aware of their basic rights as well as help to get ware of the government policies laid for them. Due to the lack of educational institutes and financial problems village people are not able to get education.

2. Lack of health care facilities: For most of the villages it is still a luxury to have a proper medical care facilities. It is important to establish medical care facilities. Many people die off not getting medical facilities at time. Also a key point to know is people in many cases avoids their small health issues which later on turns into a fatal one. So providing Health care facilities nearby could help a lot.

3. Less income: It is one the most concern for the village people. Income has much to do with purchasing power of the people. If we provide them with facilities but if they don't have that

purchasing power, there will be no positive impact on their life. So it is important to generate income sources.

4. Electricity: Electricity is still an question mark for the people of villages. It is not so that people don't receive electricity but it is more about reliability and application.

5. Lack of awareness of government policies: For people to get benefit of government policies it is important to get aware of it. In some cases people are not aware of these policies which is primarily because of the communication gap between the people and the government.

6. Social issues: Still villages faces the social issues like gender inequality, racism, etc.. which is not a good sign. This not only leads to disputes between them but also leads to weaken the development activities as development is team work.

The above were a few and we know there is a lot but in order to overcome these issues we can do something and which are listed below.

1. Educating people: It is not about schooling, but is much of awareness. We really don't need much of awareness programs to be conducted but it is require to have quality awareness programs.

2. Establishing health care facilities are a primary requirement.

3. NGOs can play avital role in helping the people in terms of villages. NGOs can help in educating people, help in analyzing the environment of the village which would help a lot to understand and prepare a development plan for them.

4. Increasing Agriculture Income: Still today framers face the problem of low income. There should a way out to increase their income.

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

Norms and Standards:

Construction of buildings on plots in layout to conform to certain standards – Layout Plan The distribution of land use for the preparation of layout plan shall be as follows:

(a) Land under each use:

In the land to be developed, maximum of the plots may be of size less than 100 sq. m. and no plot may be more than 500 sq. m. The layout should generally conform to the following land use:

Area	Land under each use
Residential	50 - 60 %
Work place, Schools, Institutions, Nursing Home, Dispensary, Community places/Facilities, Veterinary Hospitals etc.	15 - 20 %
Shops, Offices, Consumer Stores, Fertilizer Depot and other bazaar's	3 - 5%
Open spaces	3 - 5%
Roads, Pedestrian Paths, Drains, Cooperative Bank, P.O. and other utilities	15- 20%

Table 2.3 Percentage land distribution

(b) Residential Development:
The Residential plotted development, till the development plans are prepared, the following norms shall be as follows:

Plotted Development excluding other activities such as Cattle Shed, Storage etc.	60 and above plots/hectare
Covered area per dwelling unit	25 sq. m. (minimum)
Height of buildings	10 maximum (3 storey)

Table 2.4 Residential development

(c) Road hierarchy:

Road which connects villages to nearby areas	9 m (min.)
Main Village Roads	6 m
Internal Village Roads	4.5 m

Table 2.5 Road hierarchy

(d) Social Facilities:

Use	Standard/Population	Area
Primary School	1 for 5000 population	0.4 to 0.6 hectare
High School with primary school	1 for 15000 population	1 hectare
Dispensary/Health Centre	1 for 5000 population	0.05 hectare
Community Hall	1 for 5000 population	0.05 hectare
Anganwadi	1 for 5000 population	0.05 hectare

Table 2.6 Social Facilities

Space Requirement

The plot size ground coverage, FAR, height and set backs of various uses shall be as per following tables
Notes:
(1) The setbacks proposed here under will be limited to table 1 to 5. The setbacks along highways will be minimum as prescribed in section 12.
(2) The norms are suggestive and may be modified as per local conditions in the States/UTs.
(3) The norms of nearby urban areas may also be referred.

(a) Residential: Plotted Housing:

Sr. No.	Plot area in Sq m	Max in Ground Coverage %	FAR	No. of D/U	Max. height in M	Set Backs M Front	M Side	M Black
1	Below30	90%	180	2	6	1.2	-	-
2	30 to 50	80%	160	2	6	1.2	-	-
3	51-100	80%	160	3	9	1.2	-	1.5
4	51-100	75%	150	3	9	1.2	-	2.0
5	151-250	66%	130	3	9	1.2	-	3.0
6	251-500	60%	120	3	9	1.2	1.5	3.0
7	Above 501	50%	100	3	9	1.2	3.0	3.0

Table 2.7 Residential: Plotted Housing

(b) Commercial Use Table:

Sr. No.	Plot size in sq m	Ground coverage %	FAR	Max. height in M	Set Backs M Front	Set backs M side
1	1 Convenient Shops	75%	100	6	2	-
2	Local Shopping Centre	50%	100	6	3	-
3	Sectoral/Shopping	40%	120	9	4.5	-

Table 2.8 Commercial Use Table

(c) Institutional & community facilities:

Sr. No.	Plot size in sq m	Ground coverage %	FAR	Max. height in M	Set Backs M Front	Set Backs M Front	Set Backs M Back
1	500-1500	40%	120	8	3	-	3
2	1001-2000	33%	100	8	4.5	-	3
3	2001-4000	30%	90	8	6	3	3
4	>4001	25%	90	8	9	3	4.5

Table 2.9 Institutional and community facilities

(d) Educational and health:

Sr. No.	Use	Min. Plot Area in sq m	Ground coverage %	FAR	Max. height in M	Set Backs M Front	Set Backs M Front	Set Backs M Back
1	Anganwadi	500-1500	33.3%	100	10	4.5	3	3
2	Primary School	1500-3000	30%	90	10	6	3	6
3	Senior Secondary	4000-10000	25%	100	12.5	9	4.5	6
4	Nursing Home Dispensary & Diagnostic Centre	250 251-500 >501	35% 33.33% 30%	70 100 100	6 9 12	3 4.5 6	- 3 3	3 3 4.5

Table 2.10 Educational and health

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

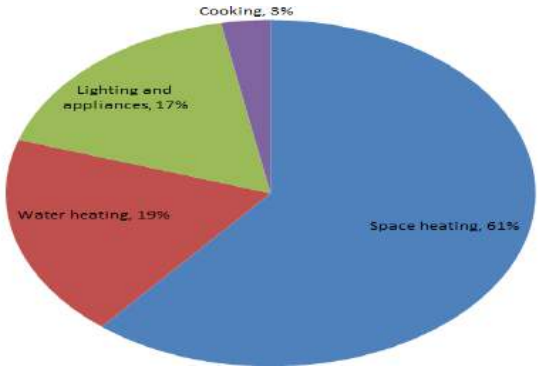


Fig. 2.1 Average Electrical Demand of Village

In 1950, only 3,000 Indian villages had electricity. Rural electrification has been the holy grail for successive governments. While around 1,500 villages had been electrified during Independence, it was 481,124 in 1991. As many as 63,955 villages were provided electricity in the 10th five-year plan (2002-07) and 45,955 villages in the 11th plan (2007-12). 579,012 of Indian villages were electrified by 31 March 2015.

It was an old saying that electricity is a luxary for many of villages of India but the scenario is changed. The results can be seen as approximately 90 percent of villages in **India** were estimated to be electrified in 2019.

It is however villages don't receive a 24x7 of supply.

A village is declared electrified if 10% of the households can access power, along with public institutions such as schools, the panchayat office, health centers, dispensaries and community centers.

From a report **Rural Electrification in India Costumer Behavior and Demand(February 2019)**By SmartPowerIndiawhich was done on 200 villages following data was collected:

Average Day Deamd of villages:

An average village has a total electricity demand of 1,826 kWh per day, with about 52% contributed by households, 7% by enterprises, and the remainder by agriculture. Various sources of electricity, including diesel generators, serve this electricity demand.

Composition of Electicity deamnd in village:

The below data shows the typical electrical usage of a village.

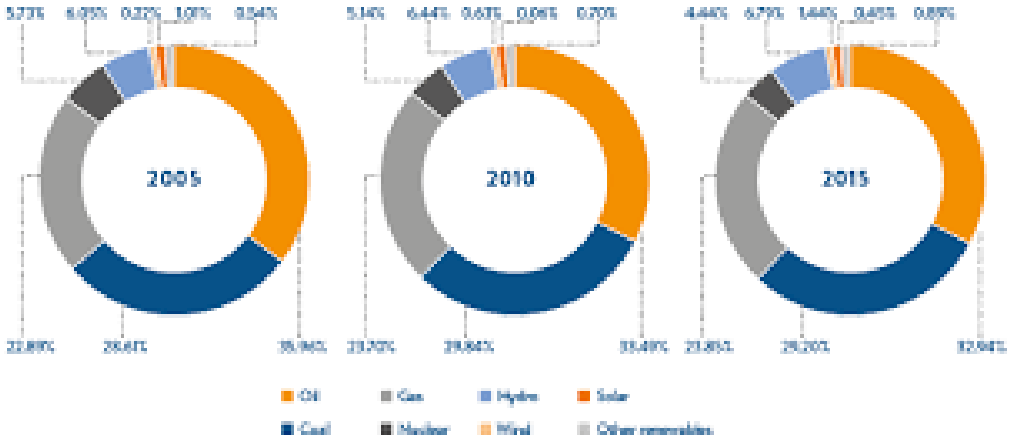


Fig. 2.2 Composition of Electicity demand in village

2.9 Other Projects / Schemes of Gujarat / Indian Government

Government Schemes for Rural India

1. DeenDayal Upadhyaya Grameen Kaushalya Yojana*:*

On the 98th birth anniversary of Pandit Deendayal Upadhyaya, this scheme became official in 2014. The motto of this scheme is to "Transform rural poor youth into an economically independent and globally relevant workforce". It targets youth (15–35 years) as a part of the National Rural Livelihood Mission. It aims to give diversity to the rural poor family's income and help rural youth with careers. An amount of Rs 1,500 crores is released for this scheme to improve the employability of rural youth**.**

2. Pradhan Mantri GraminAwaas Yojana*:*

It is a social welfare programme by the Indian Government for providing housing facilities to rural poor in India. This scheme is similar to Housing for All by 2022 scheme 2015. It began as Indira Awas Yojana launched in 1985. It comes under the Ministry of Rural Development and constructs houses for the BPL population in the rural areas. This provides cash assistance and subsidies to the villagers for building their houses.

3. GraminBhandaran Yojana*:*

It is a capital investment subsidy scheme begun in 2001. The subsidy is for constructing or renovating the warehouses for storing farm produce in rural areas. The idea is to increase farmer's

holding capacity. This can avoid distress sales and help them establish. It promotes scientific storage capacity with facilities to help farmers.

4. DeenDayal Upadhyaya Gram Jyoti Yojana:

It is a Government of India scheme to provide a continuous power supply to rural India. This scheme replaced Rajiv Gandhi Grameen Vidyutikaran Yojana in 2015. It focuses on strengthening infrastructure like metering at all levels in rural areas. This will help in providing power to agricultural consumers. It comes under the Ministry of Power.

5. Mahatma Gandhi National Rural Employment Guarantee Act:

It is an Indian labor law to guarantee the 'right to work'. It came into establishment in 2006. The idea is to enhance livelihood security in rural areas by giving 100 days of wage employment to every household there. The employment has to be a minimum of 100 days per financial year for every volunteering household. The gram panchayats handle MGNREGA in their villages. It comes under the Ministry of Rural Development.

6. Remunerative Approach for Agriculture and Allied sector Rejuvenation:

It was a National Agriculture Development Programme and a State Plan Scheme of Additional Central Assistance. It began in 2007 as Rashtriya Krishi Vikas Yojana. This was a part of the 11th Five Year Plan by the Government of India. It was under the National Development Council and aims to achieve a 4% annual growth in agriculture. It ended in 2011 after completing the 11th five-year plan.

7. Sampoorna Grameen Rozgar Yojana:

It was a scheme by the Government of India to provide employment for the rural poor. The Panchayati Raj institution maintains this scheme. The Employment Assurance Scheme and Jawahar Gram Samridhi Yojana merged and led to the establishment of SGRY in 2003. The programme aims to provide employment and food in rural areas to BPL families. It comes under the Ministry of RuralDevelopment.

8. Pradhan Mantri Gram Sadak Yojana:

It is a nationwide plan in India to provide good road connectivity to secluded areas. Places with populations of 500 and above are to be connected by all-weather roads. By 2017, 82% of these areas were already connected. This Centrally Sponsored Scheme became official in 2000 by Late Shri Atal Bihari Vajpayee.

9. Pradhan Mantri Adarsh Gram Yojana:

It is a rural development programme by the central government that began in 2009. It is mainly for the development of villages with a higher SC/ST ratio, over 50%. The idea is to merge several central government schemes to develop these villages. The schemes are – Bharat Nirman, Pradhan

Mantri Gram Sadak Yojana, Sarva Shiksha Abhiyan, MGNREGA, Integrated Child Development Services, and more. This program is applicable to 44,000 villages SC/ST population above 50%. It comes under the Ministry of Social Justice and Empowerment.

10. National Rural Livelihood Mission:

It is a poverty alleviation project by the Government of India that began in 2011. This scheme aims to promote the self-employment of the rural poor. The idea is to organize the poor into a Self Help Group for self-employment. It comes under the Ministry of Rural Development. The world bank finances this scheme as it is one of the largest schemes working for rural poor. DeenDayalAntyodaya Yojana took over it in 2015.

11. Swamitva Yojana

Swamitva Yojana is a government scheme to encourage land ownership in rural areas with use of modern technology. The Panchayati Raj ministry of the Union government is responsible for this scheme management. Panchayati Raj Day 2020 saw the launch of this scheme. The reason is many villagers don't have a paper to prove their land. This yojana is to provide them ownership rights**.**

12. Sansad Adarsh Gram Yojana:

It is a rural development programme that focuses on social, cultural, and economic development. It aims to motivate people on social mobilization of the village community. This yojana is demand-driven, inspired by society, and based on people's participation. It comes under the Ministry of Rural Development and began in 2014.

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

3.1 Introduction: Concepts, Definitions and Practices

In India there are 6,00,000 villages out of them 1,25,000 villages are backward so there is a need for designing and building the village as a smart village. With modernization and urbanization people migrate from one place to another place for different facilities such as education, employment and affinity o f people towards the locality or city. Village is main criteria for development of nation. So, develop the village in such a way that which is self dependant in providing the services, employment and well connected to the rest of the world i.e. smart village. The smart village corrects the social oversight by providing accommodations for sustainable family relationships without disturbing the lifestyle of different generations. The vision of smart village is that modern energy access can act as catalyst for development in education , health , productive enterprise , clean water , sanitation , environmental sustainability and participatory democracy which helps to support further improvement in access to energy . Initially the concept of development of village is of Mahatma Gandhi i.e. swaraj and suraj village. But, now days it is newly termed as smart village. We know that, India is a developing nation; with the help of smart village we can make India as a SS nation. Now days, our government also gives strong focus on smart village. Government implements so many schemes on smart village.
Making a city "smart" is evolving as a strategy to ease the problems generated by the urban population growth and speedy urbanization. Yet little hypothetical research has sparingly discussed the phenomenon. To close the gap in the literature about smart cities and in response to the increasing use of the concept, this paper proposes an agenda to understand the concept of smart cities. Based on the exploration of a wide and extensive array of literature from various disciplinary areas we identify eight critical factors of smart city initiatives: management and organization, technology, governance, policy context, people and communities, economy, built infrastructure, and natural environment.

- Smart security
- Efficient public transportation system
- Improving sanitation conditions
- Solid and liquid waste management.
- Rain harvesting /Rain water drainage system.
- Safe drinking water facilities.
- Use of renewable energy

Access to sustainable energy services in Smart Village acts as a catalyst for development – enabling the provision of good education and healthcare, access to clean water, sanitation and nutrition, the growth of productive enterprises to boost incomes, and enhanced security, gender equality and democratic engagement.

Definitions (Civil):

Smart village means all the necessaries facilities is developed in the village and no need to moves in city for any kind of requirement. Facilities like Bank, Panchayat building, Good road connectivity, Sanitation facility, ATM, Shopping center, Recreation center etc.

Definition (Electrical):

Smart village means all the necessaries facilities is available their like Street-light, 24 x 7 hr electricity available, people may use Solar water heater etc.

Practices (Civil):

A 'Smart Village/Ward' encompasses sustainable and inclusive development of all sections of its Community, so. The 100 per cent achievement of the following basic amenities, they enjoy a high standard of living. Homes for all – with access to toilet, safe-drinking water, and regular power. Skills and Village Enterprise development with bank and market linkages gave more flexible access to youth. Has functional solid/liquid waste management system. For smart village Efficient public transportation system. Improving sanitation conditions Rain harvesting /Rain water drainage system Use of renewable energy. A lot of work needs to be done in making the villages clean and sustainable to live in. There are different aspects of clean village such as: water supply, sanitation, indoor air quality, solid waste management and renewable energy etc.

Practices (Electrical): The Idea of Smart villages based on Internet of Things. There are certain ideas in smart cities that can be directly implemented in villages. For example, the use of cameras and sensors in streets for surveillance, sensors for healthcare etc. On the other hand, there are certain sectors like agriculture, cattle/livestock rearing etc. which need some improvised ideas for smart working. In the following sections, the various aspects of villages have been considered and how the quality of life in villages can be made better using the IoT and Smart village model.

3.2 Vision-Goals, Standards and Performance Measurement Indicators

1. Economy:

- Gross Domestic Product (GDP) for the City (Core Indicator)
- GDP Per capita (Core Indicator)
- Gini's coefficient (Supporting Indicator)
- City's Unemployment Rate (Core Indicator)
- Assessed Value of Commercial and Industrial Properties as a Percentage of Total Assessed Value of all Properties (Core Indicator)
- .Number of Businesses per 100000Population (Supporting Indicator)

2. Education:

- Percentage of Female School-aged Population Enrolled in Schools (Core Indicator)

- Percentage of Students Completing Primary Education: Survival Rate (Core Indicator)
- Percentage of Students Completing Secondary Education: Survival Rate (Core Indicator)
- Primary Education Student/Teacher Ratio (Core Indicator)
- Percentage of School-aged Population Enrolled in Schools (Supporting Indicator)

3. Energy:

- The Percentage of Total Energy Derived from Renewable Sources, as a Share of the City's Total Energy Consumption (Core Indicator)
- Total Residential Electrical Energy use per Capita (kWh/year) (Core Indicator)
- Total Electrical Energy Use per Capita (kWh/year) (Supporting Indicator)
- Average Number of Electrical Interruptions per Customer per Year (Supporting Indicator)
- Average Length of Electrical Interruptions (in Hours)(Supporting Indicator)

4. Environment

- Fine Particulate Matter (PM2.5) Concentration (Core Indicator)
- Particulate Matter (PM10) Concentration (Core Indicator)
- NO2 (Nitrogen Dioxide) Concentration (Supporting Indicator)
- SO2 (Sulphur Dioxide) Concentration (Supporting Indicator)
- O3 (Ozone) Concentration (Supporting Indicator)
- Green House Gas Emissions Measured in Tones per Capita (Core Indicator)
- Air Quality Index (Core Indicator)
- Noise Pollution (Core Indicator)
- Quality of Public Water Bodies (Core Indicator)

5. Finance:

- Debt Service Ratio (Debt Service Expenditure as a Percentage of Municipality's Own-Source Revenue) (Core Indicator)
- Capital Spending as a Percentage of Total Expenditures (Supporting Indicator)
- Own-Source Revenue as a Percentage of Total Revenues (Supporting Indicator)
- Tax Collected as a Percentage of Tax Billed (Supporting Indicator)

6. Fire and Emergency Response:

- Number of Professional Fire Fighters per 100000 Population (Core Indicator)
- Number of Volunteer and Part-time Firefighters per 100 000 Population (Supporting Indicator)
- Number of Fire Related Deaths per 100000 Population (Core Indicator)

3.3 Technological Options

- **Smart Buildings –** security cameras, fire safety, electricity managements.
- **Smart Dairy-** Remote supervision and monitoring in open fields and barns.
- **Smart Farming-** Satellite data for farm activities.
- **Smart agriculture-** Smart agricultural equipment for crop production.
- **Smart Weather and Irrigation**- Weather water levels in dams.
- **Smart health care –** Smart beds and equipment to monitor patient.
- **Smart Education –** Interactive learning through videos.
- **Smart surveillance system –** CC cameras and sensors to detect robbery.
- **Smart Buildings –** Security cameras, fire safety, electricity managements Smart Dairy, etc.

3.4 Road Map and Safe Guards

The purpose of building smart cities is to make the lives of the people safer and easier. Technology can be used as an instrument to protect lives and improve services and, furthermore, it can be used to protect Personally Identifiable Information and cities critical infrastructures, such as water treatment systems, transportation, hospitals, and power plants. Technology can be used to reduce crimes by geographically spotting areas with high crime rates, identifying specific crime patterns, and reporting it to law enforcement instantly, many of these services are achieved.

Sensors are small measurement devices that can be integrated with electronics to detect certain smells, sound, or levels of variations. Sensors can be passive or active. Passive sensors do not necessarily take action; they simply collect data, and they are used mainly to measure weather conditions, such as Ozone levels, wind speed, or the sun's ultraviolet levels. Active sensor devices, on the other hand, use electronics to process data and take action.

To become a digital city, governments will need an appropriate set of solutions that will help them advance to the next stage of ICT maturity. The more a city takes advantage of the potential offered by ICT in terms of the provision of digital services and an integrated urban network, the higher its level of ICT maturity. In many ways, this is easier for newer cities in emerging markets, which are just now investing in urban infrastructure. For example, Lusail City in Qatar, Masdar City in the UAE, and Songdo in South Korea are all making digital technology, networks, and apps a central part of how they operate and interact with citizens. By contrast, existing — or brownfield — metropolitan areas face clear challenges in moving up the ICT maturity ladder, as they need to modernize their existing infrastructure with embedded sensors and control systems and retrofit old buildings — a complicated and expensive process.

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

- The first step in establishing a road map for a smart city is to know why there is a need for a smart city initiative. This can be done by studying the city's demographics, including their sides who are the principal stakeholders in the city.
- The second step in establishing a smart city roadmap is by developing a policy that drives the whole initiatives. The policy needs to define the roles, responsibilities, strategies, and objectives of the smart cities.
- The third element in developing a smart city roadmap is engaging the citizens through the use of e-government and effective governance, which leads to the increase of efficiency and enhancing delivery of services.

3.5 Issues & Challenges

1. Retrofitting existing legacy city:
Infrastructure to make it smart, there are a number of issues to consider when reviewing a smart city concept. The most important is to determine the existing cities weak areas that need utmost consideration, e.g. 100-per-cent distribution of water supply and sanitation. The integration of formerly isolated legacy systems to achieve citywide efficiencies can be a significant challenge.

2. Financings of smart cities:

The High-Power Expert Committee on Investment Estimates in Urban Infrastructure has assessed a per-capita investment cost of Rs 43,386 for a 20year period. Using an average figure of 1 million people in each of the 100 smart cities, the total estimate of investment requirements for the smart city comes to Rs 7 lakh crore over 20 years. This translates into an annual requirement of Rs 35,000 crore. One needs to see how these projects will be financed as the majority of project need would move through complete private investment or through PPPs (public-private partnership).

3. Availability of city development plan:

Most of our cities don't have a city development plan, which is the key to smart city planning and encapsulates, and encapsulates all a city needs to improve and provide better opportunities to its citizens. Unfortunately, 70-80 % of Indian cities don't have.

4. Financial sustainability of ULBS:

Most ULBS are not financially self-sustainable and tariff levels fixed by the ULBs for providing services often do not mirror the cost of supplying the same. Even if additional investments are recovered in a phased manner, inadequate cost recovery will lead to continued financial losses.

5. Technical constraints of ULBS:

Most ULBS have limited technical capacity to ensure timely and cost-effective implementation and subsequent operations and maintenance owing to limited recruitment over a number of years along with inability of the ULBs to attract best of talent at market competitive compensation rates.

6. Three-tier governance:

Successful implementation of smart city solutions needs effective horizontal and vertical coordination between various institutions providing various municipal amenities as well as effective coordination between local government, state government, central government, agencies on various issues related to financing and sharing of best practices and service delivery processes.

7. Providing clearances in a timely manner:

For timely completion of the project, all clearances should use online processes and be cleared in a time-bound manner. A regulatory body should be set up for all utility services so that a level playing field is made available to the private sector and tariffs are set in a manner that balances financial sustainability with quality

8. Dealing with a multivendor environment:

Another major challenge in the smart city space is that software infrastructure in cities contains components supplied by different vendors. Hence, the ability to handle complex combinations of smart city solutions developed by multiple technology vendors becomes very significant.

9. Capacity building program:

Building capacity for 100 smart cities is not an easy task and most ambitious projects are delayed owing to lack of quality machinery and manpower, both at the center and state levels. In terms of funds, only around 5 per cent of the central allocation may be allocated for capacity building programs that focus on training, contextual research, knowledge exchange and a rich database. Investments in capacity building programs have a multiplier effect as they help in time-bound completion of projects and in designing programs, developing faculty, building databases as well as designing tool kits and decision support systems. As all these have a lag time, capacity building needs to be strengthened right at the starting.

10. Reliability of utility services:

For any smart city in the world, the focus is on reliability of utility services, whether it is water, telephone, electricity, broadband services. Smart cities should have to provide electricity 24 Hours.

3.6 Smart Infrastructure - Intelligent Traffic Management

The idea of Smart villages based on Internet of Things Smart Education Is the basic means to implement all the advancements in life. Educating people about the use of new technologies facilitates better implementation. It can be the force behind reducing the digital-divide which is far more prevalent in villages than the cities. The whole idea of Smart villages revolves around its people and how efficiently they make use of the components of a Smart village. They can be educated to participate in each and every activity of the village leading to a better lifestyle for its people and interactive videos can foster the learning in children and even adults. These can be used to educate them to use the facilities provided in the Smart villages in the best way. The village

schools can be equipped with Internet and other devices and learning can be made a fun activity turning the schools into Smart schools.

Infrastructural Facility in Punsari village (smart village):

Smart Village:- Five bore well and four hand pumps, a reverse osmosis plan and house to house piped connections to distribute chlorinated water. 66KVA- substation for electricity generation and 100% coverage of all streets with LED street lights. All 73 wells of the village regularly recharged. Police station, post office, telephone exchange and primary health center. Atal Express minibus for villagers with free of charge commute of student. Internet WIFI covering the whole village; future development of village proposed through GIS mapping. A public address system with 120 waterproof speakers for announcing communal information, bhajans, shocks, and Mahatma Gandhi's massages every street and nook of village under CCTV surveillance, which has helped drop the crime rate to 0%. Every family has a solid constructed home with personal lavatory. Whole village covered with underground drainage system for disposal of waste water. Pay and use public toilet near the bus station. A well managed crematorium for last rites; mortal remains of the deceased kept in pots/urns and disposed collectively at Haridwar or Suitable religious sites.

3.7 Cyber Security

Cyber security is the body of technologies, processes and practices designed to protect networks, computers, programs and data from attack, damage or unauthorized access. In a computing context, security includes both cyber security and physical security. Ensuring cyber security requires coordinated efforts throughout an information system. Elements of cyber security include:

- Application security
- Information security
- Network security
- Disaster recovery / business continuity planning
- Operational security
- End-user education

3.8 Retrofitting- Redevelopment- Greenfield Development District Cooling

District cooling systems produce chilled water, steam or hot water at a central plant and then pipe that energy out (either underground or over rooftops) to buildings for air conditioning, space heating and water heating. As a result, these buildings don't require their own chillers, air conditioners, boilers or furnaces.

District cooling systems are a highly efficient way for many owners and manufacturers to effectively address each of these challenges while meeting their comfort and process cooling and heating needs.

Heat sources in use for various district heating systems include, power plants designed for combined heat and power including both combustion and nuclear power plants; and simple combustion of a fossil fuel or biomass; geothermal heat; solar heat; industrial heat pumps which extract heat from, river or lake water, seawater, sewage, and waste heat from industrial processes.

Green Buildings:

Green concept includes use of Eco-friendly materials, energy conservation and preservation of environmental quality. Green concept is used to reduce adverse impact on environment due to man-made sources of pollution.

Aspects of green design:

Sustainability, Eco-sensitivity, Energy efficiency, Climate-responsiveness, User-friendliness

Cost-effectiveness.

3.9 Strategic Options for Fast Development

Three of the main components of this strategic plan include city improvement (retrofitting), city renewal (redevelopment), city extension (green field development) and pan-city development.

1. Reevaluate the Role of the City And Its Administration

Smart city strategies provide a unique opportunity for reconsidering what exactly the city should offer in terms of services, and what the reach of those services should be. The "city as a service" model is often appropriate – along the lines of "we will contact you when your passport needs renewing" rather than the other way around.

2. Involve Citizens and Other Stakeholders

Before you begin to define your smart city strategy, you must understand the needs of your target group. Getting citizens and other stakeholders from civil society, NGOs, business, etc. on board right from the start is essential. It enables you to define the added value that your smart city concept should provide to end users.

3. Avoid Isolated Solutions – Look Beyond E-Government And Actively Apply Best Practices

Many smart city concepts today focus on individual and not integrated solutions. Think about the whole range of action fields in your city and ensure that the interfaces between the different sectors are digital in order to foster cross-sector activities. Actively look for best practices and apply them.

4. Encourage Initiatives, Self-Sustaining Business Models And Other Contributions From The Private Sector

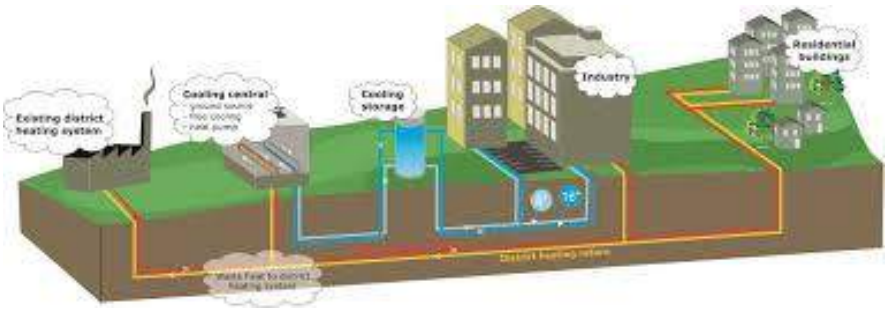


Fig. 3.1 Smart City heating and cooling

Businesses increasingly see themselves as both global and local citizens. They are willing to engage in activities that strengthen their local environment and will often invest

significantly in them. Draw on this support. Not everything has to be financed from the public pocket – many smart city solutions, such as parking guidance and information (PGI) systems, can be financed by the private sector.

5. Create a Comprehensive Data Strategy and Data Platforms

Understand the data you already have, creating data platforms to link existing data structures with each other. Implement an open data policy, proactively making public information available as a basis for a control center and innovative data-based applications.

6. Set up Innovation Labs To Foster An Inspiring Ecosystem

Create an ecosystem for innovation and entrepreneurship by providing facilities such as "maker spaces", "living labs", or "business incubators". Importantly, ensure that these facilities have the necessary regulatory room to maneuver. Provide technical and financial support wherever possible.

7. Ensure Data Security

Interconnected digital systems come with an increased need for data security. Your smart city strategy should include a cyber-security concept.

8. Involve Infrastructure Operators In Designing, Financing And Implementing Initiatives

Most major cities own and operate their infrastructure via intermediary companies, such as public utilities, public transit operators, and so on. These players have an important role in designing, financing and implementing smart city concepts. They can also help to develop smart city business models.

9. Gain Political Backing and Integrate Public Feedback

Once you have drawn up a smart city strategy, it is important to gain political backing for it. Equally important, however, is inviting citizens and other stakeholders to join in a structured and focused dialog about the strategy to ensure alignment over goals and actions. This could involve the use of participation platforms.

10. Establish a Coordinating Body and a Dedicated Planning System

Put a central authority in place to coordinate the various smart approaches across the city. The job of this body is to plan, monitor and support and evaluate the success of individual initiatives and so avoid a piecemeal approach. Clear, realistic goals, timeframes, and budgets are essential.

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

More than 90% of the urban population has access to drinking water, and more than 60% of the population has access to basic sanitation. However, access to reliable, sustainable, and affordable water supply and sanitation (WSS) service is lagging behind. Are the Services Reliable? No Indian city receives piped water 24 hours a day, 7 days a week. Piped water is never distributed for more than a few hours per day, regardless of the quantity available. Raw sewage often overflows into open drains. Are the Services Technically and Financially Sustainable? Less than 50% urban population has access to piped water. The Non-Revenue Water (NRW: due to leakages, unauthorized connections, billing and collection inefficiencies, etc.) is huge, estimated between 40-70% of the water distributed. Operations and maintenance cost recovery through user charges is hardly 30-40%. Most urban operations survive on large operating subsidies and capital grants.

3.11 Initiatives in village development by local self-government

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

Rural Local Governments (or Panchayat Raj Institutions):

- Zilla Panchayat
- Mandal or Taluka Panchayat
- Gram Panchayat

Initiation by Local People:

- Organizing programme for increase literacy for peoples of village.
- Providing enough information regarding to using of various facilities.
- Peoples have to learn various things regarding how to keep facilities in good condition.

3.12 Smart Initiatives by District Municipal Corporation

Managing solid waste is a daunting task for every urban local body (ULB) in India. The irony is such that out of 400 municipal corporations and councils in India, only a handful of ULBs are managing their solid waste management, while reinventing some of the age-old garbage disposal methods with a touch of new technologies. The Council has listed some of the proven examples that can be considered for tackling such a sensitive issue.

Take example of Pune city. The city has managed to tackle the waste of over 1,700 tones that it generates daily, while ensuring minimization of land fill, freeing up urban land for more productive purposes. At present, the Pune Municipal Corporation (PMC) has combined an integrated approach

with decentralized waste management by installing 25 bio-methane plants that produce 600 kW of electricity and compost as a byproduct

.

The 300 TPD plant by Noble Exchange Environment Solutions Pvt. Ltd (NEX) that converts food waste to bio-CNG, is a 300 tpb (total plumbum) vermi-compost project by Ajinkya Biofert and Disha. It uses the Rochem Separation System that processes mixed waste to produce 300 TPD of refuse derived fuel (RDF). This DBOT project by NEX, which converts food waste into valuable bio fuel, has already started producing 45 TPD of bio-CNG and 150 tones of organic manure, based on the anaerobic digestion system. At maximum capacity, it can process 300 tonnes of waste, making it the largest biogas plant in India.

Another example is Jabalpur. With the installation of a 600 tone per day (TPD) municipal solid waste plant, the Jabalpur Municipal Corporation has become India's first to install a Smart WTE facility producing 11 MW of energy. The plant, installed by Council's lead partner EsselInfra projects Ltd, has used refuse-derived fuel (RDF), bio methanisation and an advanced technology called combustion. Although these technologies work differently, all of them eliminate waste and produce energy.

That apart, although technology has played a major role in arresting the waste menace, some manual intervention has came in handy as well. To cite an example, Alleppey Municipal Corporation in Kerala, which was grappling with a garbage dumping issue, has now transformed the city's waste disposal scenario. The focus of the initiative was segregation and treatment of wet waste at source. The pilot project, which was started in just 12 wards, has now spread over 52 wards, covering 40,000 households. The corporation has installed biogas plants, both portable and fixed, with a pipe composting system.

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

Government projects:

Name of Authority - National Highways Authority of India (NHAI)

Name of Contractor - Unique Construction

Project Name - Road up gradation (Kamrej-Chalthan) Project

Project Brief - The project envisages six laning of Kamrej-Chalthan section from 248.10 km to 264.35 km of NH-8 with long term remedial measures for four black spots on Kamrej Bharuch section of NH-8.

Sector – Transport

Sub-Sector - Roads and bridge

Project Status - Pre-construction Stage

NGO list:

- Vatsalyapuram Orphanage NGO
- Nature club
- Jankijivdaya charitable trust
- Bhansali trust
- Lions club of surat north
- Shri goverdhan trust
- Disable welfare Trust of India, etc.

Digital country concept:

Digital India is a campaign launched by the Government of India in order to ensure the Government's services are made available to citizens electronically by improved online infrastructure and by increasing Internet connectivity or by making the country digitally empowered in the field of technology. The initiative includes plans to connect rural areas with high-speed internet networks. Digital India consists of three core components: the development of secure and stable digital infrastructure, delivering government services digitally, and universal digital literacy, Launched on 1 July 2015 by Indian Prime Minister Narendra Modi, it is both enabler and beneficiary of other key Government of India schemes, such as Bharat Net, Make in India, Startup India and Standup India, industrial corridors, Bharatmala, Sagarmala. As of 31 December 2018, India had a population of 130 crore people (1.3 billion), 123 crore (1.23 billion) Aadhaar digital biometric identity cards, 121 crore (1.21 billion) mobile phones, 44.6 crore (446 million) smart phones, 56 crore (560 million) internet users up from 481 million people (35% of the country's total population) in December 2017, and 51 per cent growth in e-commerce.

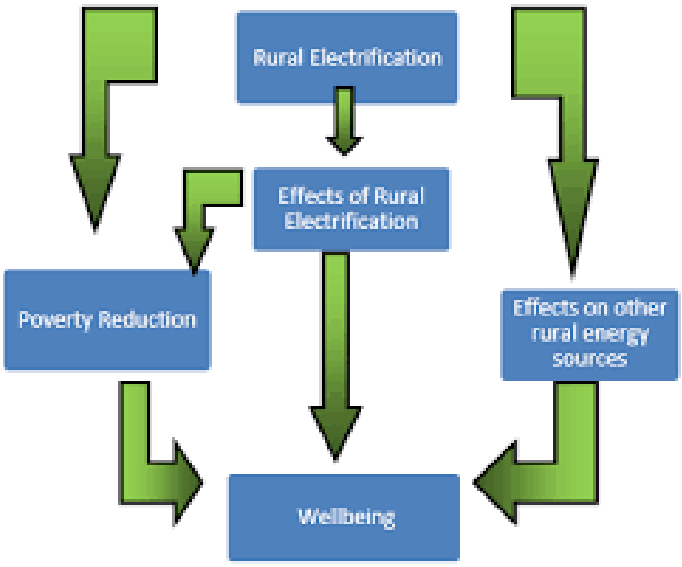


Fig. 3.2 Awareness of Rural Electrification

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

Off-grid communities:- Electrification is highly desired by all rural communities. Different international, national and local organizations use different indicators for measuring and reporting mini-grids or stand-alone systems. South Asian countries have been focusing on off-grid electrification of current trend for Rural Electrification (RE) at regional level.

Solar power:

In recent years, Taiwan is also catching up on promoting renewable energy throughout the country. According to SciTech Reports, 20% of the solar panels in the world are exported from Taiwan, making the country the second largest solar panel provider globally. Moreover, the current government has been planning on employing solar energy to public amenities and incorporate the green energy to people's daily lives.

Wind Power:
In addition, Taiwan's island geographic provides ideal wind power locations.[30] Since 2000, there have been 347 wind power systems constructed, yielding a total of 684.4 MW of storage nationwide.[31] The offshore wind power development has also been lately invested by world-renown companies such Northland Power Inc., and Copenhagen Infrastructure Partners etc. and it is anticipated Wind power that the offshore wind power would be generating 5.5 GW by 2025.

Thermal power:

Besides wind power, the volcanic formation of Taiwan also provides the country with geothermal resources.

Hydropower:
Hydropower is another crucial renewable energy in Taiwan and it is estimated that the current hydropower can provide 4500 MW per year. The system running is a combination of predominantly cascade, diversion and large accumulation types in order to handle the unpredictable typhoons and droughts. The mountainous landscape of Taiwan has gifted the country a better foundation for hydropower development.

Other power sources:

Beyond natural resources, some tech companies invented alternative energies such as transforming pig dung into biogas power and excess wax apple wood sticks to biomass energy. The former can produce around 25 kW of energy and the technology was introduced in the Discovery Channel. Furthermore, an applied physics research team at Ching Hua University also came up with extracting DNA from fish roe to obtain certain material for DNA biopolymer photonics, which can be used to as a kind of sustainable energy.

3.15 Electrical concept (Design Ideal and Prototype model)

Smart villages are sustainable electricity supplies and the availability of clean and efficient appliances for cooking. Productive enterprises and facilities with higher energy demands will tend to be located in hub villages supplied by the national grid if sufficiently close or – for the many remoter communities – by local mini-grids driven by renewable energy sources, possibly in hybrid form with diesel generators in some cases. The more dispersed communities around the hub villages will typically use pico-power and stand-alone home systems to provide more basic levels of electricity supply until distribution networks can be extended to them.

Energy management:

- Smart meters and management
- Renewable sources of energy
- Energy efficient & green buildings

CHAPTER 4: About Chichwada Village

4.1 Introduction

Below is the introduction of the chichwada Village:

4.1.1 Introduction about Chichwada Village

Chichwada village is located in Valsad Tehsil of Valsad district in Gujarat, India. It is situated 7 km away from Valsad, which is both district & sub-district headquarter of Chichwada village.

The total geographical area of village is 142.99 hectares. Chichwada has a total population of 1,025 peoples. There are about 238 houses in Chichwada village. Parnera is nearest town to Chichwada which is approximately 3km away.

Fig. 4.1Chichwada Village

In Chichwada village population of children with age 0-6 is 92 which makes up 8.98 % of total population of village. Average Sex Ratio of Chichwada village is 909 which is lower than Gujarat state average of 919. Child Sex Ratio for the Chichwada as per census is 804, lower than Gujarat average of 890.

- **Population :1025**
- **Families :238**
- **Literacy :91.21%**
- **Sex Ratio :909**

Chichwada village Photos:

The figure shows the primary school of chichwad village. School in closed condition.school have one big ground near school one well and one aaganwadi. The location of school is center of chichwada village.

Fig. 4.2 Chichwada Village Primary School

Fig. 4.3 Chichwada Village Lake

Fig. 4.4 Chichwada Village Roads

4.1.2 Justification/ need of the study

- The study of these village is necessary in order to have an idea of the problems prevailing in these villages.
- It is essential to estimate the various aspects of the villages in order to find the gaps in these villages.
- Studying is not only about getting the information but is the way of understanding the people of villages so that, the major problems of the villages can be found out.
- Studying also helps us in understanding the social aspects of the villages which is very necessary for the involvement of the people of the village for development purpose.
- Study also helps in collecting the data for future analysis of the history of a village.
- These studies done under Vishwakarma Yojana can be a database for other government policies and documentation.

4.1.3 Study Area (Broadly define)

Chichwada village is located in Valsad Tehsil of Valsad district in Gujarat,India. It is situated 7 km away from Valsad, which is both district & sub-district headquarter of Chichwada village.

Village: Chichwada
Taluka: Valsad
District: Valsad
State: Gujarat
Area:142.99 Hect.
Total Houses: 238

The total geographical area of village is 142.99 hectares. Chichwada has a total population of 1,025 peoples. There are about 238 houses in Chichwada village. Parnera is nearest town to Chichwada which is approximately 3km away.

In Chichwada village population of children with age 0-6 is 92 which makes up 8.98 % of total population of village. Average Sex Ratio of Chichwada village is 909 which is lower than Gujarat state average of 919. Child Sex Ratio for the Chichwada as per census is 804, lower than Gujarat average of 890.

Sex Ratio of Chichwada Village -Census 2011

As per the Census Data 2011 there are 488 females per 537 males out of 1025 total population of village. There are 41 girls per 51 boys under 6 years of age in the village.

Literacy of Chichwada Village

Out of total poplation total 851 people in Chichwada Village are literate, among them 462 are male and 389 are female in the village. Total literacy rate of of Chichwada is 91.21%, for male literacy is 95.06% and for female literacy rate is 87.02%.

Chichwada Village Census 2011 Data ---Census 2011

Description	Census 2011 Data
Village Name	Chichwada
Teshil Name	Valsad
District Name	Valsad
State Name	GUJARAT
Total Population	1025
Total Area	143(Hectares)
Total No of House Holds	238

Total Male Population	537
Total Female Population	488
0-6 Age group Total Population	92
0-6 Age group Male Population	51
0-6 Age group Female Population	41
Total Person Literates	851
Total Male Literates	462
Total Female Literates	389
Total Person Illiterates	174
Total Female Illiterates	75
Total Male Illiterates	99
Scheduled Cast Persons	0
Scheduled Cast Males	0
Scheduled Cast Females	0
Scheduled Tribe Persons	92
Scheduled Tribe Males	53
Scheduled Tribe Females	39

Table 4.1Chichwada Village Census Data (2011)

4.1.4 Objectives of the study

The main objective of the study undertaken is to utilize the results to provide true feedback of the present state of implementation of all development schemes in the rural areas. The observation made during the study are to inputs to help in bringing about changes in the formulation or reformulation.

- To assess problems, constrains in the effective implementation.
- To know the basic requirement of village.
- To provide the basic facilities in rural areas like Education, Health, irrigation, electric power etc.
- To suggest strategies and policies that would enable Government of India to increase the pace of rural development.
- To assess the adequacy of these schemes in solving and providing solution to problems of rural development.
- To provide the impact of these various Programmes.
- To gauge the general opinion of the people towards these schemes and programs of the government

4.1.5 Scope of the Study

The aim of project is finding the problem or need of a village in terms of socio – cultural or physical or social infrastructure and to design that facility with efficient engineering solution which include the design proposal and estimate cost to facilitate the require facility for the future growth of village with urban facilities.

The study will focus the development trend, intensity of growth of the village, and find out the problems related to the socio-cultural or physical development of the area, social infrastructure services, and the administrative systems of the village.

The study of village gives the reason where there is need of sustainable facilities like infrastructure facilities, community hall, primary health center, post office, general market, pure drinking water, road network, schools, electricity, sanitation, library, aaganwadi, overhead tank, police station, fire station, etc. are available or not. Rural settlement engulfed in urban limits during the process of development, and also those located in the fringe areas of large cities, can be termed as urban villages.

4.1.6 Methodology Frame Work for development of your village

Fig. 4.5 Methodology Frame Work for Developement of

The overall goal of our Village Development work is that people in poor rural villages have access to their most basic needs, improved education and health, and a means of sustaining their livelihoods and increasing their standard of living. More specifically,

4.1.7 Available Methodology for development related to Civil/Electrical

Methodology:

- Design objectives
- Technical approach
- Proposed sustainability features
- Identify customer needs
- Identify local/state/federal engineering and construction specifications
- Project management structure
- Budget
- Gantt Chart of project schedule
- Resumes of team members

Objects which were available in the Chichwada village were, Panchayat Building, Water Tank, Underground Sump, Post Office, Approach and Internal Road, Public Library, RO Water Plant, Dairy, Primary School, Anganwadi, Dharmshala, Government Grocery Shop, Village Temples, etc.

Census Parameter	Census Data
Total Population	1025
Total No of Houses	238
Female Population %	47.60 %(488)
Total Literacy rate %	83.02 %(851)
Female Literacy rate %	45.71 %(389)
Scheduled Tribes Population %	8.97% (92)
Scheduled Caste Population %	0
Working Population %	38.14 %(391)
Child(0 -6) Population by 2011	8.97%(92)
Girl Child(0 -6) Population % by 2011	44.56%(41)

Table 4.2 About Village(Chichwada)

4.2 Chichwada Village Study Area Profile

Chichwada village is located in Valsad Tehsil of Valsad district in Gujarat, India. It is situated 7 km away from Valsad, which is both district & sub-district headquarter of Chichwada village.

The village area is approximately 25.48 Hect., out of which 142.99 Hect. is Forest area,100.19 Hect. is Agricultural area, 0.2 Hect. Residential, 3.24 Hect. is other area(Gochar).

The nearest Railway Satiation to this village is Atul Railway station which is 2.9 km away. The nearest Air Port to the village is Surat Air Port which is about 104.0 km from the village.

The nearest Town from the village is Atul which is 2.7 km from the village and nearest district is Navsari (60.7 km) from the village.

4.2.1 Study Area Location with brief History land use details

Location:

Chichwada village is located in Valsad Tehsil of Valsad district in Gujarat, India. It is situated 7 km away from Valsad, which is both district & sub-district headquarter of Chichwada village.

The nearest Town from the village is Atul which is 2.7 km from the village and nearest district is Navsari (60.7 km) from the village

Village: Chichwada
Taluka: Valsad
District: Valsad
State: Gujarat
Nearest Railway Station: Atul Railway Station (2.9 km)

Air Port:
Surat Airport (104.0 km)
Town/City:
Atul (2.7 km)
District:
Navsari (60.7 km)

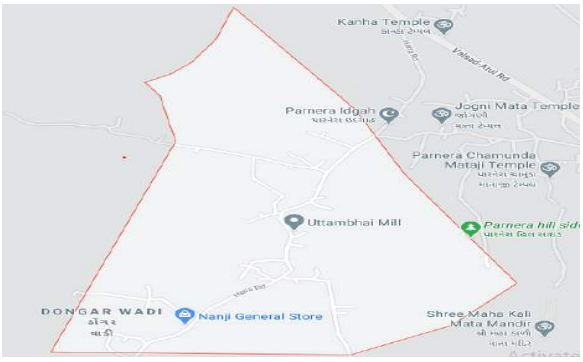


Fig 4.6 Satellite map of Chichwad village

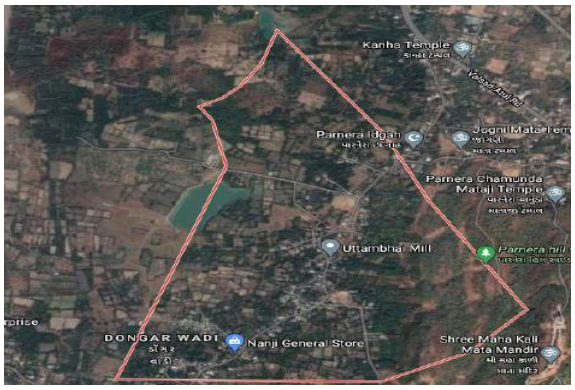


Fig. 4.7 Map of Chichwada Village

Brief History of Land use:

According to census 2011 the village area is approximately 142.99 Hect., out of which 25.48 Hect. is Forest area, 100.19 Hect. is Agricultural area, 0.2 Hect. Residential, 3.24 Hect. is other area(Gochr).

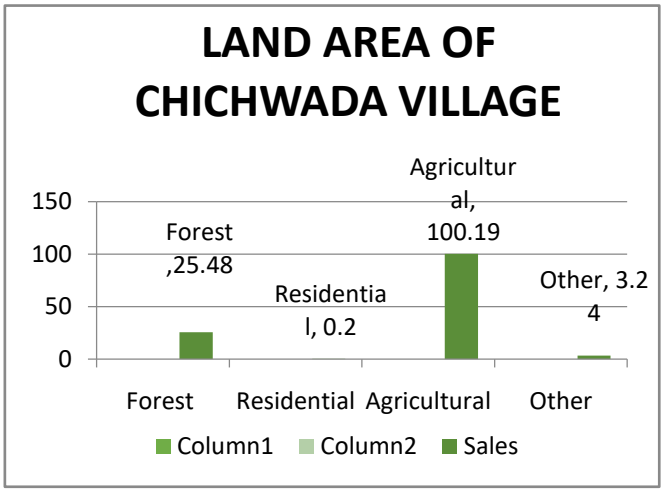


Fig. 4.8 Chichwada Village Land Use (%) (2011 Census)

4.2.2 Base Location map, Land Map, Gram Tal Map

Fig. 4.10 Chichwada Village Base Loaction Map

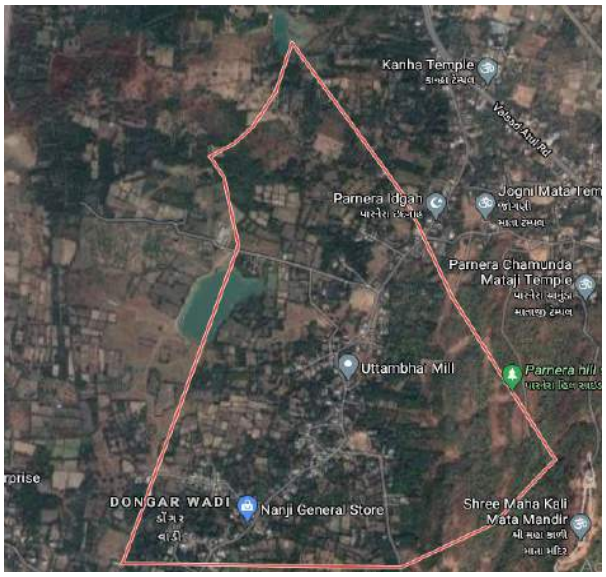


Fig. 4.9 Chichwada Village Land Map

4.2.3Physical & Demographical Growth

Demographics:

The Chichwada village has population of 1025 of which 537 are males while 488 are females as per Population Census 2011.

In Chichwada village population of children with age 0-6 is 92 which makes up 8.98 % of total population of village. Average Sex Ratio of Chichwada village is 909 which is lower than Gujarat state average of 919. Child Sex Ratio for the Chichwada as per census is 804, lower than Gujarat average of 890.

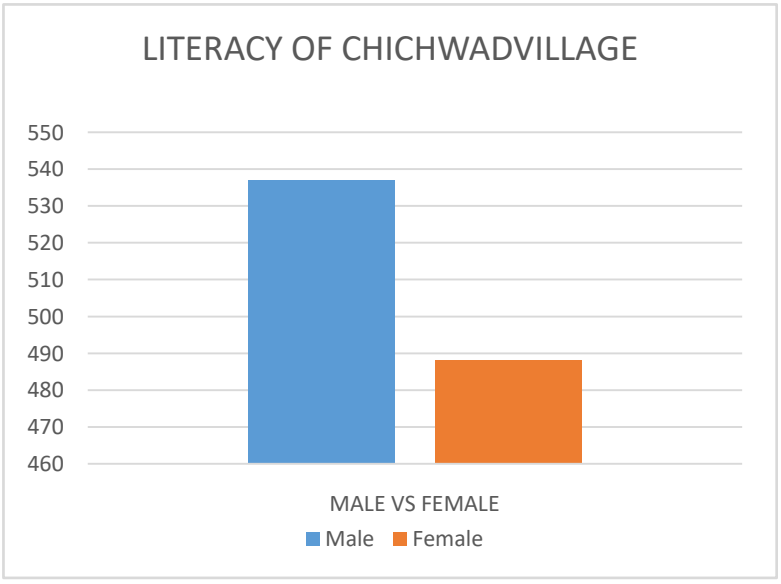


Fig. 4.11 Chichwada Village Population Distrbution (2011 Census)

Population Distribution:

The graph shows the population Distribution of Chichwada village.in the graph first bar is shows Adult Vs children (0-6), seconded is male Vs femle(Adult),thired os male Vs Female(0-6), fourth id male Vs female (overall).

Sex Ratio:

As per the Census Data 2011 there are 909 Femals per 1000 males out of 1025 total population of village. There are 804 girls per 1000 boys under 6 years of age in the village.

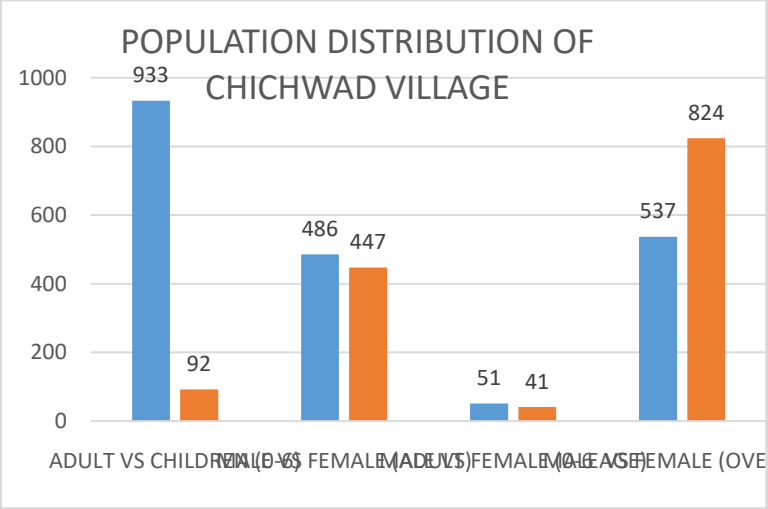


Fig. 4.12 Chichwada Village Literacy (2011 Census)

Literacy:

Literacy is popularly understood as an ability to read and write in at least one method of writing, an understanding reflected by mainstream dictionaries. Correspondingly, the term illiteracy is considered to be the inability to read and write.

As per the Census Data 2011 there are 909 Females per 1000 males out of 1025 total population of village. There are 804 girls per 1000 boys under 6 years of age in the village.

Cast wise distribution:
The Chart shows the cast wise Distribution of chichwada village. There are mainly S.C, S.T and other cast like general, OBC and other.

In Chichwada Village S.C people are Zero (0),S.T people are 92,nd other People are 933.

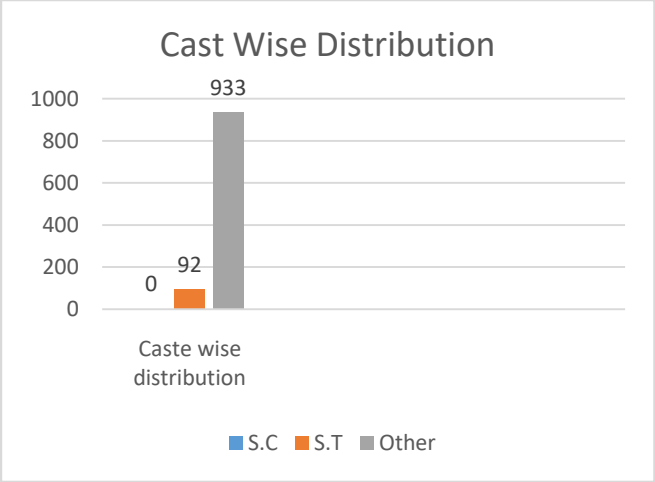


Fig. 4.13 Chichwada Village Caste wise Population Distrbution (2011 Census)

4.2.4 Economic generation profile / Banks

Total working population of Chichwada is 391 which are either main or marginal workers. Total workers in the village are 391 out of which 338 are male and 53 are female. Total main workers are 315 out of which female main workers are 281 and male main workers are 34. Total marginal workers of village are 76.

	Total	Male	Female
Total Workers	391	338	53

Main Workers	315	281	34
Main Workers Cultivators	60	59	1
Agriculture Laborer	0	0	0
Household Industries	1	1	0
Other Workers	254	221	33
Marginal Workers	76	57	19
Non-Working Persons	634	199	435

Table 4.3 Chichwada Village Profile of work

Banks: No bank or ATM
Post Office: No Post Office
Shops:4 Shop
Business: Mango,Surecane Farms

4.2.5 Actual Problem faced by Villagers and smart solution

During our visit in the village, we interacted with the sarpanch of the village. The sarpanch told us about the problems of the village. Also, we with ourselves found out some problems.

Following are the variousproblems faced by the village:

Problems:

- Requirement of Public Garden.
- Requirement of Panchayat Office.
- There is no health care facility in village.
- There are no public toilets.
- No garbage collection system.
- No solid waste management system.
- Commercial Electrical supply is not provided.
- No renewable Energy sources.
- No general market
- Tap water not proper provided..
- Bus station in damage condition.

The above problems can be solved by implementing the following things:

Solutions:

- Made Public Garden With Open GYM.
- Made Panchayat Office with Good Fcilies.
- Private clinics should be made.
- Public toilets should be made.
- Panchayat should provide a garbage collection system.
- Solid waste management is needed.
- More commercial activities should be started.
- Solar panels can be installed.
- Banks and ATM.
- Do proper maintains of tab water pipe lines.
- Redesign of bus station.

Other Recommendation:

- Community hall
- General Market

4.2.6 Social scenario -Preservation of traditions, Festivals, Cuisine

Gujarat may have earned the position of being most industrialized and developed states of India but the people of Gujarat have preserved the rich Culture and tradition of Gujarat. **Hence, it is rightly said "JyaJya Vase Gujarati, tyatya Vase Gujarat" (Wherever in the world lives Gujarati, there live Gujarat) and the state stands as "Heart of India" due to Multiculturalism.**

From food to faiths and beliefs Gujaratis carry a unique culture in almost all the aspects of their lives. Shri Modi had once beautifully described the importance of the culture and its uniqueness "Never forget your ancestors, your roots and the place where you have come from. Always remember one thing, have a strong bond with your culture, tradition and native place as in these lie our uniqueness and oneness!" he said.

Fig. 4.14 Gujarat Culture and Traditions

Traditions:

Music:

Fig. 4.15 Gujarat Dance Form

Gujarati music has gained some attention and has been making its vital contributions since a very long time. There are several rags who's original roots can be traced back to Gujarat these include – GujariTodi, Bilaval (from Veraval), Sorathi, Khambavati, Ahiri and Lati. These are a few of the many priceless gifts of music that Gujarat has given to classical Hindustani music. Gujarat has been successful in preserving its musical authenticity and have actively been involved in not losing its musical heritage that is now a pride of Gujarat. Rann Utsav is one of the ways through which you can experience the glorious culturally enriched musical gift of Gujarat. The community who is to be thanked for keeping their music alive are the communities of Charans and Gadhavis, whose hereditary profession has been to carry on the lineage of Gujarati folk music. Some common types of Gujarati folk songs are – Lullaby, Nuptial songs and festive songs.

Dance Forms

- **Dandiya Raas –** This famous dance form was originated in Gujarat and is characterized by being energetic, playful along with being romantic. The men and women taking part in this dance dress themselves up in traditional colorful clothing and dance around while simultaneously moving in concentric circles
- while clicking their bamboo sticks that they hold in either hands with each other.
- **Garba –** This graceful traditional dance form is performed primarily by women arranged in a circular form. This dance is performed to offer reverence to goddess Ambaji. The dance involves rhythmic singing and clapping while moving around the goddess. Women dress up in colorful and elaborately embroidered Ghaghra, cholis, anklets, bracelets etc.
- **Garbi –** Initially and originally this dance form was performed by the men of the Gujarati community. They used to perfumer this dance when they used to return victoriously back from a battle. The songs which they used to dance to used to be of the spirit of Valour and this dance was the characteristic of fascinatingly forceful movements. Nowadays even women take part in this dance.

Fairs And Festivals:

- **Bhavnath Mahadev Mela (February) –** This fair takes place at the Bhavnath Mahadev Temple that is located on the foot of the holy mount Girnar in Junagadh. This fair takes place

for 5 days in the month of February around the festival of Mahashivratri. During this fair, the Mahapuja of Lord Shiva takes place at midnight inside the temple on the 14th day of the dark half of the month of Magh. It is a popular belief that during this time, Lord Shiva himself visits this shrine.

Fig. 4.16 Gujarati Food

- **Chitra Vichitra Mela (March) –** attended by almost 60,000 to 70,000 tribal people this fair is known for being one of the largest tribal fairs. This festival takes place 14 days after the festival of Holi. The temples that are set up overlook rivers like Sabarmati, Akul and Vyakul. The fair is named after the two sons of King Shantanu Chitrangad and Vichitravirya.
- **Makar Sankranti (January) –** Also known as the kite flying festival this festival is celebrated with great vigor and enthusiasm. This festival marks the sun's direct reaching to the tropic of Capricorn after the completion of the winter solstice. It involves flying of colorful kites, folk music and traditional dance performances. Known as Uttarayan in Gujarat, it is also the time when preparations like Undhiyu and sugar cane juice is served.
- **Bhadra Purnima (September) –** The full moon of bhadrapada is also known for being one of the four most vital festivals that are celebrated in Gujarat. To mark this occasion a large fair is organized on the full moon days and the evening times are filled with performances of folk drama – Bhavai. All the farmers and agriculturists go to the holy shrine of Ambaji.

Fig. 4.17 Gujarat Fairs and Festivals

Cuisine:

Gujarati food originated from Gujarat, the western coastline state of India, often referred to as "Jewel of Western India". Although the long coastline ensures huge variety of seafood, the influence of Jain culture and philosophy makes the region a predominantly vegetarian barring some communities who incorporate non-vegetarian items such as goat, chicken, eggs and seafood in their platter. Gujarati cuisines are not only varied and lip smacking but also high in nutritional value. Different cooking styles and combination of spices are incorporated in preparing different dishes marking uniqueness of each. Traditionally a Gujarati thali

comprise of rotli, kadhi or dal, rice, and shaak/sabzi. Some of the dishes are stir fred, while others are boiled. Gujarati food is more often served on a silver platter. Gujaratis use a combination of different spices and flavours to cook their meals and this is what makes their food truly exotic. People in Gujarat eat one or the other type of curry along with rice and roti in almost every meal. Gujarati dishes usually have a very subtle taste that makes it truly distinct from other Indian cuisines. Most of the Gujarati dishes are sweet, while others have a quite larger concentration of sugar as compared to salt and spices. Sometimes, jaggery is used as an alternative to sugar.

4.2.7 Migration Reasons / Trends

In Chichwada Village most of people are migrating now a days because of better opportunity for jobs, Business, High living standard, good facilities, etc. People are migrating to Vapi and Surat. Because Surat is one of the biggest economic hub of Gujarat and Vapi is a industrial area so leaber get easily job opportunity. People earn more money in the city rather than village that's why people migrate from village to city.

4.3. Data Collection Chichwada Village(Photograph/Graphs/Charts/Table)

Data collection is first and the foremost work which is need to be done in order to understand the village profile. The data collection need to be done is a proper and systematic way in order to have a clear picture of village.

During this covid times it was a tough work for us to do, but we managed to do it with the positive response of the sarpanch and the online media.

4.3.1 Describe Methods for data collection

Our approach for the data collection was the mixture of regular offline visits and online research both. Since it was the covid time we preferred to collect much of the data from our homes as per the government norms for the covid times. Below are the ways by which we did our data collection:

Interacting with the Sarpanch:

We interacted with the sarpanch of the village Shri. Tusar. Patel. In this interaction we filled the techno survey forms and discussed the various problems with the sarpanch. We particularly focused over knowing the various problems of the village.

Visiting the Village:

We visited the village conforming the data provide by the sarpanch with the actual scenario of the village. The most the things matched with the actual scenario. We opt for the cleanliness, infrastructure details, roads, etc. of the village.

Interaction on call:

When sometimes it was not possible to go to the village, we used to get in touch with the village sarpanch on call.

Online Research:

We did a lost research on the internet for the collection of data of the village especially regarding the 2011 census.

4.3.2 Primary details of survey

The primary survey of the village was done and following were the thing which were observed and collected:

Demography:

The Chichwada village has population of 1025 of which 537 are males while 488 are females as per Population Census 2011.

In Chichwada village population of children with age 0-6 is 92 which makes up 8.98 % of total population of village. Average Sex Ratio of Chichwada village is 909 which is lower than Gujarat state average of 919. Child Sex Ratio for the Chichwada as per census is 804, lower than Gujarat average of 890.

Infrastructure:

The village consists of descent infrastructure with Aganwadi, good roads with street lights, a greater number of pucca houses as compared to kuccha etc.
The village does not consist of some basic infrastructure like community hall, public toilets etc.

Electrical Distribution:

The village is equipped with good electrification. The village gets power supply for more than 6 hours a day, with electric supply provided for both domestic and agricultural use.

The village has also got some solar enabled led Street lights in bed condition.

Literacy:

Out of total poplation total 851 people in Chichwada Village are literate, among them 462 are male and 389 are female in the village. Total literacy rate of of Chichwada is 91.21%, for male literacy is 95.06% and for female literacy rate is 87.02%.

Health and Health Care Facilities:

The village people have good health conditions.

The village has no sub PHC or as well as private clinics. The village also does not have any pharmacy nearby. Village has only one sub PHC center with good condition. And also new sub PHC center is under contraction. Near exiting sub PHC center. On 4th march 2021 soil test is going On.

Transportation:

Within the village the roads are in good condition. Within the village the mode of transportation is AUTO.

Water Facilities:

The village has good water facility for drinking and their domestic use. The village has a 2 Wells and 1 Pond They receive treated tap water.

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

The village has no specified size of house, but the Middle class villagers have Pakka House and and poor villagers have pukka house. There is no geo tagging done in the Chichwada village.

4.3.4 No of Human being in One House

From the 2011 survey the village has 238 houses in total and about 1025 people lived in the village so an average can be estimated of 4-5 people in a house.

Note: Data as per average per 2011 census and also to keep in mid that there are variations in the type of family ranging from nuclear families to the joint families.

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

The materials like milk, other grocery materials, wheat, and other agricultural cereals are locally available.

For the grocery items some are available at local grocery but for sometimes they hae to visit near by market out of village.

4.3.6 Geographical Detail

The village is most of Agricultural land with a total land are of 142.99 acers divided as follows:
Forest area: 25.48 Hect.
Agricultural area: 100.19 Hect.

Residential: 0.2 Hect.

Other area: 3.25 Hect.

Elevation, Latitude and Longitude:

Elevation above MSL:13 meters

Latitude: 20.554592

Longitude: 72.940756

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

The case wise distribution of the village is shown as below:

Caste	Numbers
Scheduled Cast Persons	0
Scheduled Cast Males	0
Scheduled Cast Females	0
Scheduled Tribe Persons	92
Scheduled Tribe Males	53
Scheduled Tribe Females	39
Other	933

Table 4.4 Chichwada Village Caste wise distribution

4.3.8 Occupational Detail - Occupation wise Details / Majority business

Total working population of Chichwada is 391 which are either main or marginal workers. Total workers in the village are 391 out of which 338 are male and 53 are female. Total main workers are 315 out of which female main workers are 281 and male main workers are 34. Total marginal workers of village are 76.There are many Mango farms in the village.

4.3.9 Agricultural Details / Organic Farming / Fishery

About 70 % of the village land is agricultural land i.e. about 100.19 hect. So, the village have majority occupation as farming.

There are no farmers using organic farming and doing fishery.

4.3.10 Physical Infrastructure Facilities - Manufacturing HUB / Ware Houses

The village consists of descent infrastructure with Aganwadi, good roads with street lights, a greater number of pucca houses as compared to kuccha etc.

The village road is all weather road with solar street lights being provided. The village houses are electrified with more than 6 hours of electric supply.

The village houses have their own individual toilets. More of the houses are pakka houses. The village does not consist of some basic infrastructure like community hall, public toilets etc.

There is no small scale or large-scale industries in the village.

4.3.11 Tourism development available in the village for attracting the tourist

There is no tourism spot in the village.

4.4 Infrastructure Details (With Exiting Village Photograph)

4.4.1 Drinking Water / Water Management Facilities

The village has many small water and big water tanks, with big water tanks of capacities 5000 Ltr. The water is provided to the houses with the help of pumps. The water is available at the people on taps. This 5000 Ltr. Water Tank Located at the starting of the Village and also 5500 Ltr. Underground Water Tank near to over head water tank. Underground water tank is proper end closed by RCC and also condition of underground tank is good. Over head tank has leader for tark on it and also tank end closed by RCC. Over Head tank in good condition. Over head tank fill by water supply given by Valsad. There is ump and pipe

The water is treated and made available to the people of village. The water is used for domestic usage.

Fig. 4.18 Water Tanks of Chichwada Village

Below are the photographs of the water tanks of village:

Fig. 4.18 Water Tanks of Chichwada Village

Fig. 4.19 Small Water Tanks of Chichwada Village

Fig. 4.20 Water Taps of Chichwada Village

4.4.2 Drainage Network / Sanitation Facilities

Drainage Network:

The village does not have any drainage facility available in the village.

Sanitation Facilities:

The village has good cleanliness. The roads and village is cleaned by the locals only.
Apart from that the village does not have public toilets but, each house has their own toilets. The picture of the toilets are shown below:

Fig. 4.21 Toilet (Chichwada Village)

Fig. 4.22 Clean Roads (Chichwada Village)

4.4.3 Transportation & Road Network

The village has got good all road with street lights. The village approach road is about 8 km.

Road Network:

Village approach Road: 8 km

Main Road: 2 km

Internal Streets: 120 lights

Nearest NH: NH-9 (5 km)

Transportation Facility:

Nearest Railway Station: Atul (3 km)

Nearest Bus Station: Atul(3km)

Internally people can travel through their private vehicles or Auto AUTO.

Fig. 4.23 Internal Road (Chichwada Village)

4.4.4 Housing condition

The village houses are both pakka and kachaa. But most of the houses are pakka. Below are some photos as per our visits:

Fig. 4.24 Houses (Chichwada Village)

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

Heath Infrastructure:

There is one sub PHC health center infrastructure located in the village. Village does not consists of any private or government clinics or hospitals.

Education Infrastructure:

The village has 1 primary school and 1 Aganwadi. They are in bed conditions, with primary school's redesign is needed to be improved.

Fig. 4.26 Aganwadi (Chichwada Village)

Fig. 4.25 Primary School (Chichwada

CommunityHall:

The village dose not hve community hall. No separate community hall is being provided which, can be provided.

Library:

There is no library available in the village.

Temples:

The village has one small temples located within the village. The village Temple is known as LOAD GANESH TEMPLE

Fig. 4.27 Temple (Chichwada Village)

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

The public buildings like Aganwadi, water tanks etc. are all in good conditions.bus stop, primary school, panchayat office is needed to redesign.

But a new Community hall is needed to be build in the village as it is very small and attached with the post office. Also the toilets of primary school need a reconstruction.

4.4.7 Technology Mobile/ WIFI / Internet Usage Details

The technological usage of the village is kind of good. Almost all the families have at least one phone in their home and android too.

There is Wi-Fi facility not available at the chichwada but not yet to the people of village.

The internet usage of the of the village is average. The internet is usually used by the youth of the village and some adults.

4.4.8 Sports Activity as Gram Panchayat

There are many such sports events conducted by the village people, like cricket,vollyboll,etc.

Fig. 4.28 Cricket Ground (Chichwada Village)

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

There are no such public garden, park and playground in the village. Though there are ponds in the village but are not in very good condition. Village need public graded for village people.

Fig. 4.29 well of (Chichwada Village)

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

There are no so such facilities. But the street lights are solar powered.

4.4.11 Any other details

The village development can be one more effectively if there is a commercial development of the village. More of the land is forest.

4.5 Electrical Concept

4.5.1 Renewable energy source planning particularly for villages

There are solar street lights available in the village. There are no such renewable sources available in the village.

Fig. 4.30 solar street light (Chichwada

4.5.2 Irrigation Facilities

There are no such irrigation facilities in the village. The village do have two ponds

4.5.3 Electricity Facilities with Area

The area is equipped with good electrical network. The village receive more than 6 hours of electricity. The electric supply is also provided for the farming.

The supply is supplied with proper supply meters.

4.6 Existing Institution like - Village Administration – Detail Profile

Fig. 4.31 Electric Meter (Chichwada Village)

4.6.1 Bachat Mandali

There is no such bcahtmadali in the village.

4.6.2 Dudh Mandali

There is no DudhMandali

4.6.3 Mahila forum

There is no Mahila forum in village.

4.6.4 Plantation for the Air Pollution

The village has not done any activity regarding this.
But, there is enough vegetation in the village.

4.6.5 Rain Water Harvesting - Waste Water Recycling

There is no such type of planning in the village for Rain Water Harvesting.

4.6.6 Agricultural Development

The agricultural activities are good in this village. The major farming of this village is of mangoes. There are ponds available in the village for the irrigation. There is no irrigation system for the farming.

CHAPTER 5: Technical Options with Case Studies

5.1 Concept (Civil)

5.1.1 Advance Sustainable construction techniques / Practices and Quantity Surveying

The term 'advanced sustainable 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.

Various Advance techniques:

- Building information modeling (BIM).
- Construction Innovation Hub.
- Construction plant. Modern methods of construction.
- Site investigations and surveying.
- Substructure works.
- Water engineering.
- Smart technology.
- Robotics.
- GPS controlled equipment (3D design model)

5.1.2 Soil Liquefaction

Soil liquefaction, also called **earthquake liquefaction**, ground failure or loss of strength that causes otherwise solid soil to behave temporarily as a viscous liquid. The phenomenon occurs in water-saturated unconsolidated soils affected by seismic S waves (secondary waves), which cause ground vibrations during earthquakes. Although earthquake shock is the best known cause of liquefaction, certain construction practices, including blasting and soil compaction and 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.

Granular soils are made up of a mix of soil and pore spaces. When earthquake shock occurs in waterlogged soils, the water-filled pore spaces collapse, which decreases the overall volume of the soil. This process increases the water pressure between individual soil grains, and the grains can then move freely in the watery matrix. This substantially lowers the soil's resistance to shear stress and causes the mass of soil to take on the characteristics of a liquid. In its liquefied state, soil deforms easily, and heavy objects such as structures can be damaged from the sudden loss of support from below.

Buildings constructed on loose soil pitch and tilt easily when liquefaction occurs, since the soil no longer supports the structures' foundations. In contrast, structures anchored to bedrock or stiff soils in earthquake-prone areas suffer less damage, because less vibration is transmitted through the foundation to the structure above. In addition, buildings anchored to bedrock have a reduced risk of pitching and tilting.

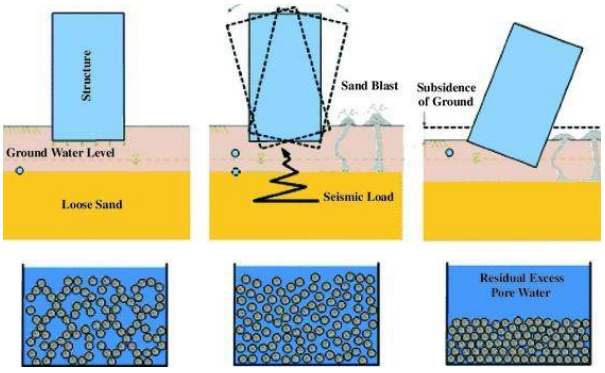


Fig. 5.1 Soil liquefaction

One of the most severe episodes of liquefaction in modern times occurred in China during the Tangshan earthquake of 1976. Some scientists estimate that an area of more than 2,400 sq km (about 925 sq miles) was subjected to severe liquefaction, which contributed to the extensive damage that took place in the southern part of the city. The liquefaction of the soft lake sediment upon which central Mexico City was built amplified the effects of the 1985 earthquake, the epicentre of which was located hundreds of miles away. In addition, the liquefaction of the ground beneath the Mission and Market districts in San Francisco during the 1906 earthquake caused several structures to pitch and collapse. These districts were built on poorly filled reclaimed wetlands and shallow-water areas.

Liquefaction may also contribute to sand blows, which are also known as sand boils or sand volcanoes. Sand blows often accompany the liquefaction of sandy or silty soil. With the collapse of the soil's granular structure, the density of the soil increases. This increased pressure squeezes the water out of the pore spaces between the soil grains and expels wet sand from the ground. Sand blows have been observed in the aftermath of several earthquakes, including the New Madrid earthquakes of 1811–12, the Tangshan earthquake of 1976, the San Francisco–Oakland earthquake of 1989, and the Christchurch earthquakes of 2010–11.

5.1.3 Sustainable Sanitation

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

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

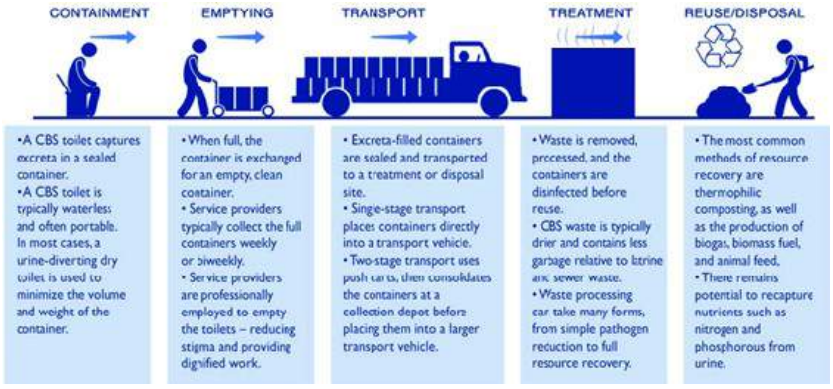


Fig. 5.2 Sanitation Valve Chain

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

it is crucial that sanitation systems are evaluated carefully with regard to all dimensions of sustainability.

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

5.1.4 Transport Infrastructure / system

Transport infrastructure consists of the fixed installations necessary for transport and includes roads, railways, airways, waterways, and terminals.

Roads

A road is a paved surface to facilitate the movement of people or goods with means, such as as automobiles, bicycles, buses, vans or trucks.

Rails.

Rails are the infrastructure for rail transport. A rail road which connects two locations is also called a rail line.

As for roads, rails on itself are not an interesting security target, but blocking a railroad will cause large problems with the rail transport.

Pedestrian / Bicycle paths:

Pedestrian paths or sidewalks, curbs, pavements, footpaths or platforms are paths alongside a road designated for pedestrians. Bicycle paths comprises of several different forms of cycling infrastructure, from non-segregated pathways aligned next to the road to segregated cycle facilities.

Fig. 5.3 Pedestrian / Bicycle paths

Segregated cycle facilities are a form of cycling infrastructure consisting of marked lanes, tracks, shoulders and paths designated for use by cyclists and from which motorised traffic is generally excluded. The term includes bike lanes, cycle tracks, separated bike lanes, road shoulders and side paths located within a road right-of-way

Urban waterways:

Inter and intra urban transport over waterways such as canals, rivers or other waterways forms a smaller although still important aspect of the urban transport system. For port cities such as Rotterdam, Antwerp or Hamburg the waterway system is of vital importance for their economic development.

Subway system:

A rapid transit, underground, subway, elevated railway, metro or metropolitan railway system is an electric passenger railway in an urban area with a high capacity and frequency, and grade separation from other traffic. Rapid transit systems are typically located either in underground tunnels or on elevated rails above street level.

Fig. 5.4 Subway system

Bridges and fly-overs:

A bridge is a structure built to span physical obstacles such as a body of water, valley, or road, for the purpose of providing passage over the obstacle. A flyover is a bridge, road, railway or similar structure that crosses over another road or railway forming a grade separation. Various different designs are possible depending on the length of the span and the conditions of the site.
Bridges and fly-overs form a vital and vulnerable element of a transport system since blocking can cause serious disruptions in the transportation system. Security risks are high since bridges and fly-overs are generally difficult to reach in case of emergencies.

Terminals:

A terminal is any location where freight and passengers either originates, terminates, or is handled in the transportation process. Terminals are central and intermediate locations in the movements of passengers and freight. They often require specific facilities and equipment to accommodate the traffic they handle.

Airports:

An airport is a location where aircraft such as fixed-wing aircraft, helicopters, and blimps take off and land. Aircraft may be stored or maintained at an airport. An airport consists of at least one surface such as a runway for a plane to take off and land, a helipad, or water for takeoffs and landings, and often includes buildings such as control towers, hangars and terminal buildings.

Train station

A train station, also called a railroad station (mainly in the United States) or railway station (mainly in the British Commonwealth) and often shortened to just station, is a railway facility where trains regularly stop to load or unload passengers or freight. It generally consists of a platform next to the track and a station building (depot) providing related services such as ticket sales and waiting rooms.

Fig. 5.5 Railway station

Bus terminal:

A bus terminus is a designated place where a bus or coach starts or ends its scheduled route.

Freight terminal:

A freight terminal is a processing node for freight. Most freight terminals are located at ports. They may include airports, seaports, railroad terminals, and trucking terminals. Freight is usually loaded onto and off the transport.

Sea port:

A sea port (or shortly port) is a location on a coast or shore containing one or more harbours where ships can dock and transfer people or cargo to or from land.

Traffic intersections:

At traffic intersections, a certain type of traffic infrastructure is intersecting. Mostly this concerns road intersections, though also rail and air intersections are possible.

5.1.5 Vertical Farming

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

Using Controlled Environment Agriculture (CEA) technology, this modern idea uses indoor farming techniques. The artificial control of temperature, light, humidity, and gases makes producing foods and medicine indoor possible. In many ways, vertical farming is similar to greenhouses where metal reflectors and artificial lighting augment natural sunlight. The primary goal of vertical farming is maximizing crops output in a limited space.

How Vertical Farming Works:

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

1. Physical layout
2. Lighting
3. Growing medium
4. Sustainability features.

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

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

Advantages and Disadvantages of Vertical Farming:

Vertical farming has a lot of promise and sounds like the farm of the future. However, there are a few stumbling blocks to consider before rushing full-speed ahead into vertical farming.

Fig. 5.6 Vertical Farming

Advantages:

- It offers a plan to handle future food demands
- It allows crops to grow year-round
- It uses significantly less water
- Weather doesn't affect the crops
- More organic crops can be grown
- There is less exposure to chemicals and disease

Disadvantages:

- It could be very costly to build and economic feasibility studies haven't yet been completed
- Pollination would be very difficult and costly
- It would involve higher labor costs
- It relies too much on technology and one day of power loss would be devastating

5.1.6 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

Fi s 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 ha been suggested as the protective solution for damaged structure due to corrosion.
Overall, there is very little published empirical evidence that provides insight into the durability of silane treatments and their long-term residual protection (i.e. following at least 10 years of service). Such a gap in knowledge is undesirable given the scale of infrastructure treated with hydrophobic treatments such as silanes.

5.1.7 Sewage treatment plant

A sewage treatment plant is a system that treats all the wastewater that is produced in any type of building. The wastewater includes black water or sewage, which comes from the use of toilets and bidets; and greywater, which comes from the use of kitchen sinks, washing machines, dishwashers, baths, and showers.

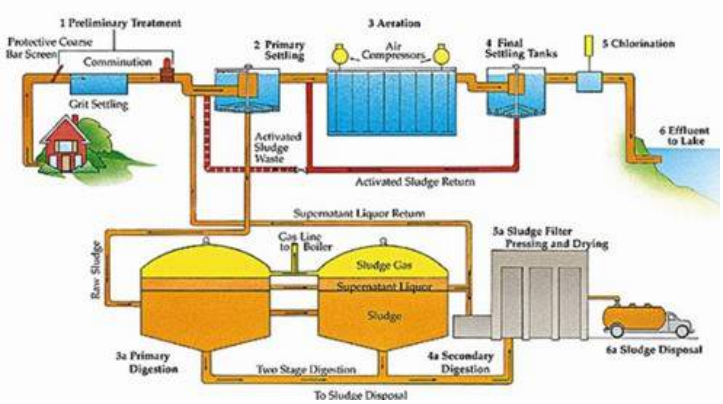


Fig. 5.8 Sewage Treatment plant

The treatment process is environmentally sustainable, as it uses bacteria that is naturally occurring in the wastewater. It does not use dangerous chemicals and additives that can harm humans and the environment. The treatment plant is designed to hold the polluted liquid waste in tank compartments, where all types of bacteria can grow or develop. Through this process we treat the wastewater naturally, which is not only safe for you and people and pets but its safe and kind to the environment.
ECO-SEPTIC can install a home sewage treatment plant efficiently, as our system has been engineered to make installation easy. It also makes servicing the treatment plant fast and easy. Before we start any install, we first assess the quality of your topsoil and take accurate measurements. Our attention to every detail makes any installation stress and hassle free.

How Do Home Sewage Treatment Plants Work?

Stage 1

The first stage starts in the primary chamber, this is where solids that are slow to treat, such as grit, oils, fats, personal hygiene items are retained. The heavier matters settle, while the lighter one's float to the surface. This compartment, basically, is a primary filter and there is no dissolved oxygen here.
When the liquid waste reaches the mid water level, it flows through the secondary chamber. Here, the pollutants are consumed by anaerobic bacteria (bacteria that do not need oxygen to live) to begin breaking the impurities down.

Stage 2

The second pre-treatment stage is the aeration chamber, where air is added to the liquid waste, using a fine bubble aerator located at the bottom of the section. As the bubbles rise, dissolved oxygen becomes present in the water, which is then accessed by the aerobic bacteria (bacteria that need oxygen to live).

This type of bacteria works faster than the anaerobic type and can multiply and increase their number very rapidly; some eating the pollutants and some eating other bacteria. The outcome is a total mass of organisms cleaning the water of its pollutants.

Stage 3

The third stage is the clarification step, with clearer water. The biomass settles to the bottom. The top-level water flows out, as it is pushed by the water from the home that enters the primary chamber. It then passes through an ultraviolet disinfectant tube.

The irrigation pump transfers the clarified water out into the environment, where it can be utilized to irrigate gardens and plantations, without threatening your health and your family's, your neighbours and everything around you.

5.1.8 Technical Case Study of "Case Study on a Structural Building Subjected to Earthquake Forces Considering Soil Structure Interaction"

INTRODUCTION

Swift release of stress in the form of waves during the deformation and brittle rupture of rocks due to the gigantic tectonic plates is known as an Earthquake. These seismic waves travel in all directions through the earth layer with large strain energy, reflecting and refracting at each interfaces. The severity of the ground shaking at a given location during an earthquake can be minor, moderate and strong. When seismic wave hits the structure, one or more foremost peaks of magnitude of motion are noticed which signify the impinging of ground shaking. But, the impact of the seismic waves depends upon the distance of the building commencing from the epicenter. In 2011, an earthquake of magnitude 6.9 with depth of 19.7 Km hit the North-East Himalayan state of India-Sikkim. This earthquake was also known as the 2011 Himalayan earthquake. 18th September, 2011 was the "Black Day" for the people of Sikkim and the neighboring countries like Nepal, Bhutan and Tibet. More than 112 people were killed in the earthquake while most of the deaths occurred in Sikkim. After a month of research and study, experts came to conclusion that the collapse of structures were caused mainly due to the irregularities in the structural Building. The main objective of this study is to analyze already constructed RC structure (vertically irregular) in order to know the seismic behavior of the structure when hit by an earthquake. The structure was modeled and analyzed by Response Spectrum analysis using E-tabs software. Parameters such as time period, displacement, base shear, stiffness were calculated and compared.

VERTICAL IRREGULARITIES

Vertical irregularities are the irregularities which are caused due to the sudden change in mass, stiffness and geometry which leads to discontinuity in load transfer. Vertical irregularities are one

of the major reasons behind the irregularities and failure of the structure during Earthquake forces. It is classified into various types, such as:

A. Vertical Irregularities in Load Path: One of the major causes of vertical irregularities is critical load path. The structure must possess continuous load path for the load transfer. If load transfer is asymmetrical the structure gets severely damaged and even collapse. Earthquake forces which are produced from the structural element of the building are delivered to vertical members by the help of a diaphragm. The diaphragm is a structural element that transfer loads to columns or shear walls of the structure, so the diaphragm must be of adequate stiffness. Irregular in load transfer leads to floating box type situation. Such cases, the columns do not get extended till the ground floor which leads to discontinuity in load transfer and structure may get severely damaged. The critical region for damage is the column and beam joints. Primary concern must be taken regarding discontinuity of columns and at the column beam joints.

B. Vertical Irregularities in Strength and Stiffness: Irregularities due to strength and stiffness are broadly classified into two types;

a. Weak storey. b. Soft storey.

Weak storey is defined as one whose lateral strength of the store considered is less than 80% of the stories above it. Lateral loads are generally the strength of all the lateral load resisting elements sharing sheer force of the storey based on the direction considered. Soft storey is defined as one whose lateral stiffness is less than 70% of the storey immediately above or less than 80% of the all above storey's. Extreme soft storey is one in which the lateral stiffness is less than 60 percentage of that in the storey above or less than 70 percentage of the average stiffness of the three storey's above.

C. Mass Irregularities: Mass irregularities in a structure exist when the effective mass of any storey is more than the 200% of the effective mass of adjacent storey. It can lead to increase in lateral inertial force, decrease in ductility of vertical members and collapse of the structure due to P-delta effect. Mass irregularities can lead to complex dynamics and irregular response of the structure. During earthquake the structure swings due to change in mass in upper and lower floors. Such case, the lateral load is shifted above the base which leads to large bending moment.

SOIL STRUCTURE INTERACTION

Soil Structure Interaction can be defined as the coupling of the structure and the soil during an Earthquake. It is one of the most flourishing areas of research for structural engineer. SSI is influenced by two types of loading .i.e. Dynamic loading and static loading. Basically, engineers neglect SSI while designing ordinary structure as they evaluate the structure under the assumption of fixed based dynamic response.

When the structure is hit by the seismic waves, these waves tend to generate vibrations or motion on the structure. In order to resist the motion, the structure needs to overcome its own inertia force which in result deals with SSI. There are two types of primary issues of soil structure interaction:

- Inertial Interaction.
- Kinematic Interaction.

When soil undergoes deformation and stress, they induce base shear and moments in the vibrating structure. Such cases lead to dynamic response of the structure by creating dynamic interacting system between soil and the structure. This type of interaction is known as Inertial Interaction. When seismic waves enter the soil, a discontinuity in medium of wave propagation is encountered at the interface of foundation and soil. This leads to reflection, scattering deflection, refraction of

seismic waves at soil foundation interface along with change in nature of ground motion. Slippage occurs across the soil foundation interface which is affected by wave propagation in elastic medium. This phenomenon due to the wave propagation consideration is known as Kinematic Interaction.

STRUCTURAL DETAILING

The structural building considered has been already constructed in Sikkim, India. It is vertically irregular in nature and comprises of B-3 and G+4. The total area comprises of 18.01m x 16.92 m. The soil condition of the structure is dense gravel soil with soil bearing capacity of 180 kN/m2. The grade of concrete used is M30 and grade of steel is Fe 500. The loads considered are: Dead load of 1 kN/m2, Live Loads of 3 kN/m2, 4 kN/m2 and 5 kN/m2 respectively. The frame Loads provided were of 11 kN/m as exterior wall load and 5.08 kN/m as partition wall load. The structure was modeled and response spectrum analysis was carried out using E-tabs software. The same structure was analyzed considering soil structure interaction for X and Y direction respectively. The material properties of a structure are shown in Table 1, frame properties of beam are shown in Table2, frame properties of slab are shown in Table 3 and frame properties of column are shown in Table 4. The frame loads are shown in Table 5 and the shell loads are shown in Table:

Table 5.1 Material properties of a structure considered.

SL.NO	MATERIAL PROPERTIES	VALUES	UNIT
1	Characteristic compressive strength of concrete	M 30	kN/m2
2	Characteristic strength of reinforcement	Fe 500	kN/m2

Table 5.2 Frame Properties of beam

SL. NO	PROPERTIES	DIMENSION	UNITS
1	Beam(B1)	500X400	mm
2	Beam(B2)	600x600	mm

Table 5.3 Frame Properties of slab

SL. NO	PROPERTIES	DIMENSION	UNITS
1	Slab(S1)	127	mm

Table 5.4 Frame Properties of column

SL. NO	PROPERTIES	DIMENSION	UNITS
1	Column (C1)	400X300	mm
2	Column (C2)	500X450	mm
3	Column (C3)	600X500	mm
4	Column (C4)	300X400	mm
5	Column (C5)	500X400`	mm

Table 5.5 Frame loads			
SL. NO	**FRAME LOAD**	**VALUES**	**UNITS**
1	Exterior wall load	11.65	kN/m
2	Partition wall load	5.08	kN/m

Table 5.6 Shell loads			
SL. NO	**SHELL LOAD**	**VALUES**	**UNITS**
1	Dead Load	1	kN/m2
2	Live load	3	kN/m2
3	Live load	4	kN/m2
4	Live load	5	kN/m2
5	Floor Finish	1	kN/m2

RESULTS

After analysis of the structure, seismic weight was obtained and base shear was calculated. The base shear calculated manually was compared to that obtained from E-Tabs. The seismic weight and base shear of the structure are shown in Table 7 and Table 8 respectively. The parameters considered such as Displacement and Story Shear was calculated and compared considering with and without soil structure interaction for both X and Y direction respectively.

Table 5.7 Seismic Weight			
SL. NO	**Seismic weight**	**VALUES**	**UNITS**
1	Dead Load	13834.1368	kN
2	Live Load	1506.8116	kN
3	Floor Load	1766.6434	kN
4	Wall Load	12797.0864	kN

Table 5.8 Base Shear			
SL NO	**BASE SHEAR**	**VALUES**	**UNITS**
1	X direction(VBX)	945.94	kN
2	Y direction(VBY)	952.404	kN

The comparison of storey displacement and storey shear are done and the comparative result are shown in figure

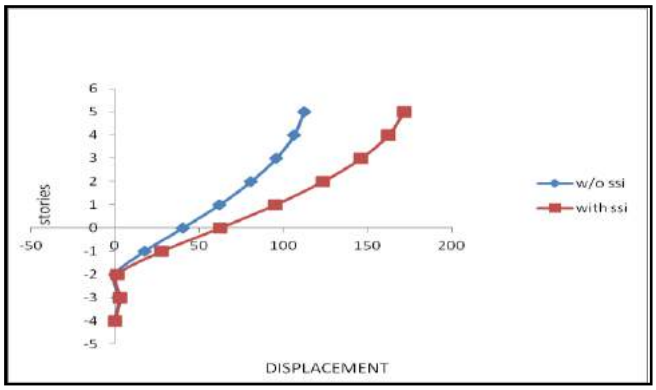


Fig. 5.9 Comparision of storey displacement of the strcture with and without soil structure interaction in X-direction

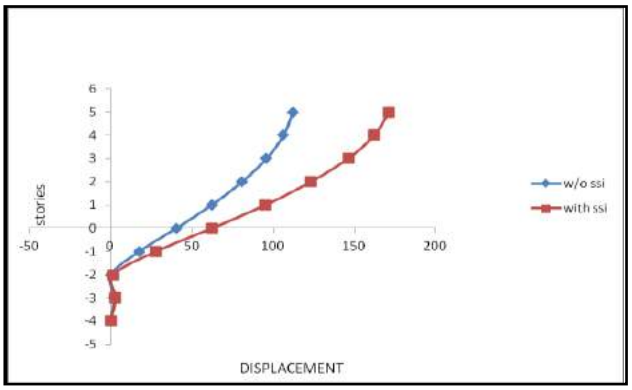


Fig. 5.10 Comparision of storey displacement of the strcture with and without soil structure interaction in Y-direction

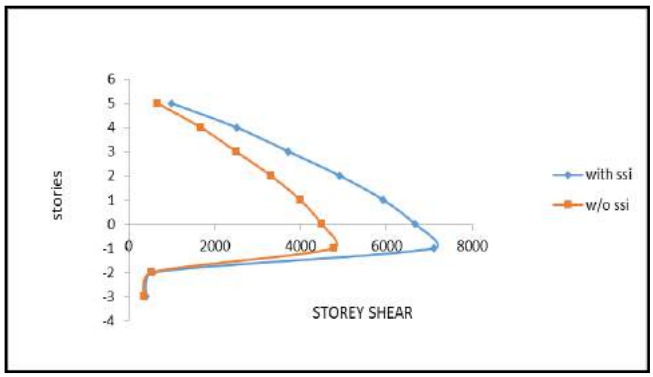


Fig. 5.11 Comparision of storey shear of the strcture with and without soil structure interaction in X-direction

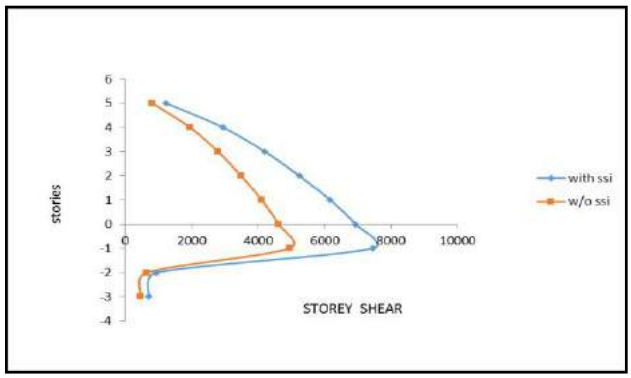


Fig. 5.12Comparision of storey shear of the strcture with and without soil structure interaction in Y-direction

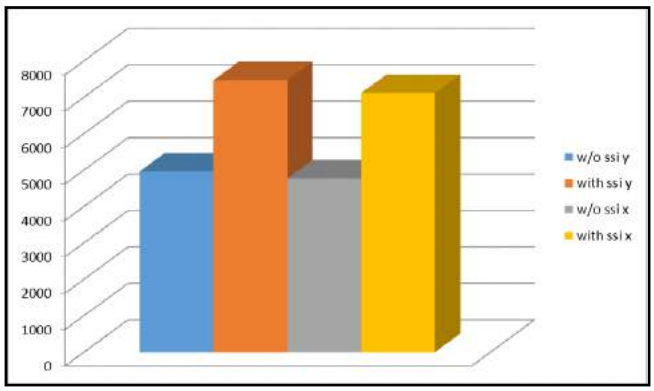


Fig. 5.13 Comparision of storey shear of the strcture with and without soil structure interaction for Basement-1 in X and Y direction

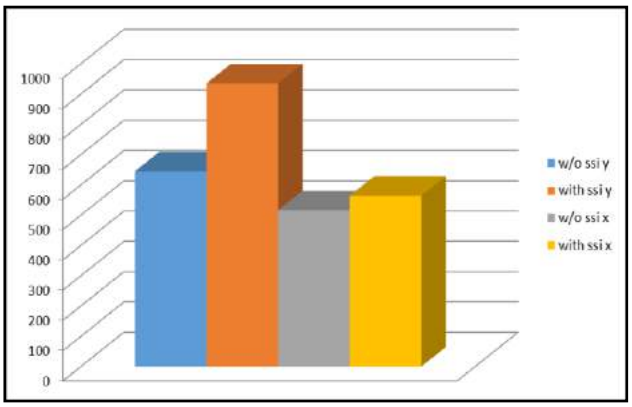


Fig. 5.14 Comparision of storey shear of the strcture with and without soil structure interaction for Basement-2 in X and Y Direction

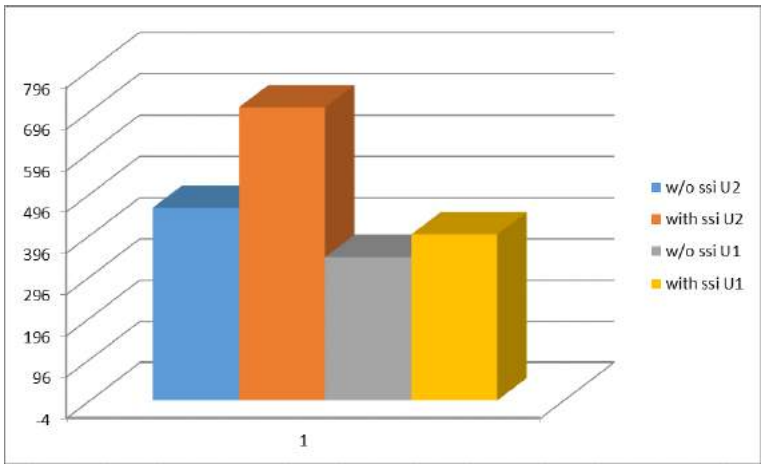


Fig. 5.15 Comparision of storey shear of the strcture with and without soil structure interaction for Basement-3 in X and Y Direction

CONCLUSION

From the above study, the parameters considered were compared and the following conclusion were drawn:

1. From figure 1; the structure undergoes 53.52 % more displacement when soil structure interaction is taken into consideration comparative to without soil structure interaction in x direction.
2. From figure 2; the structure undergoes 52.95 % more displacement when soil structure interaction is taken into consideration comparative to without soil structure interaction in y direction.
3. From figure 3; 49.14 % more story shear was observed when soil structure interaction was taken into consideration comparative to without soil structure interaction in x direction.
4. From figure 4; 71.32 % more story shear was observed when soil structure interaction was taken into consideration comparative to without soil structure interaction in y direction.
5. From figure 5, 8.65 % more story shear was observed in x direction than in y direction for basement 1.
6. From figure 6, 21.6 % more story shear was observed in x direction than in y direction for basement 2.
7. From figure 7, 0.835 % more story shear was observed in x direction than in y direction for basement 3.
8. Displacement below ground level was negligible due to presence of foundation at each of these levels.
9. As per above conclusion it is advisable to check model with the SSI for max deflection and min base shear.

5.2 Concept (Electrical)

5.2.1 Programmable Load Shedding

In today's world, there is a continuous need for automatic appliances with the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. The project is designed to operate an electrical load multiple number of times as per the program. It overcomes the difficulties of switching the load ON/OFF manually. This proposed has an inbuilt real time clock (RTC) to keep tracking the time and thus to switch ON/OFF the load accordingly.

Load shedding is what electric utilities do when there is a huge demand for electricity that exceeds the supply. Thus in a distribution system it needs to be precisely controlled for specific period of time. Programmable load shedding time management system is a reliable circuit that takes over the manual task of switch ON/OFF the electrical devices with respect to time. It uses real time clock (RTC) interfaced to a microcontroller of 8051 family. While the set time equals to the real time, then microcontroller gives command to the corresponding relay to turn ON the load and then another command to switch OFF as per the program. Multiple ON/OFF time entry is the biggest advantage with this project.

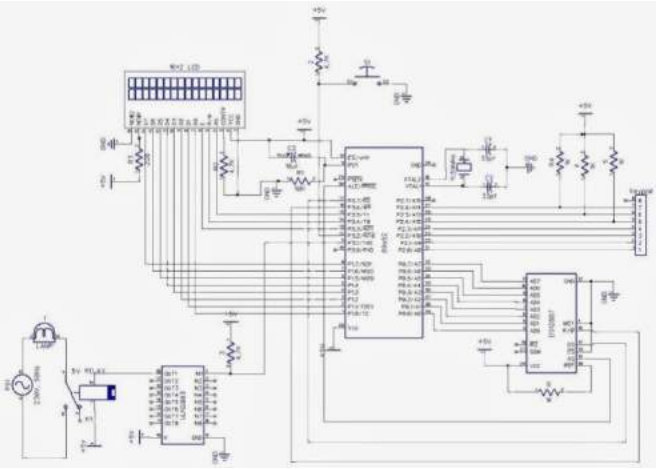


Fig. 5.16 Circuit Diagram

Software Implementation:

Algorithm:

STEP 1: Start.
STEP 2: Initialize RTC.
STEP 3: Initialize LCD.
STEP 4: Turn on relay.
STEP 5: Display time on LCD.
STEP 6: If pin P3.2=0 then go to step 7 else go to step8.
STEP 7: Read character 'n' from keypad.
STEP 8: If n=1 then go to step 10.
STEP 9: Update the current time and go to step13.
STEP 10: If n=2 then go to step11 else go to step12.
STEP 11: set the power off alarm time and power off interval, go to step13.
STEP 12: Display "try again" and go to step 13.
STEP 13: If current time matches the alarm time then go to step14 else go to step5
STEP 14: Turn off the relay.
STEP 15: Set the new value of alarm time as the power on time.
STEP 16: display the current time and power on time on LCD.
STEP 17: If current time matches the alarm time go to step 16.
STEP 18: Turn on relay and go to step5.
STEP 19: END.

Circuit Operation:

The programmable load shedding time management for utility department circuit consists of an 8592 microcontroller ic,16*2 LCD module,7805 voltage regulator ic,4*3 keypad,DS12887 RTC IC,relay,aCrystal oscillator.

The 7805 voltage regulator converts the input voltage to 5V and is given to the Vcc (pin :40) of the 8952 microcontroller. This voltage is necessary to enable the microcontroller .A DS12887 RTC interfaces with port0 of the microcontroller i.e. from pins 32 to 39.The rtc shows the real time at every instant. Once the RTC is programmed ,it will work continuously even though the power goes

off in between. The keypad is interfaced with port2 of the microcontroller i.e. from pins21 to28.The keypad is used to set the real time, the time for load shedding time and the time duration. The 16*2 LCD is interfaced to port1of the microcontroller i.e. from pins 1 to 8.The crystal oscillator helps to provide the working frequency 11.059MHz for the microcontroller.

The microcontroller programmed in such a way that we can set the actual time and load shedding time. Using the program we can monitor both real time and load shedding time. Program always check the equality and whenever it get matched output relay turn off. Then it began to check equality with target time and real time, whenever it get matched relay turns on.

There are many advantages for this circuit. Some of them are.

- Power can be Saved.
- Low cost .
- Easy to use .
- Accuracy in time
- Effective distribution of power
- We can set the time in advance

5.2.2 Railway Security System using IoT

On 26th February 2015, Shri Suresh Prabhu, Minister for Railways presented the Rail Budget in Lok Sabha, which was hailed by the Prime Minister for the technology-driven measures announced. The PM said, “I am particularly delighted that for the first time there is a concrete vision for technology upgradation & modernization of the Railways,” The Rail Budget 2015 proposed all-embracing use of Information Technology and eGovernance initiatives in Railway functioning, from SMS alert service for passengers, provision for Wi-Fi at Railway Stations, digitized mapping of rail land. Corporate India termed the budget, as ‘Technology-Enabled Traveler-Centric’.

Some of the technology initiatives that were announced:

- Open Wi-Fi would be made available at 400 railway stations across the country
- Digitized mapping of Rail land will be initiated to counter encroachment.
- An integrated customer portal is being put in place for customers to access various railway services at one place
- An ‘Operation five minutes’ will be introduced for issuing unreserved tickets. Under this facility, ticketless passengers can get regular tickets within five minutes of entering station. Unreserved ticket purchase is also expected to be made simpler through smart phones and debit cards
- SMS alert service would be introduced to inform passengers about train arrival and departure
- Mobile charging facility would be made available in all trains and stations. The facility will be extended to general coaches as well.

- Railway helpline number 138 will become operational 24×7. Toll free number 182 will be created for security related complaints.
- CCTVs to be introduced in select trains and suburban trains for women safety
- E-catering will be launched for select meals from an array of choices, ordering food through IRCTC websites at the time of booking tickets.

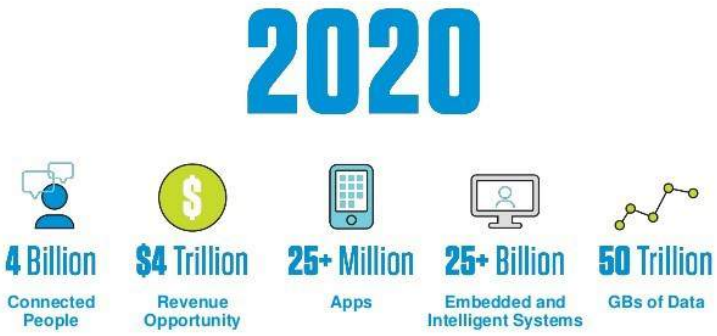


Fig. 5.17 2020 and the INTERNET OF THINGS

Indian Railways can have remarkable improvement in asset management using IoT for Rolling Stock like Coaches, Wagons and Locomotives. The optimal use of assets can be facilitated once their exact location is known in real time. Track maintenance can become better and manpower can be effectively utilized. The great pressure that railways is facing due to the whopping wage bill and its severe criticism by experts can be eased once the handheld devices can enable management to optimally deploy staff for maintenance works. The assets will have sensors depicting their health and with use of intelligent monitoring systems, they will reach the right location at the right time. IR today is dependent heavily on supply chain partners. Lot of time and effort is wasted in pursuing the supplies, gaining access to information of vendor. All this can be automated using IoT. The role of purchase department can be limited just to give the purchase order, the balance work can be handled by intelligent systems when the network has information on consignments, stock position etc. IoT is the future, and it has already arrived.

During July 2014, it was envisaged that the Indian Railways will opt for an enterprise resource planning (ERP) solution, which will integrate freight, passenger, human resources and administrative operations across the country. Features like real-time monitoring of trains, mobile-based wake up call for passengers and destination arrival alerts, and station navigation information system would be taken forward. Thus the potential for the IT industry to leverage existing strengths in cloud, mobility and **IoT (Internet of Things)** for the Railways. In the Proposed Investment Plan (2015-2019), Information Technology/Research has been assigned Rs 5,000 crore. There will be an integration of train control and asset management applications.

According to Gartner, by the 2020, there will be 26 billion devices connected to the internet. Gartner further estimates that IoT products and services will generate revenue exceeding $300 billion in 2020. IDC on the other hand has forecast that the worldwide market for IoT solutions will grow to $7.1 trillion in 2020. In a 2012 study by Beecham Research for Oracle, several verticals were identified that would benefit from machine to machine (M2M) device connectivity and create the IoT ecosystem. These were connected smartphones to cars to homes, commercial buildings, retail, industrial, IT facilities, etc.
A “thing” can join in IoT, only when it is tagged as ‘smart’. For becoming ‘smart”, common things or objects, a few action are needed;

- a unique identity is assigned to the object
- it has the ability to communicate or to transmit data wirelessly
- sensing devices must be inbuilt in the object
- it should have capacity to be remote controlled

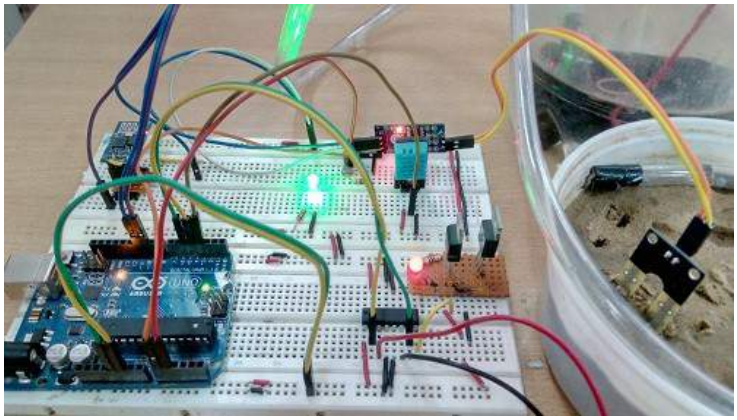


Fig. 5.18 NodeMCU Based Moisture Monitoring System

5.2.3 Management through Energy Harvesting Concept:

The objective of the **Power Management through Energy Harvesting Concept** has been designed and implemented in the power management through energy harvesting concept which deals with the power saving and optimization.

The overall control is based on sensors of light and temperature. After installing the components, the process becomes automatic.

Operation:

Energy harvesting devices converting ambient energy into electrical energy have attracted much interest in both the military and commercial sectors. Some systems convert motion, such as that of ocean waves, into electricity to be used by oceanographic monitoring sensors for autonomous operation. Future applications may include high power output devices (or arrays of such devices) deployed at remote locations to serve as reliable power stations for large systems. Another application is in wearable electronics, where energy harvesting devices can power or recharge cellphones, mobile computers, radio communication equipment, etc. All of these devices must be sufficiently robust to endure long-term exposure to hostile environments and have a broad range of dynamic sensitivity to exploit the entire spectrum of wave motions.

Accumulating energy:
Energy can also be harvested to power small autonomous sensors such as those developed using MEMS technology. These systems are often very small and require little power, but their applications are limited by the reliance on battery power. Scavenging energy from ambient vibrations, wind, heat or light could enable smart sensors to be functional indefinitely.

Typical power densities available from energy harvesting devices are highly dependent upon the specific application (affecting the generator's size) and the design itself of the harvesting generator. In general, for motion powered devices, typical values are a few $\mu W/cm^3$ for human body powered applications and hundreds of $\mu W/cm^3$ for generators powered from machinery.Most energy scavenging devices for wearable electronics generate very little power.

Storage of power:

In general, energy can be stored in a capacitor, super capacitor, or battery. Capacitors are used when the application needs to provide huge energy spikes. Batteries leak less energy and are therefore used when the device needs to provide a steady flow of energy. Compared to batteries, super capacitors have virtually unlimited charge-discharge cycles and can therefore operate forever enabling a maintenance-free operation in IoT and wireless sensor devices.

Use of the power:

Current interest in low power energy harvesting is for independent sensor networks. In these applications an energy harvesting scheme puts power stored into a capacitor then boosted/regulated to a second storage capacitor or battery for the use in the microprocessoror in the data transmission.The power is usually used in a sensor application and the data stored or is transmitted possibly through a wireless method.

5.2.4 Moisture Monitoring System

Planting a tree in an environment where the seed or the plant would not get water adequately through natural sources like rain or ground water in its initial phases has been always a matter of concern for tree planters. This is where an autonomous moisture monitor for plants system can help.

Fig. 5.19 IOT based home automation

The system timely monitors the moisture level of the soil. If at the time of monitoring it comes to know that the moisture level of the soil is lower than recommended then it will raise an audio visual alert. This alert is then received by the care taker of the plant. When the care taker waters the plant the alarm goes off and the monitoring cycle continues.
In this system we use a timer IC to time the monitoring process. A moisture level sensor is used to detect the moisture level of the soil. An LED is used to give visual alarm and a Buzzer is used to give audio alarm to the care taker of the plant. Thus, in this project with the help of a simple combinational circuit and a sensor we can help save a plant by maintaining the moisture level of the soil of the plant, thus keeping the plant healthy.

5.2.5 Home Automation using IoT / Any other methodology

Applications of home automation:

Rebuilding consumer expectations, home automation has been projected to target wide array applications for the new digital consumer. Some of the areas where consumers can expect to see home automation led IoT-enabled connectivity are:

- Lighting control
- HVAC
- Lawn/Gardening management
- Smart Home Appliances
- Improved Home safety and security
- Home air quality and water quality monitoring
- Natural Language-based voice assistants
- Better Infotainment delivery
- AI-driven digital experiences
- Smart Switches
- Smart Locks
- Smart Energy Meters

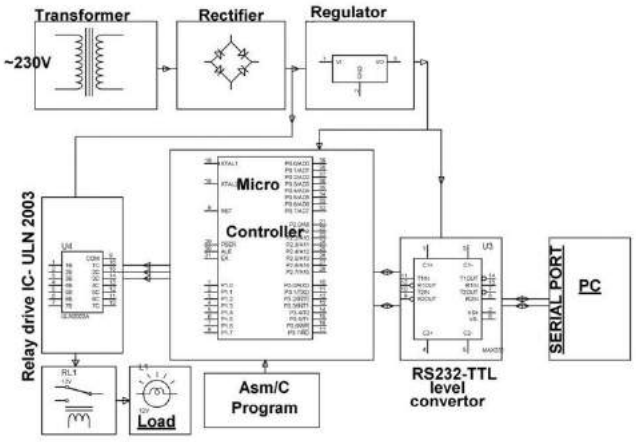


Fig. 5.20 PC Based electrical load control system block diagram

5.2.6 PC Based Electrical Load Control

Automation system is mostly depending upon the power systems in industrial, residential or commercial, which needs remote controlling and monitoring. By employing wireless technologies, it is more competent to execute a suitable technology depending upon the requirements of the proposed system like speed, cost, and distance.
For distant controlling and monitoring of different loads and by means of efficient power usage through real time power spending with the help of a PC based graphical user interface application. The progress of technology equipment is becoming simpler and easier for us. Automated systems have more benefits over manual system. PC based electrical load-controlled systems are highly reliable, precise and time conserving systems. They give number of features like rapid data storage, transfer data and data securities.

Concept:

The PC based electrical load control system can be built with 8051 series Microcontroller, Level Shifter IC, DB Connector, Relays, Relay Driver, Transformer, Diodes, Capacitors, Resistors, LED, Crystal, Lamps, Keil compiler and Language: Embedded C or Assembly.

Keil an ARM Company makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards, and emulators for ARM7/ARM9/Cortex-M3, XC16x/C16x/ST10, 251, and 8051 MCU families.

Compilers are programs used to convert a High-Level Language to object code. Desktop compilers produce an output object code for the underlying microprocessor, but not for other microprocessors. i.e the programs written in one of the HLL like 'C' will compile the code to run on the system for a particular processor like x86 (underlying microprocessor in the computer).

For example, compilers for Dos platform is different from the Compilers for Unix platform So if one wants to define a compiler then compiler is a program that translates source code into object code.

5.2.7 Electrical Parameters Measurements

Standard Electrical Units of Measure:

Electrical Parameter	Measuring Unit	Symbol	Description
Voltage	Volt	V or E	Unit of Electrical Potential $V = I \times R$
Current	Ampere	I or i	Unit of Electrical Current $I = V \div R$
Resistance	Ohm	R or Ω	Unit of DC Resistance $R = V \div I$
Conductance	Siemen	G or ʊ	Reciprocal of Resistance $G = 1 \div R$
Capacitance	Farad	C	Unit of Capacitance $C = Q \div V$
Charge	Coulomb	Q	Unit of Electrical Charge $Q = C \times V$
Inductance	Henry	L or H	Unit of Inductance $V_L = -L(di/dt)$
Power	Watts	W	Unit of Power $P = V \times I$ or $I^2 \times R$
Impedance	Ohm	Z	Unit of AC Resistance $Z^2 = R^2 + X^2$
Frequency	Hertz	Hz	Unit of Frequency $f = 1 \div T$

Table 5.9 Standard Electrical Units of Measure

Multiples and Sub-multiples

Prefix	Symbol	Multiplier	Power of Ten
Terra	T	1,000,000,000,000	10^{12}
Giga	G	1,000,000,000	10^{9}
Mega	M	1,000,000	10^{6}
kilo	k	1,000	10^{3}

none	none	1	10^0
centi	c	1/100	10^{-2}
milli	m	1/1,000	10^{-3}
micro	μ	1/1,000,000	10^{-6}
nano	n	1/1,000,000,000	10^{-9}
pico	p	1/1,000,000,000,000	10^{-12}

Table 5.10 Multiples and Sub-multiples

The "Standard" electrical units of measure shown above, other units are also used in electrical engineering to denote other values and quantities such as:

- Wh – **The Watt-Hour**, The amount of electrical energy consumed by a circuit over a period of time. Eg, a light bulb consumes one hundred watts of electrical power for one hour. It is commonly used in the form of: **Wh** (watt-hours), **kWh** (Kilowatt-hour) which is 1,000 watt-hours or **MWh** (Megawatt-hour) which is 1,000,000 watt-hours.
- dB – **The Decibel**, The decibel is a one tenth unit of the Bel (symbol B) and is used to represent gain either in voltage, current or power. It is a logarithmic unit expressed in **dB** and is commonly used to represent the ratio of input to output in amplifier, audio circuits or loudspeaker systems.

  For example, the dB ratio of an input voltage (V_{IN}) to an output voltage (V_{OUT}) is expressed as $20\log_{10}$ (Vout/Vin). The value in dB can be either positive (20dB) representing gain or negative (-20dB) representing loss with unity, ie input = output expressed as 0dB.

- θ – **Phase Angle**, The Phase Angle is the difference in degrees between the voltage waveform and the current waveform having the same periodic time. It is a time difference or time shift and depending upon the circuit element can have a "leading" or "lagging" value. The phase angle of a waveform is measured in degrees or radians.

- ω – **Angular Frequency**, Another unit which is mainly used in a.c. circuits to represent the Phasor Relationship between two or more waveforms is called Angular Frequency, symbol **ω**. This is a rotational unit of angular frequency $\mathbf{2\pi f}$ with units in *radians per second*, **rads/s**. The complete revolution of one cycle is 360 degrees or 2π, therefore, half a revolution is given as 180 degrees or π rad.

- τ – **Time Constant**, The Time Constant of an impedance circuit or linear first-order system is the time it takes for the output to reach 63.7% of its maximum or minimum output value when subjected to a Step Response input. It is a measure of reaction time.

5.2.8 Technical Case Study on "Battery Electric Vehicle Global Adoption Practices and Distribution Grid Impacts"

INTRODUCTION AND BACKGROUND

Electric vehicles (EV) represent a large market opportunity to address macro- and micro-level carbon emissions, electric grid integration, and technological advances. The term, EV, references to hybrid, plug-in, battery electric, and fuel cell vehicles. Studies forecast that by 2040, 25% of the global car fleet will be EVs, leading to city-level reduction in air pollution. In India, 80% of crude oil imports drive 30% of primary energy, and majority of this is used by the transportation sector. India's oil import bill is USD 120 billion with an anticipated increase to USD 230 billion by 2023. This transportation sector is expected to expand fueled by the economic development, oil-price declines, government policies to develop highway and road infrastructure, and make in India programs that promote local manufacturing. In 2015-16, India's market for internal combustion engine (ICE) vehicles was 20.5 million. This ICE vehicle market comprised of passenger, commercial, two-, and three-wheelers. The two-wheelers and passenger vehicles formed majority of sales with 80% and 14% market share, respectively. The carbon emissions by the ICE transportation sector and oil imports pose challenges for India's sustainable and affordable growth, similar to the challenges posed by carbon emissions from electricity generation and consumption sectors. This study focus is on battery-based EVs (BEVs) that understanding of global deployment practices, the policy push to encourage early adoption (e.g., incentives), and an understanding of BEV impacts on the electric grid— primarily the distribution system with last-mile connectivity to the consumers. This integrated planning of macro national- and state-level programs, and micro regional- and city-level electricity distribution systems' readiness and market structures are essential for large-scale and accelerated deployments of BEVs in India. Albeit not the focus of this study, the integrated planning can also enable the use of BEVs for grid services and integrate renewable generation. The goal of the study is to accelerate and scale the adoption of BEVs in India and assist the Indian national and state regulators meet their electric mobility goals. The goal is achieved through an integrated contextual overview of global BEV deployment practices and analyses of BEV impacts on the distribution grid. The main objectives of the study are:

1. Review global adoption practices for large-scale deployments of BEVs.
2. Analyze the Indian scenarios for EV initiatives and unique deployment needs.
3. Conduct preliminary distribution system analysis and case study for a distribution utility in Delhi.
4. Assess distribution system impacts from the adoption of BEVs in Delhi.
5. Propose recommendations to accelerate and scale BEV adoption.

Background

To decarbonize the transportation sector, in 2012, the Government of India's (GOI) Ministry of Heavy Industries (MoHI) launched National Electric Mobility Mission Plan (NEMM) to deploy 6 to 7 million hybrid and EVs (includes 2- and 4-wheelers) by 2020. In support, the GOI has allotted INR 1,000 crores or USD 150 million for faster adoption and manufacturing of (hybrid and) electric vehicles scheme (FAME) for the financial years, April 2015-16 and 2016-17. The budget for the FAME scheme is allocated for the following components: demand incentives, technology platform, pilot projects, charging infrastructure, and program operations. Of the 2016-17 budget of INR 5,350 million or USD 80.25 million, the percentage share of various

components is, 51%, 18%, 7.5%, 3%, and 0.75%, respectively. The large share for demand incentive lowers the retail price of the vehicle. The demand incentive varies based on the vehicle emission levels across the following segments: two- and three-wheelers, passenger cars, light-commercial vehicles, and buses. The classifications of emissions levels across the vehicle segments are: mild-hybrid, strong-hybrid, based on the technical criteria prescribed in the FAME guidelines and certified by the GOI designated testing centers. In its first year, 2015-16, the FAME has made a minor dent in EV adoption with 1.3% of total hybrid and battery electric passenger vehicle sales. The phase 2 of the FAME scheme for 2016-17 more than doubles the incentives to likely influence higher sales.

India's NEMM and FAME programs and lower tax rates offered by select state-level programs are intended to encourage adoption of EVs. It should be noted that the FAME demand incentives form one component of the incentives, whereas the state- and central-level incentives further reduce the capital expenditure costs of hybrid and EVs to parity or slightly above their equivalent ICEvehicle base case. While hybrid and EV adoption rates in India have a long road ahead to meet the NEMM goals, the global adoption practices show that the readiness of the refueling infrastructure and other supporting ecosystem programs are key to influence consumer's decision to own EVs. For BEVs, the deployment of charging infrastructure is determined by the extant electricity supply and the state of the grid.

The impact of BEVs on the electric grid can be minimal to significant, depending on the state of the grid, electricity supply, levels and distribution of charging infrastructure within the smart grid domains— transmission, distribution, and customer (or behind-themeter)—and market share of BEVs. In India, there is no large-scale public demonstration to integrate EVs and grid. Vehicle grid integration (VGI) services include smart or managed charging and two-way power flow scenario, vehicle-to-grid (V2G). However, there are large-scale demonstrations for automated demand response (AutoDR) in India. One such demonstration is conducted by Delhi's distribution utility, Tata Power Delhi Distribution Limited (TPDDL), to automate DR for over 145 commercial and industrial customers. Studies have shown success and: (1) identified and characterized each consumer sector's load duration curve and aggregated power demand [8]; (2) characterized AutoDR system, including advanced metering infrastructure, data analytics, smart meters, and standards and (3) estimated the potential of DR for customers in the state of Delhi [10]. The regulatory, technologies, and utility-customer engagement findings can accelerate VGI and mitigate system upgrades.

Global adoption practices, and the BEV impacts on the grid provide an impetus to accelerate and scale India's EV adoption. The paper is organized, as follows:

• Section II reviews global practices for EV adoption.

• Section III summarizes state-level EV programs in India and conducts analysis of BEVs on the distribution system for the state of Delhi.

• Section IV lists conclusions and recommendations.

GLOBAL PRACTICES DRIVING ADOPTION

Several countries have set targets for BEV adoption. While some countries are proceeding aggressively by favorable environment for policies and incentives, others are at a nascent stage. The United States (U.S.) represents one of the largest BEV markets in the world have aggressive plans to deploy EVs with tangible incentives at both state- and federal-level, public investment and loan programs for the deployment of charging infrastructure, and aggressive R&D investment in the key areas of grid modernization, vehicle-grid integration, and power systems

interoperability. For example, In the U.S., California's Zero Emission Vehicle (ZEV) mandate requires 1.5 million BEVs by 2025 with over USD 1.1 billion public investments in the charging infrastructure with the bulk system operators and distribution utilities playing a key role in accelerating their adoption. Beginning 2015, California's building codes also require requires all new residential and non-residential buildings to install electricity infrastructure for EV charging stations. The building codes and enforcement will lead to pervasive EV charging stations and enable consumers to buy electric cars. Overall in 2016, 609,629 Alternate Fuel Vehicle (AFVs) or non-ICE vehicles were registered in the European Union, up 4.1% compared to 2015. The hybrid electric vehicles (+27.3%) followed by the electrically chargeable vehicle (ECV) segment, which saw more modest growth (+4.8%), drove the increase. Among the big five markets, Spain (+49.4%), Germany (+21.9%) and the United Kingdom (+14.9%) recorded substantial increases in non-ICE vehicle registrations. Growth in these countries was fully driven by demand for electric and hybrid electric vehicles. Similar to California, France plans for aggressive EV deployment through new building codes requiring new apartment and commercial buildings to be ready for charging infrastructure. At a macro-level, to promote the EVs, Europe is planning initiatives to accelerate the deployment of EV charging infrastructure. In 2016, China sold 351,000 Plug-in passenger cars, which makes it by far the largest market for plug-ins (termed, as New Energy Vehicles or NEVs in China). The increase of NEVs 2016, over 2015, was staggering 85%. The following sections summarize global best practices for market share, incentives, standardization, ownership and operational models for VGI programs to manage grid impacts from BEV demand growth

Summary of Global Best Practices

TABLE 5.11GLOBAL BEV SALES IN 2016

Country	Sales in 2016
United States	84,850
Canada	4,160
Netherlands	4,147
Germany	11,410
Portugal	756
United Kingdom	10,264
Denmark	1,373
Sweden	2,945
Spain	2,005
Norway	24,222
France	21,751
Austria	3,826
India	~1,000
China	2,66,000

The global BEV adoption rates are primarily driven by strong state- and/or country-level policies, which are targeted at the higher market share of 4-wheelers. Table provides the 2016 2 and 4-wheeler BEV sales for the American, European, and Asian countries. 2 The global electric car adoption crossed the million-mark barrier to 1.26 million in 2015. India has the least per-capita BEV adoption among the countries studied.

While the availability of and access to the charging infrastructure is a determinant in nudging the consumer adoption of BEVs, initial interviews with market makers in India have revealed that the capital expenditure costs of BEVs represent a key decision influencer for consumer adoption. Albeit the BEV costs globally are falling precipitously, it still remains a key decision factor for consumers. Most policies incentivize the early adopters to for BEV purchase. Table 2 summarizes the incentives available for BEVs and their charging infrastructure.

To increase BEV adoption, innovative operational and ownership models and electricity rate tariffs are proposed to ensure consumer and grid preparedness. Table 4 summarizes ownership models and installations for charging infrastructure, and electricity rate tariffs, as proposed by the major distribution system utilities in the state of California in the U.S.3 The combined budget and total charging stations are USD 227 million, and 12,500 level 1 and level 2, and 100 DCFCs, respectively.

TABLE 5.12 BEV CHARGING INFRASTRUCTURE AND OWNERSHIP MODELS IN THE UNITED STATES (CALIFORNIA)

Ownership Models	Description	Installations	Electricity Rate Tariffs
Customer	Most widely used business model for level 1 with any available 108-120 V outlets and, partially, for level 2 charging.	Residential, Building, and Campus Owners	Comprises of three types: 1. Dynamic day-ahead VGI rate to driver or host. 2. TOU rates to driver or host. 3. TOU rates to host.
Third-Party	Increasingly popular business model for level 2 and DCFCs, where a charging station OEM, or a city/county deploys charging infrastructure.	Public Spaces, Highway Corridors	
Electric Utility	Evolving business model to deploy level 2 and DCFCs in to support aggressive national- and state level BEV adoption and zero-emission vehicle mandates.	Public spaces, highway corridors, and disadvantaged communities	

Studies show VGI opportunities, challenges, and multi-level benefits. VGI is increasingly accepted through pilot projects and has shown positive grid impacts. The BEV battery is used for voltage and frequency regulation to balance supply and demand. With the increase in penetration of wind and solar energy intothe Indian grid, voltage and frequency stability will soon be a major concern. During unpredictable peak demands, VGI can be a resource, similar to the TPDDL DR project for commercial and industrial customers (described earlier). EV batteries can also provide emergency backup services during power outages and become a resource for electricity reliability. Consolidated Edison's project in the U.S. opts for demand-side resources—batteries and thermostats—to defer USD 1 billion substation and infrastructure upgrades in congested urban centers at 50% lower cost.

ELECTRIC VEHICLE ADOPTON IN INDIA: DISTRIBUTION SYSTEM IMPACTS IN DELHI

India represents one of the fast growing automobile market in world with vehicle sales increase from 18.5 million per year in 2013-14 to 20.5 million per year in 2015-16. Though EVs are not new in India, the country, however, continues to struggle with the consumer acceptance primarily driven by cost consciousness, lack of charging infrastructure, and EV availability, as key factors. The size of the domestic market for electric vehicles, primarily two-wheelers, has seen a drop of 79% over the past two years.4 With recent advancements in electric mobility technologies, lower costs through advanced manufacturing (e.g., leveraging the FAME scheme) and batteries, and ambitious GOI policies and incentives, the consumers and automobile industries seem to be ready to embrace electric mobility. In support the push from the GOI, various private players, non-profits, and state governments have launched pilot projects around the country in previously unexplored areas such as, grid impacts, systems interoperability, and electrification of public transportation.

To assess the distribution system grid impacts, the study conducted a preliminary case study for the state of Delhi; mainly stemming from the access to data, national capital territory (NCT) of Delhi tax incentive offerings, and the Delhi Pollution Control Committee's "air ambience fund," which is a special tax, collected from sale of diesel fuel. The proceeds of this fund are used for cash subsidies to encourage the adoption of hybrid and EVs. Moreover, the value-added tax on EVs in Delhi is 5%, which is lower than those for the ICE vehicles (12.5%).The GOI levies an excise duty of up to 30% on conventional car technologies, while hybrid and electric vehicles are subjected to flat duties of 12.5% and 6%, respectively. For electric grid management, as stated earlier, the Delhi's distribution utilities have already demonstrated commercial and industrial building AutoDR programs. The study leverages the state of Delhi's actions to understand BEV impacts on the distribution system.

A. Electric Vehicle Impacts on the Distribution System

Although India's EV adoption policies look promising, understanding of the impact of BEVs on the distribution grid is under-represented. Though BEVs may have a manageable impact on the power grid as a whole, which has a total generation capacity of 300 GW, the local impacts can be significant. At the distribution system level, simultaneous charging of many BEVs under a distribution transformer (DT) circuit can overload if the DT does not have the capacity for aggregated charging. The high-density energy storage charging of BEVs require low- to high level of electricity, which can impact the DT and the subsequent distribution system that DT is connected to. Fleet of BEVs across DTs when charged simultaneously, can demand significant proportion of the daily load from the distribution grid. Some of the challenges the grid can be subjected to are:

1. Excess Distribution System Demand: Fleets of BEV charging during peak hours in a targeted area may cause overloading and failures within the distribution system equipment or lead to excessive power demand, and require expensive upgrades. These factors can cause grid failure, transformer overloading, and even power outages.

2. Increase in System Peaks: Simultaneous BEV charging leads to system load peaks (demand) causing supply challenges and power outages, while worsening the conditions for existing system peaks. A stable load curve is one that can match the electricity supply and demand and considers distribution system capacity and the infrastructure.

3. Demand Forecasting Errors from Unmanaged Charging: The randomness of a BEV charging load profile creates daily load forecasting problems. Accurate forecasts lead to substantial savings in grid operating and maintenance costs, increased reliability of power supply and delivery system, and support correct decisions for upgrades. Since, BEVs are a mobile load within the electric grid system, it is difficult to forecast when (temporal) and where (spatial) the demand is required. The DT capacity is a major barrier for EV charging at the distribution system domain, which struts at the last mile connectivity to the consumers. Considering a typical loading capacity at 80% of the peak load, Table 5 estimates the number of level 2 EV chargers that can be connected to a DT. The more pervasive the overloading of DTs, the more will be the system-wide impacts and the need for expensive upgrades to the distribution system.

TABLE 5.13 DISTRIBUTION TRANSFORMER AND CHARGING LOAD

Transformer (kVA Class)	3.3 kW (AC Level 2)	6.6 kW (AC Level 2)	19.2 kW (AC Level 2)
50	3	1	0
75	4	2	0
100	6	2	1
350	21	10	3
650	38	19	6
1250	75	37	12

Studies show that BEV owners charge their vehicles upon reaching home at the end of a working day or, in countries such, as the U.S., at workplaces for daytime charging within the building or campus network. The study also estimates that in the U.S., VGI services save USD 4,000 over an 8-year ownership life of an EV or USD 500/year from market payments and lower electricity bills. Unmanaged BEV charging can coincide with both afternoon and evening peak time demand to aggravate the peak demand problem. Distribution utilities are subjected to the challenges of multiple customers charging on the same transformer with limited capacity. To further understand the distribution system impact, sensitivity analysis was conducted for the state of Delhi.

Charging Initiatives by the Distribution Utilities

Some distribution utilities have initiated early-stage EV charging networks, which were triggered by the early years of MNREs subsidy to utilities to promote EVs through corporate and social responsibility programs. The state of Delhi has six distribution unities—BSES Rajdhani Power Limited, BSES Yamuna Power Limited, Delhi Transco Limited, Indraprastha Power Generation Company Limited, Delhi Power Company Limited, and TPDDL. The following are the charging station ownership and operation practices by TPDDL and BSES-Delhi. TPDDL has installed “EV Charging Centers” at five locations across its territory for Mahindra Reva BEV owners where an aggregated 200 cars are charged. These charging centers are located in areas with enough power capacity and within the 66 kV and 33 kV high- and medium-voltage network, respectively. TPDDL has also installed free public charging stations for 2-wheelers for the first time in Delhi with anticipated support to 10,000 vehicles. Two BSES Delhi affiliates—BSES Rajdhani Power Limited (BRPL) and BSES Yamuna Power Limited (BYPL)—have installed charging infrastructure to encourage the use of BEVs. While BRPL has installed two BEV charging stations at BRPL’s office in RK Puram and Lodhi Colony residential neighborhood, BYPL has a network of 50 EV charging station ports within the 66 kV, 33 kV, and 11 kV, high-, medium-, and low-voltage network, respectively. While both TPDDL and BSES initiatives are welcome, the large-scale growth in EVs necessitates charging infrastructure and in the low voltage network—between

100 V to 1000 V—and regions closer to customers (e.g., traffic corridors, public spaces, petrol pumps, neighborhoods, workplaces, residences).

Peak Electric Demand Estimation: City of Delhi

The 18th electrical power survey conducted in 2013 by India's Central Electricity Authority was used, as an estimate of Delhi's peak power demand by 2021-22. This data was used to estimate hourly load curves. The following methodology was used to estimate hourly load. These estimates assume that the characteristics of distribution system, system capacities, and demand from year 2014 will scale linearly to the year 2021-22.

In July 2014,

- Delhi system peak demand in 2014: 5,925 MW
- Delhi power demand at 3 AM in 2014: 4,513 MW
- Nighttime peak load factor = 76 %

  Thus, estimates for July 2022,
- Delhi system peak demand in 2022: 9,024 MW7
- 2014 baseline peak load factor at 3 AM: 76 %
- Delhi power demand at 3 AM in 2022 = 6,874 MW

Estimation for Number of Vehicles

The number of vehicles in Delhi in 2014, which was obtained from the transportation department, was used to estimate the total number of vehicles in 2022. Using the previous vehicular adoption data, the number of vehicles in 2022 was estimated by Compounded Annual Growth Rate (CAGR). The assumed adoption for each vehicle class is applied for new registrations after 2014, as Delhi has no significant adoption of BEVs and noticeable grid impacts. Table 6 summarizes the results.

TABLE 5.14 VEHICLE GROWTH ESTIMATES (2022): DELHI

	Total vehicles (2014)	Estimated vehicles in 2022	Estimate of EV % in 2022	Estimate of EVs in 2022	Estimate of EVs in 2022
Private 4-W	4,899,733	2,022,186	1%	20,222	240,033
Taxis	236,307	159,567	10%	15,957	
Buses	32,048	11,124	10%	1,112	
Other Public Transport	50,327	26,896	50%	20,226	
Freight Vehicles	246,157	85,761	25%	21,440	
2-W	8,845,660	3,115,868	5%	155,793	
3-W	90,938	10,565	50%	5,283	

Electric Load from Battery Electric Vehicles

For the analysis of resulting electric demand growth, we assume that BEVs would not be charged simultaneously and 10% of BEVs, which will always be connected to the distribution grid and charging. Additionally, different categories of vehicles like 3- wheelers, private 4-wheelers; taxis; buses and business goods carriers are considered and their required charging level are

assumed. Thus, the hourly load profile according to different charging profiles and BEV types (commercial or private) are stated. Additional key assumptions are:

- While calculating the load of BEV on grid, only a certain percentage of vehicles and types are connected to the grid simultaneously.
- It is also assumed that in 2022, hourly load data will be proportionally scaled from 2014.
- We assume that out of 40% simultaneous charging for 2- and 4-wheelers, 10% of the and 4-wheelers will be charged outside the residential network.
- To the total number of 3W estimated by the India Smart Grid Forum (ISGF) based on CAGR in 2022, we have additionally added 5Lakh electric rickshaw as per our previous estimations.
- Each BEV category uses different charging levels:
  - Cars: 6.6 kW charger
  - Bus: 60 kW charger
  - 3-wheeler: 480 W charger
  - 2-wheeler: 450 W chargers

Figures summarize the estimated electricity load profile in 2022, as per CAGR, and estimated demand from BEVs at 10% simultaneous charging, and peak summer demand for Delhi.

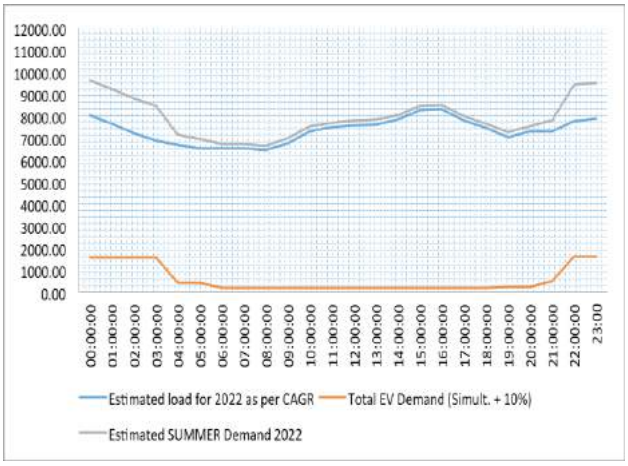


Fig. 5.21 Estimated Delhi's summer demand load curves for 2022

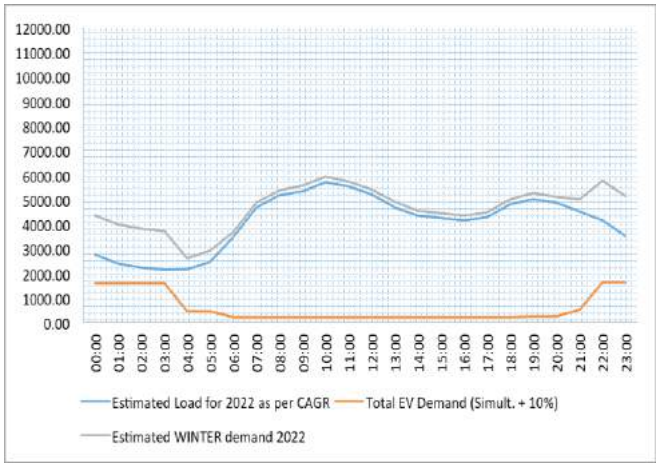


Fig. 5.22 Estimated Delhi's winter demand load curves for 2022

The summer and winter load analysis results show that while afternoon peak marginally increases, the system wide peak impacts during the evening and night are more pronounced. This is primarily due to assumptions that majority of the BEV consumers will charge during nonworking hours. Obviously, these estimates need to be assessed based on India's plans to support aggressive workplace charging.

CONCLUSIONS AND RECOMMENDED NEXT STEPS

The study reviewed macro- and micro-level initiatives in India to scale and accelerate EV adoption to meet the NEMM 2020 and FAME goals. A review of global practices for EV adoption was conducted for BEVs. The study performed a limited and preliminary review of the BEVs' impact on Delhi's distribution system by analyzing load profiles and estimating the growth. To accelerate

BEV adoption, consumer engagement, and integrated grid, the following are key conclusions. Accordingly, the recommendations are listed under adoption practices, consumer incentives, and power systems planning.

- To accelerate BEV adoption, Indian policy makers and regulations must consider global practices, while considering local requirements such as cost, electricity network, and consumer charging behavior. India must develop specific EV needs for the Indian conditions and work with global and local original equipment manufacturers (OEM) and experts to meet the NEMM 2020 plan and FAME goals. For example, the lion share for FAME scheme's demand incentive component lacks adequate focus on charging infrastructure and research needs to understand and future-proof unique vehicle and electricity distribution needs in India—all relative to global practices.
- To engage cost-sensitive consumers, Indian national and state-level regulations must consider total cost of ownership costs through mechanisms such as tax credits, lower production costs for OEMs, reduced sales taxes, etc., which can be funded from oil subsidy and import savings, CO2 reduction, and innovative financing mechanisms. BEVs also provide other no tangible societal benefits such, as urban air-quality improvements and better quality of health.
- Regulators, system operators, and utilities must consider localized and integrated power system impacts of BEVs. The VGI has the potential to mitigate or defer system upgrade costs, which can also support higher penetration of renewable. With managed charging technologies, BEVs can be charged without any restrictions and electricity rate tariffs can be designed to offer incentives to modulate consumer charging behavior, and building codes that mandate residential and workplace charging infrastructure.

CHAPTER 6: Swachh Bharat Abhiyan (Clean India) :

Swachh Bharat Mission (SBM), Swachh Bharat Abhiyan (SBA), or Clean India Mission:

"A clean India would be the best tribute India could pay to Mahatma Gandhi on his 150 birth anniversary in 2019," said Shri Narendra Modi as he launched the Swachh Bharat Mission at Rajpath in New Delhi. On 2nd October 2014, Swachh Bharat Mission was launched throughout length and breadth of the country as a national movement. The campaign aims to achieve the vision of a 'Clean India' by 2nd October 2019.
The Swachh Bharat Abhiyan is the most significant cleanliness campaign by the Government of India. Shri Narendra Modi led a cleanliness pledge at India Gate, which about thirty lakh government employees across the country joined. He also flagged off a walkathon at Rajpath and surprised people by joining in not just for a token few steps, but marching with the participants for a long way.

Fig. 6.1 Swachh Bharat Abhiyn

While leading the mass movement for cleanliness, the Prime Minister exhorted people to fulfil Mahatma Gandhi's dream of a clean and hygienic India. Shri Narendra Modi himself initiated the cleanliness drive at Mandir Marg Police Station. Picking up the broom to clean the dirt, making Swachh Bharat Abhiyan a mass movement across the nation, the Prime Minister said people should neither litter, nor let others litter. He gave the mantra of 'Na gandagi karenge, Na karne denge.' Shri Narendra Modi also invited nine people to join the cleanliness drive and requested each of them to draw nine more into the initiative.

Swachh Bharat Abhiyan has become a 'Jan Andolan' receiving tremendous support from the people. Citizens too have turned out in large numbers and pledged for a neat and cleaner India. Taking the broom to sweep the streets, cleaning up the garbage, focussing on sanitation and maintaining a hygienic environment have become a practice after the launch of the Swachh Bharat Abhiyan. People have started to take part and are helping spread the message of 'Cleanliness is next to Godliness.'

6.1 Swachhta needed in chichwada village -Existing Situation with photograph:

We have done one survey on existing condition of village regarding swachhta. The people are maintaining cleanliness of the village but in some streets there is no swachhata because there are animal and their waste , mud, etc. The village pond has to need a proper maintenance. Other than these there are clean streets, main road and approach road.

Fig. 6.2 Swachata photograph of Chichwada

6.2 Guidelines - Implementation in chichwada village with Photograph:

According to Talati, Sarpansh and villagers, the people are cleaning their nearby area regularly and collect that waste and dispose it to out of the village and burn it. No daily basis waste collection is there in the Kamrol village.

Fig. 6.3 After Guideline photo

6.3 Activities Done by Students for chichwada village with Photograph:

Firstly we took a permission from village Talati and Sarpanch for doing one Swachhta awareness camp and then we have done one activity of swachhta awareness in the village and we have done an interaction with villagers and aware them about the importance of swachhta in our life and told them to keep the village and infrastructure clean and safe. We have also done a cleaning of village street. We have suggested them for not dumping the waste in village streets and dispose it at right place.

a. To avoid the dampness and their results like breeding of mosquitoes Face to face interaction with the villagers.
b. To aware the people about the cleanliness, visit of school and teachers to teach about the swachhta and its benefits.
c. To initiate use of biogas by the use of cow dung and its proper like manure to avoid the smell of cow dung breeding of flies also let them know about the renewable energy and benefits of installation.
d. Chlorination of drinking water of adequate ppm range.

CHAPTER 7: Village condition due to Covid-19:

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

On interaction with the sarpanch and talati we come to know that various steps were taken by them under the guidance of district collectorate and government of Gujarat such as:
Establishing quarantine centre and isolation centre in the village.
Immediate response to the villagers for help.
Supplying foods packages by means of various NGOs and government body.
'Doctor at your door step on call' facility implementation initiated by honourable collector sir.
House to house surveillance by medical them for Covid-19 awareness and detection.
Providing free food for NFSA as well as Non-NFSA ration card holders.

7.2 Activities Done by Students for allocated village

Listening the corona (covid-19) word sounded like a curse. Especially for rural people. No doubt as per some data analytics rural area are not much affected by covid-19 virus but they were affected/suffered with various other factors resulted due to nationwide lockdown. Various people even scared of listening this word.
So we managed to interact with the sarpanch and have done effort to make people aware of the virus and tried to answer their question related with covid-19 precautions, social distancing, etc. through the sarpanch.

7.3 Any other steps taken by the students / villagers

After interaction with the sarpanch and talati we come to know that the quarantine and isolation centres built during lockdown were actually various government building, private hospitals, hotels, etc. and the people of the village volunteered themselves for various works like sanitization, cleaning, etc.

CHAPTER 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):

8.1 Design Proposals : Observation and brief write up about each design from 8.1.1 to 8.1.6

****All the drawings ,of proposed designs like plan, elevation, section and 3D model , have been added at the end of report of part 1 from page number 178 to 189. And all these drawings have also been added in their respective designs.**

8.1.1 Physical design (Civil) : Public Toilet

Scenario :

There is no any privet toilet in poor people house, so they need public toilet in village and also outcomes of Chichwada village need public toilet for use. There is some work going in village like under construction sub PHC center, Rode , so labors need public toilet for their use.

Existing Situation in Chichwada :

In Chichwada village there is no ant public toilet in kachaa house. So according to the feedback given by the villagers, one or two public toilet should be there in the village at different location. the villages go for toilet at open lend nearby there house. So that we have designed one public toilet for the urgent requirement for the villagers.

Sustainability of the design :

Public Toilet as an important tool :

Design Utilized by,

All the people living in the village of even outsiders from nearby villages can use or utilize a public toilet for their sanitization uses.

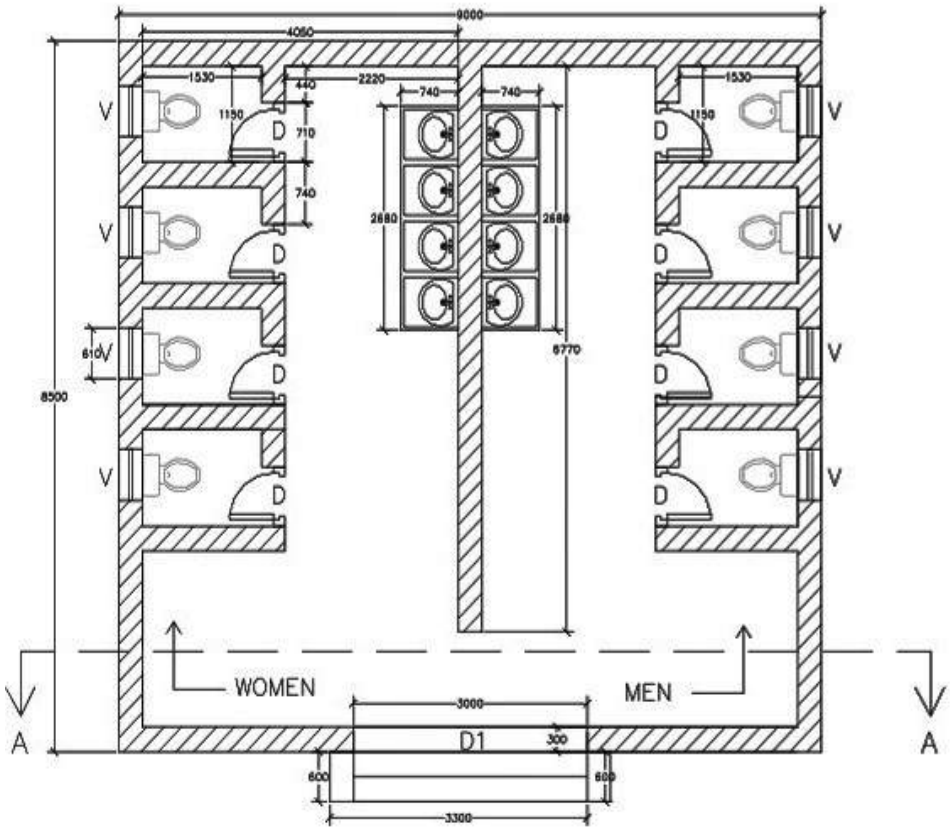
Needs :

Anyone using public toilet for their sanitization use.

Design brief :

Public Toilet has a good toilet facilities. Villages do their sanitization work in Public Toilet.

Proposed Design in Auto cad; Revit and Skechup :

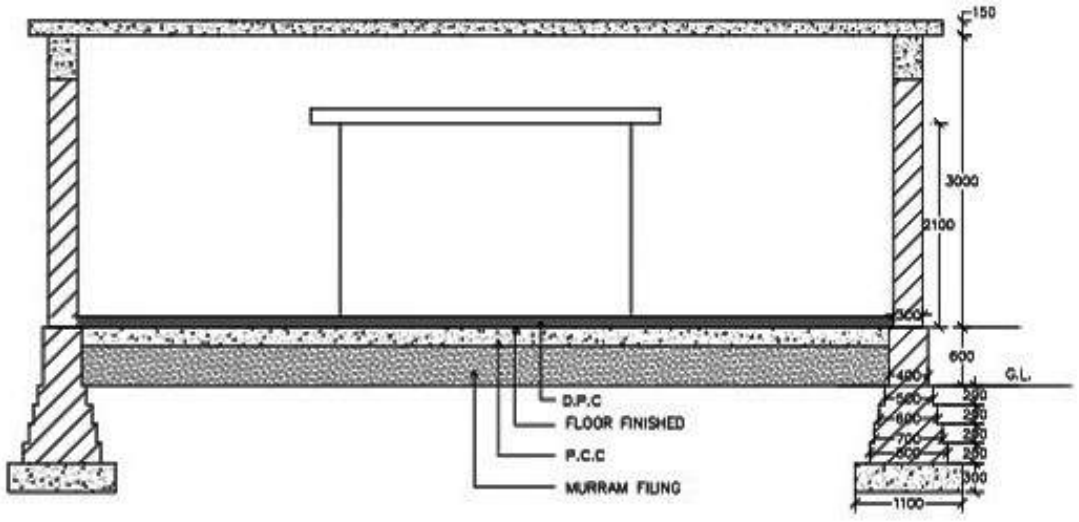


GROUND FLOOR PLAN

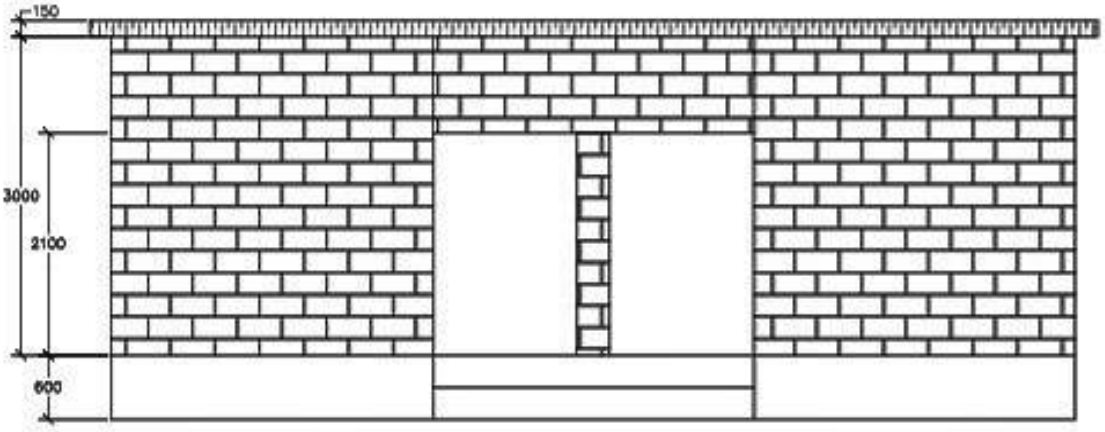
SCHEDULE OF OPENING	
D	710 x 2100
D1	3000 x 2100
V	600 x 500

Fig. 8.1 Public Toilet Ground Floor Plane With schedule of opening

*All Dimensions are in mm



SECTION – AA



FRONT SIDE ELEVATION

Fig. 8.2 Public Toilet Front and Section Elevation

*All Dimensions are in mm

Fig. 8.3 3D Modal of Public Toilet

Public Toilet : Measurement Sheet (T-8.1- measurement sheet)

Table 8.1 Public Toilet: Measurement Sheet

Item No.	Description	No.	Length (m)	Width (m)	Height (m)	Quantity
1	Earthwork in excavation for foundation					
	Total center line length					
	L=24.6+17.4+14.64+11.6=68.24					
	No of junctions =2					
	L=68.24-(0.5x2x1.10)=67.14	1	67.14	1.10	1.10	81.2394 m^3
2	PCC 1:4:8 for foundation	1	67.14	1.10	0.3	22.156 m^3
3	Brick masonry up to plinth in cm 1:6					

	First step					
	L=67.44	1	67.44	0.8	0.2	10.79
	Second step					
	L=67.54	1	67.54	0.7	0.2	9.455
	Third step					
	L=67.64	1	67.64	0.6	0.2	8.117
	Fourth step					
	L=67.74	1	67.74	0.5	0.2	6.774
	Fifth step					
	L=67.84	1	67.84	0.4	0.6	16.282
	Masonry for step					
	Step 1	1	3.0	0.6	0.3	0.54
	Step 2	1	3.0	0.3	0.3	0.27
					Total	52.228 m^3
4	Earth work in backfilling for plinth					
	W.C.					
	L=1.05	8	1.05	1.43	0.6	7.20
5	Damp proof course(1:2:4)					
	L=68.24-0.5x0.4=68.04	1	68.04	0.4	-	27.216
6	Brick masonry above plinth up to slab level in cm1:6					
	L=68.24	1	68.24	0.3	3.0	61.416
	Deduction for door window and ventilation					

	D	8	0.71	0.3	2.1	0.447
	G	1	3	0.3	2.1	1.89
	V	8	0.6	0.3	0.5	0.09
					Total	-2.427
	Deduction for lintel					
	D	8	1.01	0.3	0.1	0.0303
	G	1	3.3	0.3	0.1	0.099
	V	8	0.9	0.3	0.1	0.027
					Total	-0.1563
					Net Total	58.833 m^3

Public Toilet : Abstract Sheet (T-8.2- Public Toilet abstract sheet)

Table 8.2 Public Toilet : Abstract Sheet

Sr. no	item Description	QTY	Rate (Rs.)	Per	Amount (Rs.)
1	Earthwork in excavation for foundation	81.2394 cum	90.00	cum	7311.546
2	PCC 1:4:8 for foundation	22.156 cum	3500.00	cum	77546.00
3	Earth work in backfilling for plinth	7.20 cum	500.00	cum	3600.00
4	Brick masonry above plinth up to slab level in cm1:6	58.833 sq.m.	150.00	sq.m.	8824.95
5	Smooth Plaster inside room & ceiling	177.749 sq.m.	5	sq.m.	888.745
6	RCC slab and Chajja 0.15m thick 1:1.5:2	11.673 cum	150	cum	1750.95
7	1% steel of RCC work are used	916 kg	60	kg	54960.00
8	**Damp proof course(1:2:4)**	27.216 sq.m.	70	sq.m.	1905.12
				Total	154,882.191
			Add 1.5% Water Charge		2351.80
			Add 10% con. Charge		15488.219
			3% Contingency		4646.46
			Total Estimate Cost in Rs.		177,368.67

The rates of their respective works provided in the abstract sheet along with quantities are inclusive of water charges, contractor's profit, contingencies, utilities and labor charges.

Total cost = ₹ 177368.67/-

8.1.2 Social design (Civil) : Community Hall

Scenario :

Community hall is a public location where members of a community gather for group activities, events, festivals and social purpose. They may sometimes be open for whole community or for a specialized group example Mahila mandal hall. A community hall of village generally consists of a hall , storage or kitchen area and washroom.

Existing Situation in Chichwada :

In the chichwada village there is no any community hall so that according to the village population there should be one community hall in village. It is a public location where members of a community gather for group activities, events, festivals and social purpose. A community hall of village generally consists of a hall , storage or kitchen area and washroom. During the interaction with villagers they have also suggested that there should be a community hall in chichwda village.

Sustainability of the design :

Community hall as an important tool :

Design Utilized by,

All the people living in the village of even outsiders from nearby villages and relatives of the villagers can use or utilize a community hall for their different uses with the permission of Sarpanch, Talati and some authorized people of the village.

Needs :

where members of a community gather for group activities, events, festivals and social purpose ; for mahila mandal in the village ;etc.

Design brief:

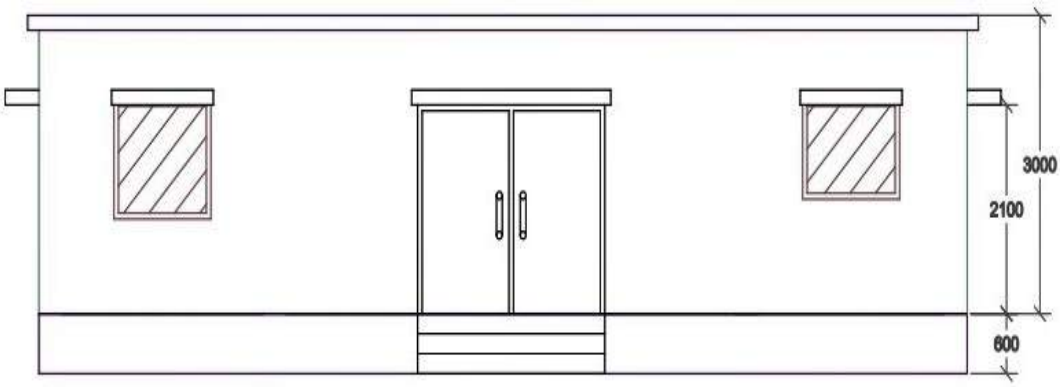
The Community Hall is an important public building in a prominent location. Village and community halls are the smallest buildings that can accommodate a sports programme alongside the customary social and arts pursuits. There are a wide variety of types and sizes, all with the following in common. A main activity and assembly space together with ancillary accommodation that might include additional small halls. The place has a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.

Community Hall Design:

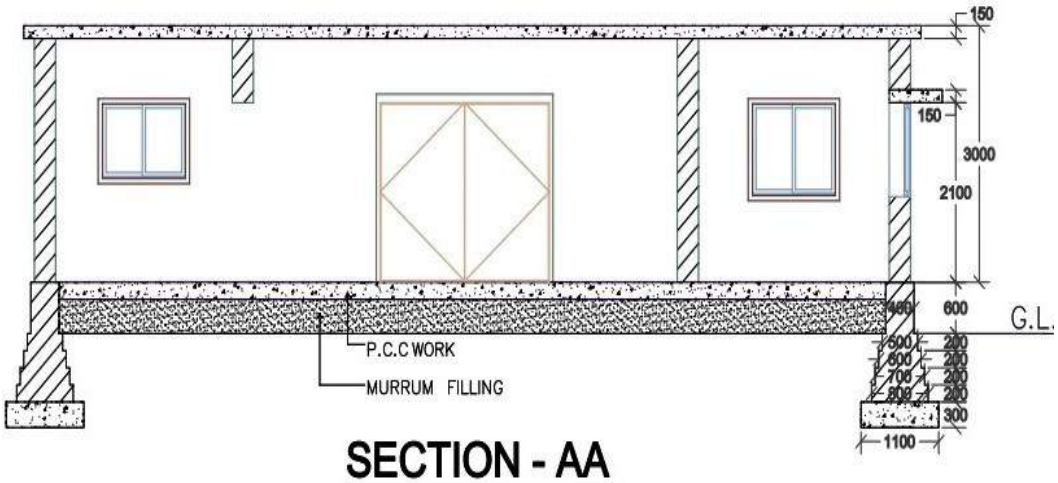
Common repair and maintenance of the structure:

Some common repairs and maintenances are as below ; Exterior painting and plastering ; Landscaping and gardening ; Paving repairs ; Carpeting and flooring; Plumbing; Repairing cracking or leaning walls etc**.** For most effective maintenance , it should be organized through a programme of cyclical maintenance. At the most basic level this includes daily routines, and works upwards to periodic programmes of weekly, monthly, semi-annual, annual, quinquennial and so on routines.

Proposed Design in Auto cad; Revit and Skechup :



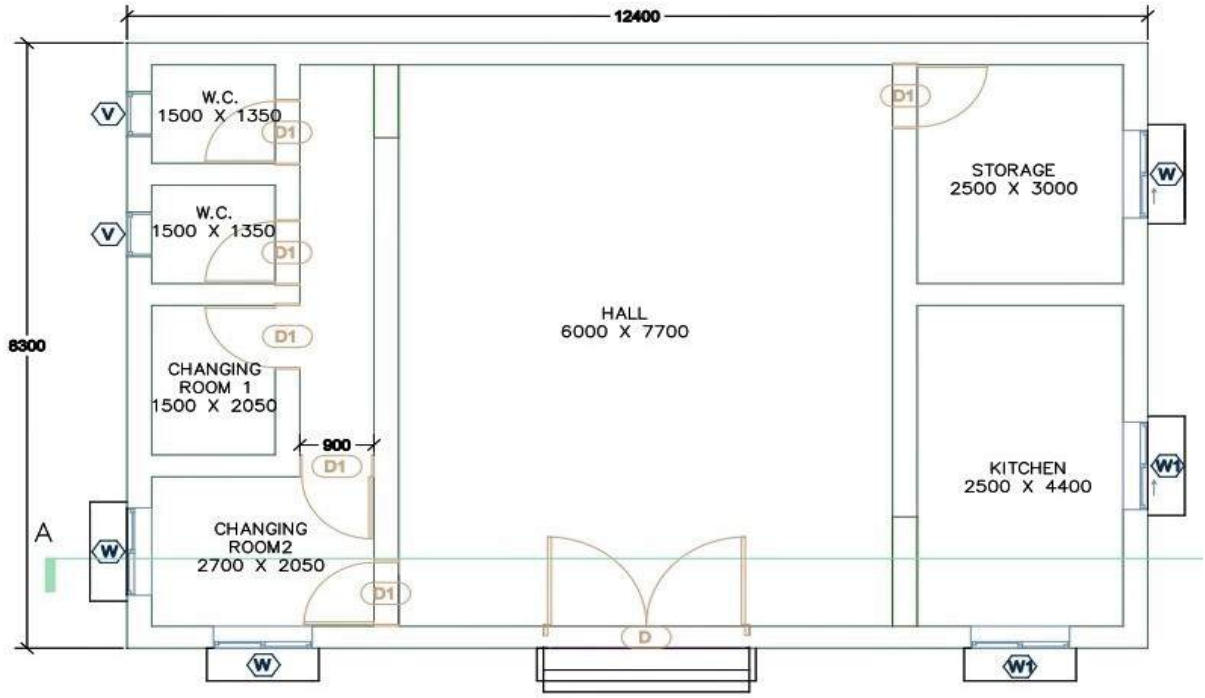
FRONT SIDE ELEVATION



SECTION - AA

Fig. 8.4 Front side elevation and Section with Schedule Of Opening of

*All Dimensions are in mm



GROUND FLOOR PLAN

Fig. 8.5 Ground Floor Plan of Community Hall

Fig. 8.6 3D Model of Community Hall

*All Dimensions are in mm

Community Hall : Measurement Sheet (T-8.3- measurement sheet)

Table 8.3 Community Hall: Measurement Sheet						
Item No.	**Description**	**No.**	**Length (m)**	**Width (m)**	**Height (m)**	**Quantity**
1	Earthwork in excavation for foundation					
	Total center line length					
	L=8X4+12.1X2+5.65+1.5X3+2.35+2.80=71.5					
	No of junctions =14					
	L=71.5-(0.5x14x1.10)=63.8	1	63.8	1.10	1.10	77.198 m^3
2	PCC 1:4:8 for foundation	1	63.8	1.10	0.3	21.054m^3
3	Brick masonry up to plinth in cm 1:6					
	First step					
	L=65.9	1	65.9	0.8	0.2	10.544
	Second step					
	L=66.6	1	66.6	0.7	0.2	9.324
	Third step					
	L=66.9	1	66.9	0.6	0.2	8.028
	Fourth step					
	L=67.6	1	67.6	0.5	0.2	6.76
	Fifth step					
	L=68.7	1	68.7	0.4	0.6	16.488
	Masonry for step					
	Step 1	1	3.0	0.6	0.2	0.36
	Step 2	1	3.0	0.3	0.2	0.18

					Total	51.684 m^3
4	Earth work in backfilling for plinth					
	Hall	1	6.0	7.70	0.6	27.72
	W.C.	2	1.5	1.35	0.6	2.43
	Changing Room1	1	1.50	2.05	0.6	1.845
	Changing Room2	1	2.70	2.05	0.6	3.321
	Storage	1	2.50	3.0	0.6	4.5
	Kitchen	1	2.50	4.40	0.6	6.6
					Total	46.416 m^3
5	Brick masonry above plinth up to slab level in cm1:6					
	L=68.24	1	68.24	0.3	3.0	69.4
	Deduction for door window and ventilation					
	D	1	2.4	0.3	2.1	1.512
	D1	6	0.850	0.3	2.1	3.213
	W	3	1.2	0.3	1.10	1.18
	W1	2	1.2	0.3	0.9	0.648
	V	2	0.6	0.3	0.6	0.108
					Total	-6.661
	Deduction for lintel					
	D	1	2.7	0.3	0.1	0.081
	D1	6	1.15	0.3	0.1	0.0345
	W	3	1.5	0.3	0.1	0.135
	W1	2	1.5	0.3	0.1	0.09
	V	2	0.9	0.3	0.1	0.054
					Total	-0.3945
					Net Total	62.3445 m^3

Community Hall : Abstract Sheet (T-8.4- Abstract sheet)

Table 8.4 Community Hall : Abstract Sheet					
Sr. no	**item Description**	**QTY**	**Rate (Rs.)**	**Per**	**Amount (Rs.)**
1	Earthwork in excavation for foundation	77.198 cum	90.00	cum	6947.82
2	PCC 1:4:8 for foundation	21.054 cum	3500.00	cum	77546.00
3	Earth work in backfilling for plinth	46.416 cum	500.00	cum	23208.00
4	Brick masonry above plinth up to slab level in cm1:6	62.3445 sq.m.	150.00	sq.m.	9351.675
5	Smooth Plaster inside room & ceiling	346.235 sq.m.	5	sq.m.	1731.175
6	RCC slab and Chajja 0.15m thick 1:1.5:2	16.077 cum	150	cum	2411.55
7	1% steel of RCC work are used	1262.0445 kg	60	kg	75722.67
				Total	196,918.89
			Add 1.5% Water Charge		2953.783
			Add 10% con. Charge		19,691.889
			3% Contingency		5907.5667
			Total Estimate Cost in Rs.		225,472.128

The rates of their respective works provided in the abstract sheet along with quantities are inclusive of water charges, contractor's profit, contingencies, utilities and labor charges.

Total cost = ₹ 225,472.128/-

8.1.3 Heritage Village Design (Civil) : Entrance gate

Scenario :

A village entrance gate as a heritage village design , a gate or gateway is a point of entry to a space which is enclosed by walls. Gates may prevent or control the entry or exit of individuals, or they may be merely decorative. Other terms for gate include yett and port. The word is derived from old Norse "gat", meaning road or path, and originally referred to the gap in the wall or fence, rather than the barrier which closed it. The moving part or parts of a gateway may be considered "doors", as they are fixed at one side whilst opening and closing like one.

Existing Situation in Chichwada :

In the Chichwada village there is no any village entrance or front gate existing in the village. After the approval of proposed designs of village as of part 1, Talati has appreciated our work and told that there is a need of the village entrance gate in Chichwada village. So we have designed a village entrance gate as a heritage village design.

Sustainability of the design :

Entrance Gate as an important tool :

Design Utilized by,

People living in the village of even outsiders from nearby villages and relatives of the villagers can use or utilize a village entrance gate for their different uses.

Needs: For better esthetic entrance view; Ease of use; Availability of good approach road ;etc.

Design brief: The village entrance gate design as a heritage village design is for better esthetics and looks of the village approach road.

Common repair and maintenance of the structure :

Some common repairs and maintenances are as below ; Exterior painting and plastering ; Landscaping and gardening ; Paving repairs ; Carpeting and flooring; Plumbing; Repairing cracking or leaning walls etc**.**
For most effective maintenance , it should be organized through a programme of cyclical maintenance. At the most basic level this includes daily routines, and works upwards to periodic programmes of weekly, monthly, semi-annual, annual, quinquennial and so on routines.

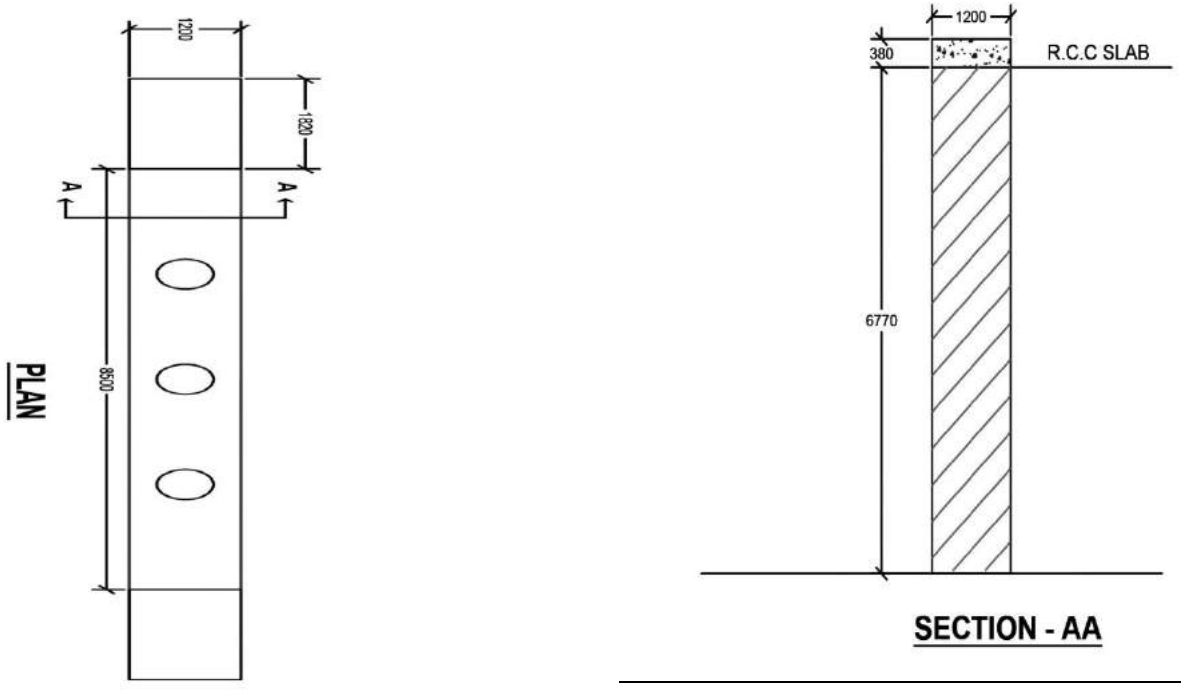


Fig. 8.7 Plan And Section Of Village GATE *All Dimensions are in mm

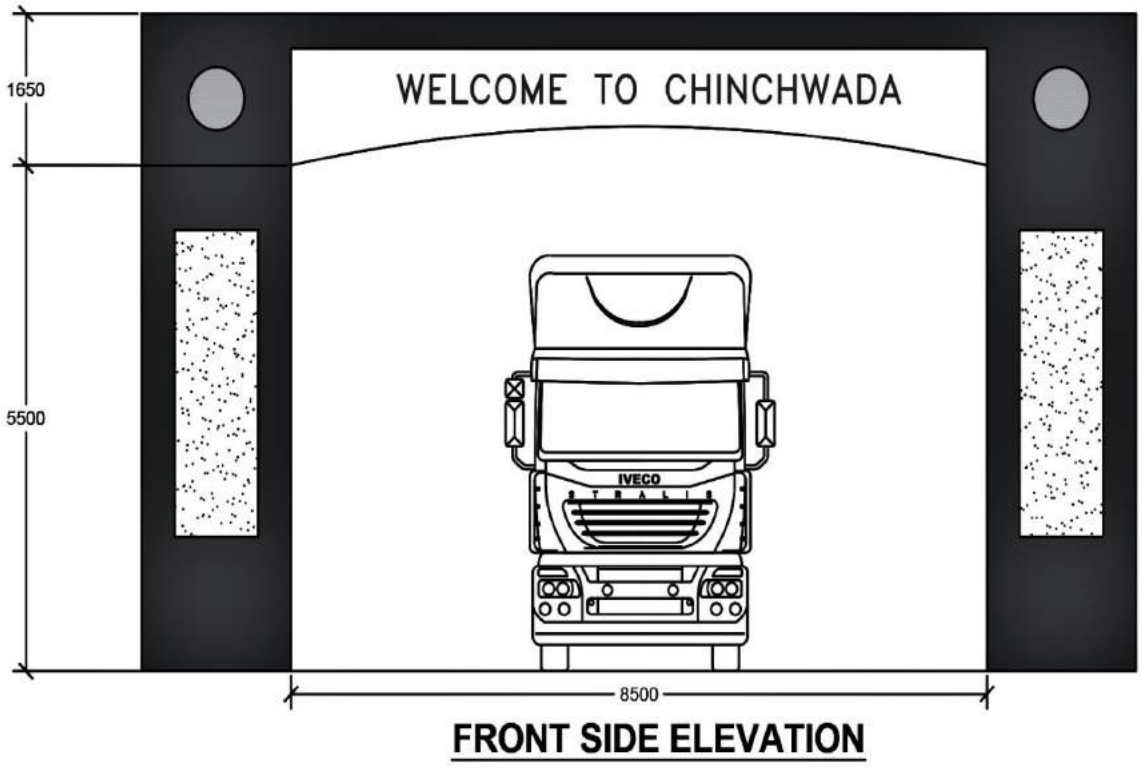


Fig. 8.8 Front Side Elevation Of Village GATE

Fig. 8.9 3D Model Of Village GATE

*All Dimensions are in mm

Entrance Gate : Measurement Sheet (T-8.5- EG measurement sheet)

Table 8.5 Entrance Gate : Measurement Sheet						
Item No.	**Description**	**No.**	**Length (m)**	**Width (m)**	**Height (m)**	**Quantity**
1	Earthwork in excavation for foundation	2	1.2	1.82	1.5	6.552 m^3
2	Brick work	2	1.2	1.82	8.5	18.564 m^3
3	R.C.C Slab	1	1.2	12.14	0.15	2.1852 m^3
4	1% steel use in R.C.C Slab					165.64 kg
	Binding wire					1.5 kg

Entrance Gate : Abstract Sheet (T-8.6- EG abstract sheet)

Table 8.6 Entrance Gate : Abstract Sheet					
Sr. no	**item Description**	**QTY**	**Rate (Rs.)**	**Per**	**Amount (Rs.)**
1	Earthwork in excavation for foundation	6.552 cum	90.00	cum	589.68
2	Brick work	18.564 sq.m.	150.00	sq.m.	2784.60
3	RCC slab	2.1852 cum	150	cum	327.78
4	1% steel of RCC work are used	165.64 kg	60	kg	9938.40
				Total	13,640.46
			Add 1.5% Water Charge		204.61
			Add 10% con. Charge		1364.05
			3% Contingency		409.21
			Total Estimate Cost in Rs.		15618.33

The rates of their respective works provided in the abstract sheet along with quantities are inclusive of water charges, contractor's profit, contingencies, utilities and labor charges.

Total cost = ₹ 15618.33/-

8.1.4 Smart Village Design (Electrical): Automatic water level controller

Introduction

Here is a simple design of automatic water-level controller for overhead tanks that switches on/off the pump motor when water in the tank goes below/above the minimum/maximum level. The water level is sensed by two floats to operate the switches for controlling the pump motor.Each sensors float is suspended from above using an aluminium rod. This arrangement is encased in a PVC pipe and fixed vertically on the inside wall of the water tank. Such sensors are more reliable than induction-type sensors. Sensor 1 senses the minimum water level, while sensor 2 senses the maximum water level as shown in figure.

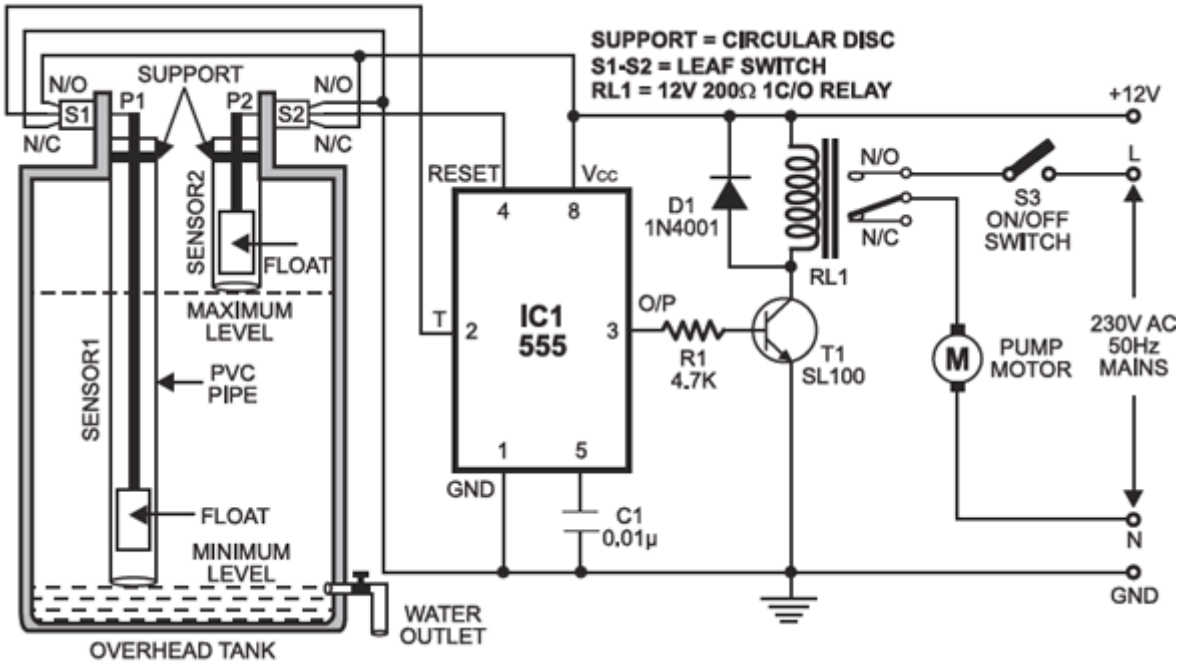


Fig. 8.10 Circuit diagram of Automatic water level controller

Switches S1 and S2 are fixed at the top of the sensor units such that when the floats are lifted, the attached 5mm dia. (approx.) aluminium rods push the moving contacts (P1 and P2) of leaf switches S1 and S2 from normally closed (N/C) position to normally open (N/O) position. Similarly, when the water level goes down, the moving contacts revert back to their original positions.

Normally, N/C contact of switch S1 is connected to ground and N/C contact of switch S2 is connected to 12V power supply. IC 555 is wired such that when its trigger pin 2 is grounded it

gets triggered, and when reset pin 4 is grounded it gets reset. Threshold pin 6 and discharge pin 7 are not used in the circuit.

Construction and working

The float sensor units can be assembled at home. Both the units are identical, except that their length is different. The depth of the water tank from top to the outlet water pipe can be taken as the length of the minimum-level sensing unit. The depth of the water tank from top to the level you want the tank to be filled up to is taken as the length of the maximum-level sensing unit. The switches are fixed at the top of the tank as shown in the figure.

Each pipe is closed at both the ends by using two caps. A 5mm dia. hole is drilled at the center of the top cap so that the aluminum rod can pass through it easily to select the contact of leaf switches. Similarly, a hole is to be drilled at the bottom cap of the pipe so that water can enter the pipe to lift the float.

When water reaches the maximum level, the floats should not go up more than the required distance for pushing the moving contact of the leaf switch to N/O position. Otherwise, the pressure on the float may break the leaf switch itself. The length of the aluminum rod is to be selected accordingly. It should be affixed on the metal/thermocol float using some glue (such as Araldite).

When water in the tank goes below the minimum level, moving contacts (P1 and p2) of both switches will be in N/ C position. That means trigger pin 2 and reset pin4 of IC1 are connected to ground and 12V, respectively. These triggers IC1 are connected to ground and 12V, respectively. This triggers IC1 and its output goes high to energize relay RL1 through driver transistor SL100 (T1). The pump motor is switched on and it starts pumping water into the overhead tank if switch S3 is ‘on’.

As the water level in the tank rises the float of sensor 1 goes up. This shifts the moving contact of switch S1 to N/O position and trigger pin 2 of IC1 gets connected to 12V. This doesn’t have any impact on IC1 and its output remains high to keep the pump motor running.

As the water level rises further to reach the maximum level, the float of sensor 2 pushes the moving contact of S2 to N/O position and it gets connected to ground. Now IC1 is reset and its output goes low to switch the pump off.

As is consumed, its level in the overhead tank goes down. Accordingly, at is consumed, its level in the overhead tank goes down. Accordingly, the float of sensor 2 also goes down. This causes the moving contact of switch S2 to shift back to NC position and reset pin 4 of IC1 is again connected to 12V. But IC1 doesn’t get triggered because its trigger pin 2 is still clamped to 12V by switch S1. So the pump remains switched off.

When water level further goes down to reach the minimum level, the moving contact of switch S1 shifts back to N/C position to connect trigger pin 2 of IC1 to ground. This triggers IC1 and the pump is switched on.

8.1.5 Smart Village Design (Electrical): Motion activated street light

Introduction

As we know that now a day’s all street lights are in on condition during whole night and the use of energy is not properly achieved because street light power usage is only utilized when any night traveler passes! So energy efficient motion activated street lights are designed with respect

to artificial intelligence. So this lights will only turned on automatically when any living being passes, in this design a sensor, small rating circuit breaker and electronics devices will be used.

Construction and working

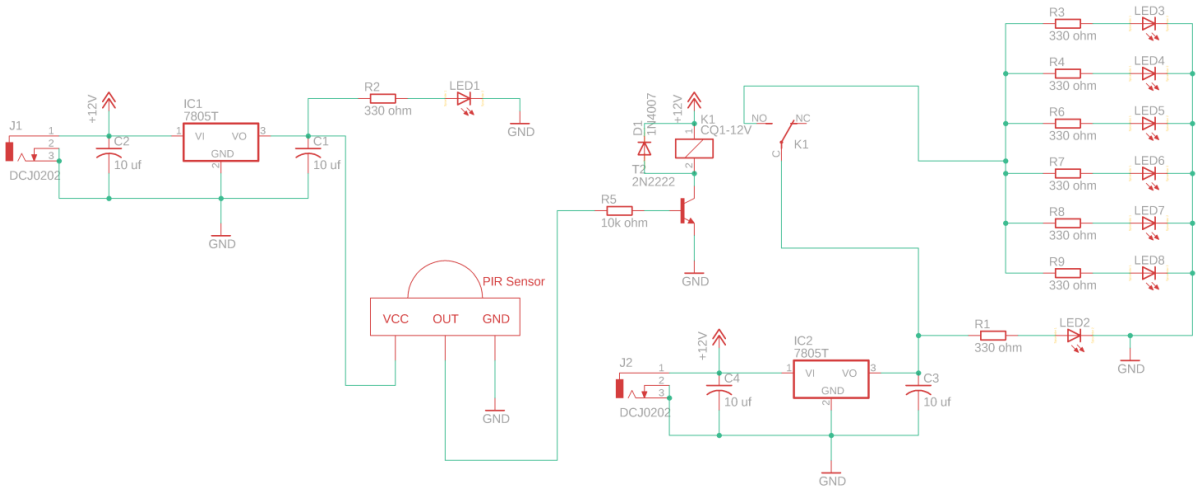


Fig. 8.11 Circuit diagram of : Motion activated street light

There is the regulated 5v power supply based on the LM7805 voltage regulator. This power supply will be used to power up the PIR Sensor Module. J1 is the dc female power jack. A 10uf capacitor is connected at the input side of the 7805 voltage regulator. Another 10uf capacitor is connected at the output side of the voltage regulator. A 330-ohm resistor is connected in series with a 2.5v led. This is a current limiting resistor.

A wire from the output of the voltage regulator is connected with the Vcc pin of the PIR sensor module, and the ground of voltage regulator is also connected with the ground of the PIR Sensor module. The Out pin of the PIR sensor is connected with the base of the 2n2222 NPN transistor through a 10k resistor. The emitter of the 2n2222 NPN transistor is connected with the ground while the collector side is connected with one side of the relay coil and the relay coil other side is connected with the 12 volts.

There is another 5v regulated power supply the same as explained. This 5 volt will be used to power up the white color LEDs. This 5 volt is given to the LEDs through this relay. 330-ohm resistors are connected with the anode sides of all the Leds. While the cathode sides of all the LEDs are connected with the ground. When the PIR sensor detects any motion the relay is turned on, so the common pin of the relay will be connected with the normally open pin, which connects 5 volts with the anode side of the LEDs, and so the leds will turned On.

The relay driver circuit simply consists of the 2n2222 NPN transistor and a 10k resistor.

8.1.6 Smart Village Design (Electrical): Roof top solar panel

Introduction

A rooftop photovoltaic power station, or rooftop PV system, is a photovoltaic (PV) system that has its electricity-generating solar panels mounted on the rooftop of a residential or commercial building or structure. The various components of such a system include photovoltaic modules, mounting systems, cables, solar inverters and other electrical accessories.

Rooftop mounted systems are small compared to ground-mounted photovoltaic power stations with capacities in the megawatt range, hence being a form of distributed generation. Most rooftop PV stations in developed countries are Grid-connected photovoltaic power systems. Rooftop PV systems on residential buildings typically feature a capacity of about 5 to 20 kilowatts (kW), while those mounted on commercial buildings often reach 100 kilowatts to 1 Megawatt (MW). Very large roofs can house industrial scale PV systems in the range of 1-10 Megawatts.

Design of a rooftop solar array:

The following section contains the most commonly utilized components of a rooftop solar array. Though designs may vary with roof type (eg. metal vs shingle), roof angle, and shading concerns, most arrays consist of some variation of the following components

1. Solar Panels produce carbon free electricity when irradiated with sunlight. Often made of Silicon, solar panels are made of smaller solar cells which typically number 6 cells per panel. Multiple solar panels strung together make up a solar array. Solar panels are generally protected by tempered glass and secured with an aluminum frame. The front of a solar panel is very durable whereas the back of a panel is generally more vulnerable.

2. Mounting clamps generally consist of aluminum brackets and stainless steel bolts that secure solar panels to one another on the roof and onto the rails. Clamps often vary in design in order to account for various roof and rail configurations.

3. Racking or rails are made of metal and often lie in a parallel configuration on the roof for the panels to lie on. It is important that the rails are level enough for the panels to be evenly mounted.

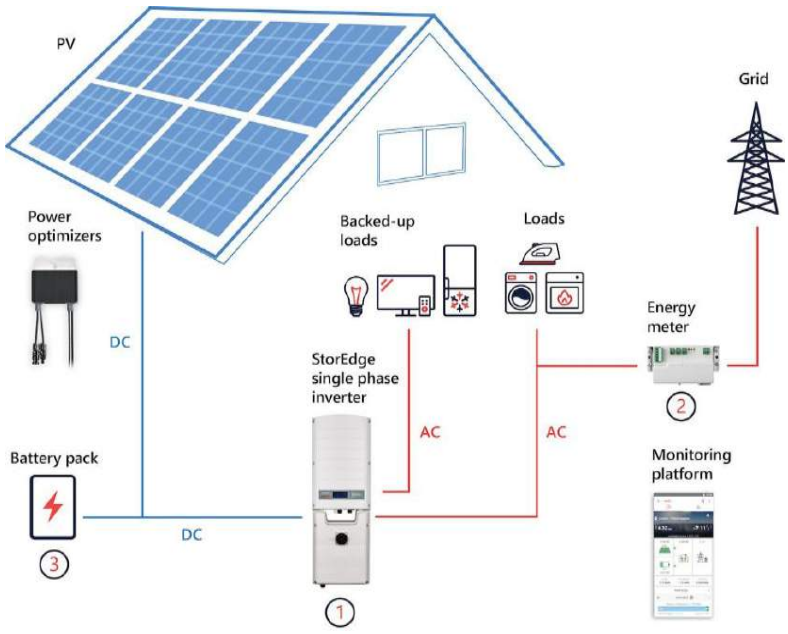


Fig. 8.12 Power Flow Of Roof Top Solar

4. Mounts attach the rails and the entire array to the surface of the roof. These mounts are often L brackets that are bolted through flashing and into the rafters of the roof. Mounts vary in design due to the wide range of roof configurations and materials.

5. Flashings are a durable metal plate that provide a water resistant seal between the mounts and roof surface. Oftentimes, caulk is used to seal the flashing to the roof and it resembles a metal roof shingle.

6. DC/AC wiring for inverters connect wires between panels and into a micro inverter or string inverter. No cables should touch the roof surface or hang from the array to avoid weathering and the deterioration of cables.

7. Micro inverters are mounted to the bottom of the panel and convert DC power from the panels into AC power that can be sent into the grid. Micro inverters allow for the optimization of each panel when shading occurs and can provide specific data from individual panels.

8.2 Reason for Students Recommending this Design :

- Public Toilet- To do their sanitization work.

- Community hall - To organize events easily for the villagers
- Entrance gate – for the better aesthetic of the village main entrance
- Automatic Water Level Controller – To reduce west of water.
- Motion Activated street Light – To reduce electricity bill.
- Roof Top Solar Panel – To reduce electricity demand and self depended electricity.

8.3 About designs Suggestions / Benefit of the villagers :

1.Public Toilet :

The population of chichwada village is 1025 as per 2011 census. So it is required to have one ublic Toilet in the village. The villagers have to go at open lend. So that we have decided and finalized the design of Public Toilet.

2. Community Hall :

There is no Community hall in the chichwada village. Community hall is a public location where members of a community gather for group activities, events, festivals and social purpose. A community hall of village generally consists of a hall , storage or kitchen area and washroom.

3. Entrance Gate :

The chichwda village has no main entrance gate at the village approach road. So that we have designed the village entrance gate as heritage village design.

4. Automatic Water Level Controller:

In Chichwada village no any automation in public property. At overhead tank and also please which required water controller, water level controller is use their and reduced west of water. So we designed design of automatic water level controller.

5. Motion Activated Street Light:

During a night time Street light are ON for hole night. Because of that the energy bill become very high and also Maintenance of street light also become required. By using this design the required man power is less and also save water. So we make Motion Activated Street Light.

6. Roof Top Solar Panel:

Now a days solar energy is used at wild range of energy. Village has some open lend ad also puchaa makn has open place. So to use their lends solar is best option. So we design roof top solar system.

8.4 About Maintenance :

Maintenance can help:

- Prevent the process of decay and degradation.
- Maintain structural stability and safety.
- Prevent unnecessary damage from the weather or from general usage.
- Optimise performance.
- Determine the causes of defects and so help prevent re-occurrence or repetition.
- Ensure continued compliance with statutory requirements.
-

For maintenance to be most effective, it should be organized through a programme of cyclical maintenance. At the most basic level this includes daily routines, and works upwards to periodic programmes of weekly, monthly, semi-annual, annual, quinquennial and so on routines.

Common maintenance tasks include:

- Exterior painting and plastering.
- Landscaping and gardening.
- Paving repairs.
- Window and door repairs.
- Debris/rubbish removal and clearance.
- Jet washing with chemical cleaning agents to remove fungal stain or mould.
- Gutter clearance and repair.
- Carpentry.
- Lighting repairs.
- Re-plastering and plaster repairs.
- Tiling.
- Carpeting and flooring.
- Plumbing.
- Repairing cracking or leaning walls.

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

For future development of the Chichwada village we are proposing the designs for Part II design in which following points should be considered,

9.1 Education Design: Primary School

In chichwada village have one primary school but it is not in working as well as good condition. All students of chichwada village going for their primary education at atul village (5 km avary).the major problem is student need to cross national high way. So village need one Primary school.

9.2 Health Facility Design: PHC Center

Chichwada village has one sub PHC center, but in Sub PHC Center only Pregnant lady and new bone babies are get doctor Facilities. Other people of village are going for their primary health facilities at 3 km away haria village.

9.3 Transportation Design: BUS Stop

Chichwada villager have one BUS Stop in very bed condition. All people of village going for their work and some special work. So people wait for bus also old people sir on lend, so redesign of BUS Stop is required in village.

9.4 Smart Village Design: Solar Penal Cleaning

Solar system is placed at open lend so atmosphere effects like Wind, Dust, Solid West, etc. are placed on it so solar penal need to clean regular. So automatic solar cleaning system is used to clean solar penal at given particular time.

9.5 Smart Village Design: OFF Grid Solar System

By Using the battery unit people of village used solar electricity at any time. In the night people used electricity which generated by solar system during day. So electricity bill reduced and proper use of sun light.

9.6 Smart Village Design: Primary School Wring

In a part 2 primary school is smarty design by us so in school Electrical wring diagram and also many electrical facilities design given by us.

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

We have visited the perfect village Baben which visit helped U.S.A. to grasp regarding the sort of infrastructure required by the village. With facilitate of techno-economic survey and gap analysis and conjointly finding out / measurement our ideal village Baben , we have a tendency to were able to broadly speaking outline necessities of development for folks of Chichwada village. Then we've got visited the good village Kamarej and by that visit we have a tendency to higher understood the good technologies and ideas as good development of our allotted village Chichwada.

In the Cichwad village, the essential necessities like community hall, any recreational space,BUS Stop, etc. weren't existing. By implanting given style proposals, all the missing amenities is provided which is able to stop the migration of rural folks towards the geographical region which is able to successively scale back pressure on cities.

The amenities designed below this Vishwakarma project part viii are useful for higher development of the village as physically also as socially, that improves the fashion of individuals beside nation with protective nature bit by bit. this can facilitate in developing good villages in property manner, scale back migration from villages and forestall the cities from the urban pressure. this could cause some rethinking regarding the which means of potency on the far side the standard conceptions of economic or technical potency. Indeed, employment growth is a minimum of as necessary as growth in productivity. In a sense, each represent the use of labor as a resource. Why, then, will wondering potency target one and neglect the opposite it's necessary to replicate on this question. The answer, that imply amendment in each social science and politics, might create a true distinction.

Students WHO need to figure towards preservation of rural soul of country will do several things for our own smart and surroundings. By implanting given style proposals, can|we area unit able to} say that every one the missing amenities are provided will stop the migration of rural folks towards the geographical region. this may cause scale back the load on urban areas also as pollution in each sector is reduced step by step.

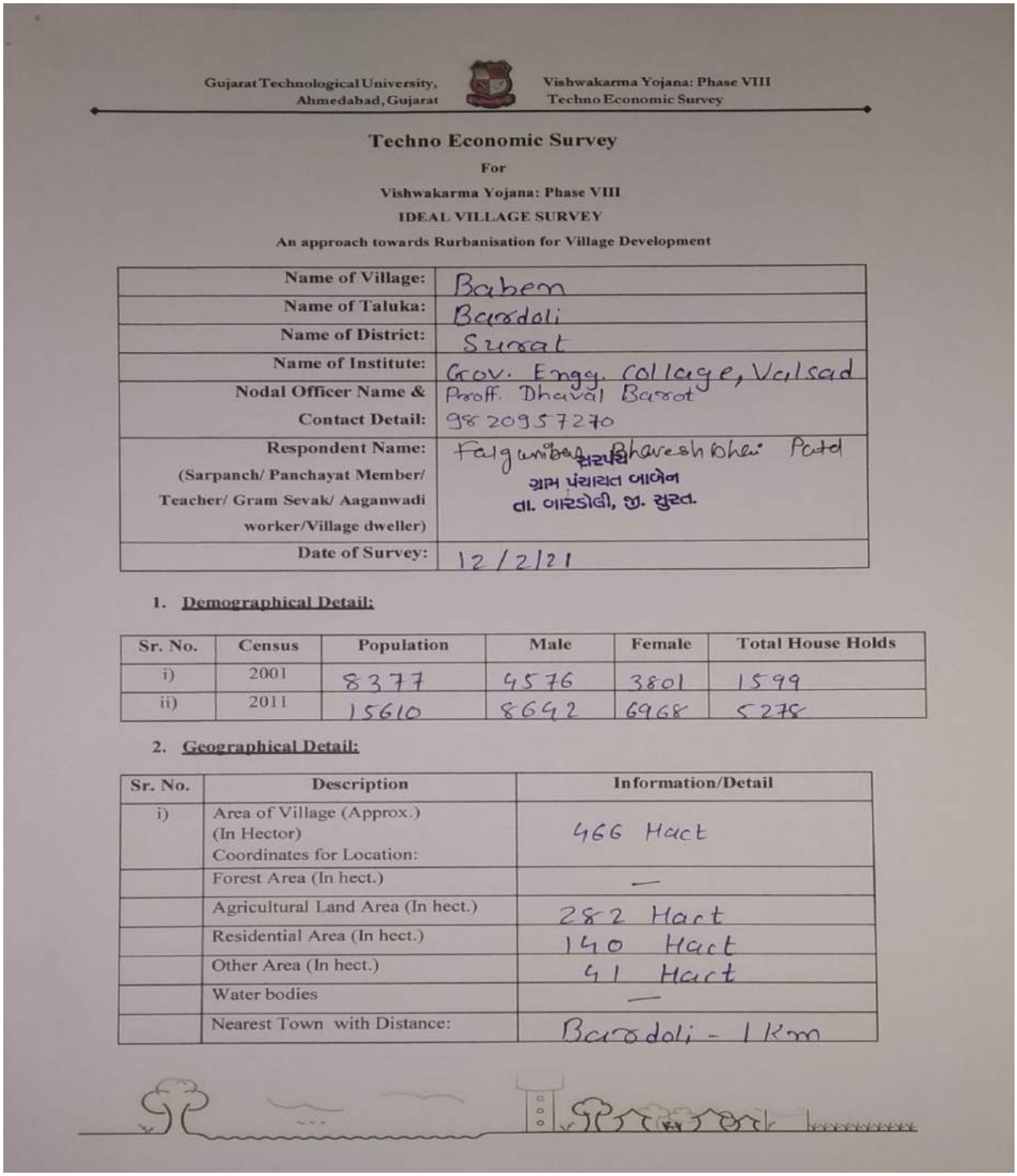
These amenities designed below this project are useful for higher development of village as physically also as socially, that improves the fashion of individuals beside nation with protective nature bit by bit.

CHAPTER 11: References refereed for this project :

- http://www.vyojana.gtu.ac.in/circular
- http://censusgujarat.gov.in/History
- GTU guidelines and briefings
- www.wikipedia.com
- URDPFI norms
- www.censusindia.gov.in
- www.researchgate.net
- www.villageinfo.in
- www.villagemaps.in
- https://villagemap.in/gujarat/valsad/valsad/1815500.html
- https://geoiq.io/places/Chichwada/vpfDg5bfap
- https://www.mapsofindia.com/villages/gujarat/valsad/valsad/chichwada.html
- https://geoiq.io/places/Chichwada/vpfDg5bfap/
- https://www.census2011.co.in/data/village/523291-chichwada-gujarat.html
- https://villageinfo.in/gujarat/valsad/valsad/chichwada.html
- Google map (L-20.55547,M-72.93819)

CHAPTER 12: Annexure attachment :

12.1 Survey form of Ideal Village Scanned copy attachment in the report for Part-I :



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:	Babem
Name of Taluka:	Bardoli
Name of District:	Surat
Name of Institute:	Gov. Engg. College, Valsad
Nodal Officer Name & Contact Detail:	Proff. Dhaval Barot 9820957270
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Falgunibe[illegible] Bhavesh bhai Patel સરપંચ ગ્રામ પંચાયત બાબેન તા. બારડોલી, જી. સુરત.
Date of Survey:	12/2/21

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	8377	4576	3801	1599
ii)	2011	15610	8642	6968	5278

2. **Geographical Detail:**

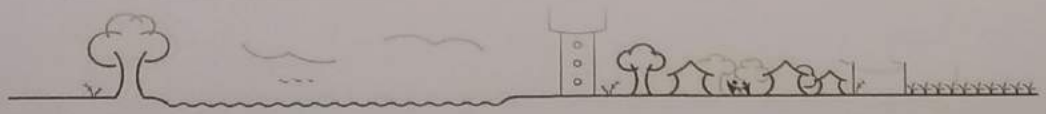
Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	466 Hact
	Forest Area (In hect.)	—
	Agricultural Land Area (In hect.)	282 Hact
	Residential Area (In hect.)	140 Hact
	Other Area (In hect.)	41 Hact
	Water bodies	—
	Nearest Town with Distance:	Bardoli - 1 Km

3. **Occupational Details:**

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

4. **Physical Infrastructure Facilities:**

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
	• Tap Water (Treated/ Untreated)	Yes	Yes		Good
	• RO Water				
	• Well (Covered/ Uncovered)	NO	-	-	-
	• Hand pumps				
	• Tube well/ Borehole	Borehole	-	-	-
	• River/ Canal/ Spring/ Lake/ Pond	Yes	Yes	-	1 Lake
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	40000	80000 Lit	
	Underground Sump	Capacity:	-	-	
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	Yes	Yes	-	Under-ground
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open				
	If Open than Pucca / Kutchcha				
	Whether drain water is discharged directly in to Water bodies/ Sewer plants				
Suggestions if any:					



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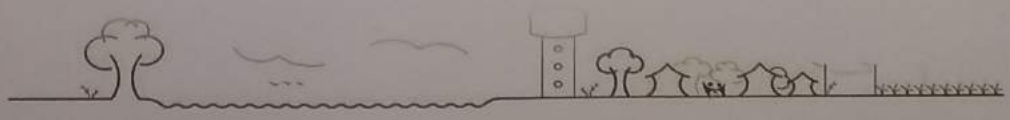
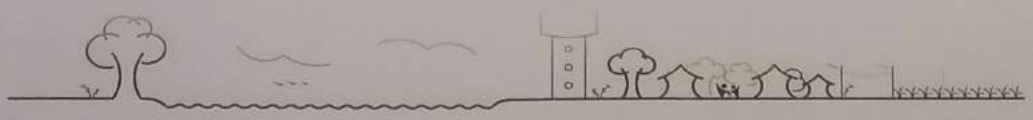
E.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	All weather	—	—	All weather
	Main road	Yes	—	—	All weather
	Internal streets	Yes	—	—	All weather
	Nearest NH/SH/MDR/ODR Dist. in kms.	Yes	—	—	NH-53 5 km
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	Yes	—	—	1 km Bardoli
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes	—	—	Baben
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	—	-	Auto/ Private Vechicle
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes	—	-	GOVT 24 Hours DGVCL
	Power supply for Domestic Use	Yes	-	-	24 Hours
	Power supply for Agricultural Use	Yes	—	—	Fixed Hours
	Power supply for Commercial Use	Yes	—	-	24 Hours
	Road/ Street Lights	Yes	-	—	-



	Electrification in Government Buildings/ Schools/ Hospitals	Yes	–	–	–
	Renewable Energy Source Facilities (Y/ N)	NO	–	–	–
	LED Facilities	Yes	–	–	–
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes	–	–	8 Nos
	Location Condition	Good	–	–	–
	Community Toilet (With bath/ without bath facilities)	Yes	–	–	with Bath
	Solid & liquid waste Disposal system available	NO	–	–	–
	Any facility for Waste collection from road	Yes	–	–	4 Vehicles
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Yes	–	–	Private Bore well & From canal
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Pucca	–	–	minor House has Kutchha

5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks



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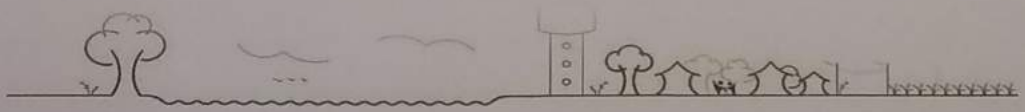
K.	**Health Facilities:**				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	Yes	–	–	Sub-center PHC
	Private Clinic/Private Hospital/ Nursing Home	Yes	–	–	Private clinic & Hospital
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					

L.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes	Yes	–	8 Nos
	Primary School	Yes	Yes	–	1
	Secondary school	Yes	Yes	–	1
	Higher sec. School	Yes	Yes	–	1
	ITI college/ vocational Training Center	–	–	–	–
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	Yes	Yes	–	1 Engineering
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					

M.	**Socio- Culture Facilities**				
	Community Hall (With or without TV) Location:	Yes –	Yes –	– –	– –



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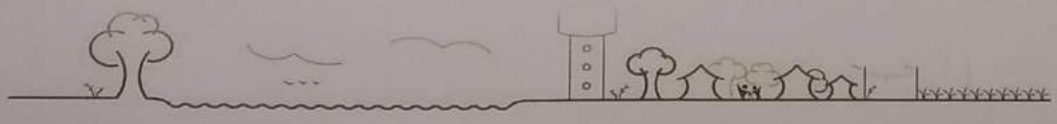
	Condition:				
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	Yes - Good	Yes - -	- - -	- - -
	Public Garden Location: Condition:	Yes 2 Nos Good	- - -	- - -	- - -
	Village Pond Location: Condition:	Yes 1 Nos Good	- - -	- - -	- - -
	Recreation Center Location: Condition:	Yes 4 Good	- - -	- - -	- - -
	Cinema/ Video Hall Location: Condition:	-	-	-	-
	Assembly Polling Station Location: Condition:	-	-	-	-
	Birth & Death Registration Office Location: Condition:	Panchayat - Good	- - -	- - -	- - -

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				
	Telecommunication Network/ STD booth				



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	General Market	Small	Yes	–	–
	Shops (Public Distribution System)	–	–	–	–
	Panchayat Building	Yes	1 Nos	–	Good
	Pharmacy/Medical Shop	Yes	2-3	–	Good
	Bank & ATM Facility	Yes	3-4	–	Good
	Agriculture Co-operative Society	Yes	1 Nos	–	Good
	Milk Co-operative Soc.	–	–	–	–
	Small Scale Industries	–	–	–	–
	Internet Cafes/ Common Service Center/Wi Fi	–	–	–	–
	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	No	–	–	–
P.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	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	
Any NGO working for village development	

8. Additional Information/ Requirement:

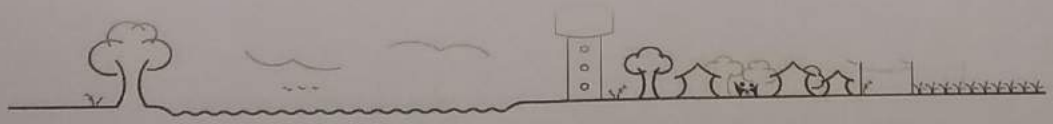
Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Repair & Maintenance of Existing Public Infrastructure facilities(School Building, Health Center, Panchayat Building, Public Toilets & any other)		
2.	Additional Information/ Requirement	All facilites available	-

9. Smart Village Proposal Design

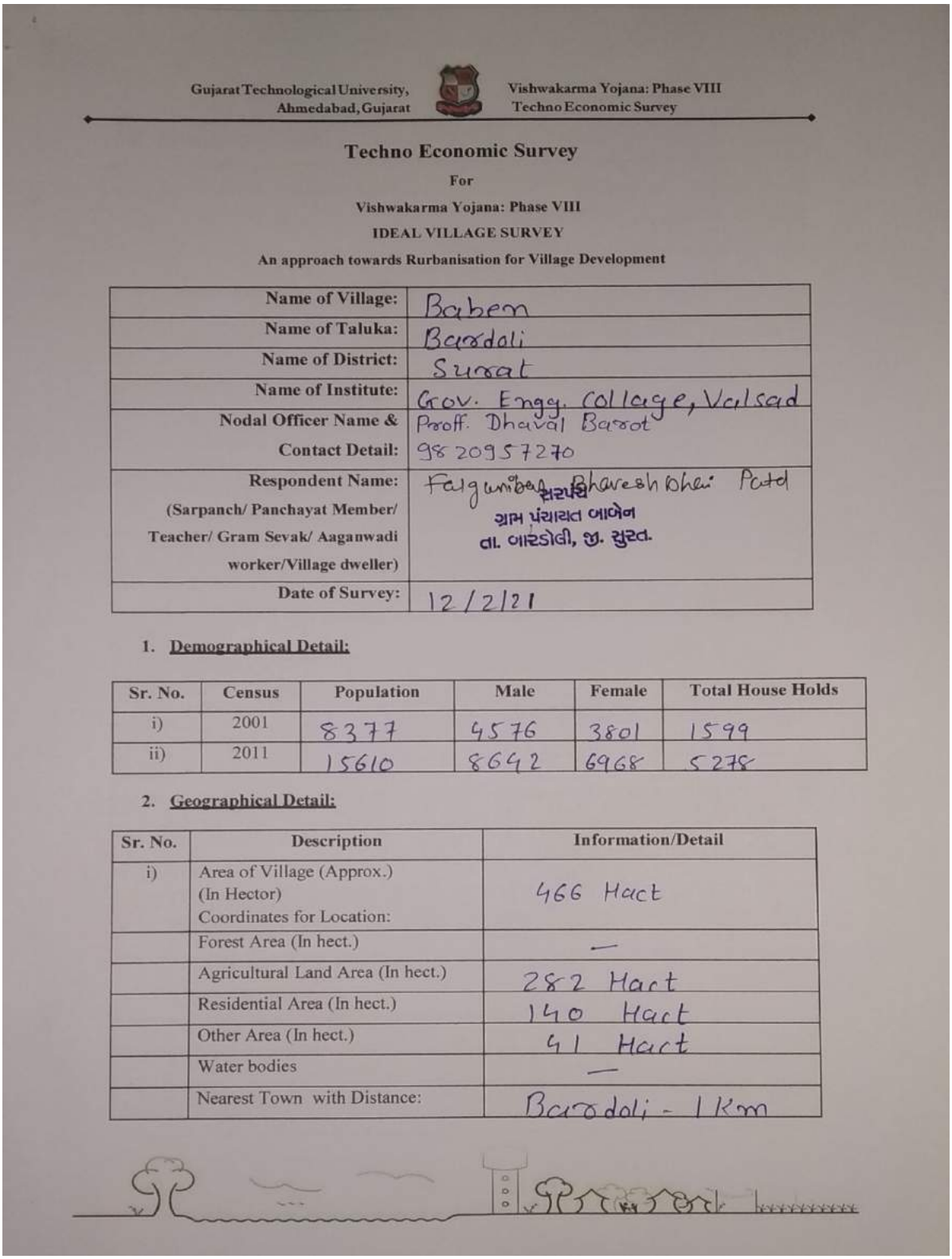
Sr. No.	Descriptions	Information/ Detail	Remarks
1.			

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

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



12.2 Survey form of Smart Village Scanned copy attachment in the report for Part-I :



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

Name of Village:	Babem
Name of Taluka:	Bardoli
Name of District:	Surat
Name of Institute:	Gov. Engg. College, Valsad
Nodal Officer Name & Contact Detail:	Proff. Dhaval Barot 9820957270
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Falguniben Bhavesh bhai Patel સરપંચ ગ્રામ પંચાયત બાબેન તા. બારડોલી, જી. સુરત.
Date of Survey:	12/2/21

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	8377	4576	3801	1599
ii)	2011	15610	8642	6968	5278

2. **Geographical Detail:**

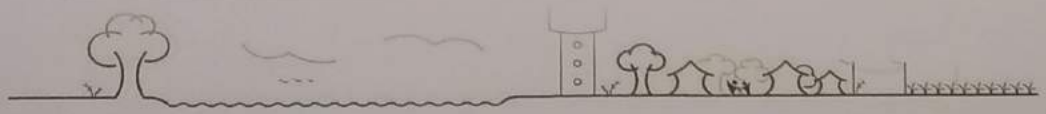
Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	466 Hact
	Forest Area (In hect.)	—
	Agricultural Land Area (In hect.)	282 Hact
	Residential Area (In hect.)	140 Hact
	Other Area (In hect.)	41 Hact
	Water bodies	—
	Nearest Town with Distance:	Bardoli - 1 Km

3. **Occupational Details:**

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

4. **Physical Infrastructure Facilities:**

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
	• Tap Water (Treated/ Untreated)	Yes	Yes		Good
	• RO Water				
	• Well (Covered/ Uncovered)	NO	-	-	-
	• Hand pumps				
	• Tube well/ Borehole	Borehole	-	-	-
	• River/ Canal/ Spring/ Lake/ Pond	Yes	Yes	-	1 Lake
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	40000	80000 Lit	
	Underground Sump	Capacity:	-	-	
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	Yes	Yes	-	Under-ground
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open				
	If Open than Pucca / Kutchcha				
	Whether drain water is discharged directly in to Water bodies/ Sewer plants				
Suggestions if any:					



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Vishwakarma Yojana: Phase VIII
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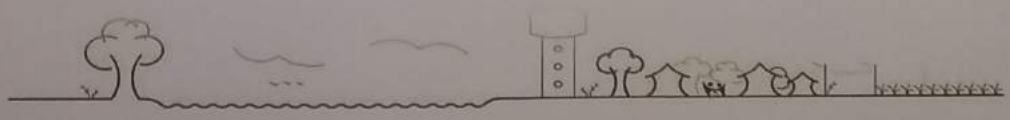
E.	Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM				
	Village approach road	All weather	—	—	All weather
	Main road	Yes	—	—	All weather
	Internal streets	Yes	—	—	All weather
	Nearest NH/SH/MDR/ODR Dist. in kms.	Yes	—	—	NH-53 5 km
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	Yes	—	—	1 Km Bardoli
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes	—	—	Baben
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	—	-	Auto/ Private Vechicle
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes	—	-	GOVT 24 Hours DGVCL
	Power supply for Domestic Use	Yes	-	-	24 Hours
	Power supply for Agricultural Use	Yes	—	—	Fixed Hours
	Power supply for Commercial Use	Yes	—	-	24 Hours
	Road/ Street Lights	Yes	-	—	-



	Electrification in Government Buildings/ Schools/ Hospitals	Yes	–	–	–
	Renewable Energy Source Facilities (Y/ N)	NO	–	–	–
	LED Facilities	Yes	–	–	–
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes	–	–	8 Nos
	Location Condition	Good	–	–	–
	Community Toilet (With bath/ without bath facilities)	Yes	–	–	with Bath
	Solid & liquid waste Disposal system available	NO	–	–	–
	Any facility for Waste collection from road	Yes	–	–	4 Vehicles
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Yes	–	–	Private Bore well & From canal
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Pucca	–	–	minor House has Kutchha

5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks

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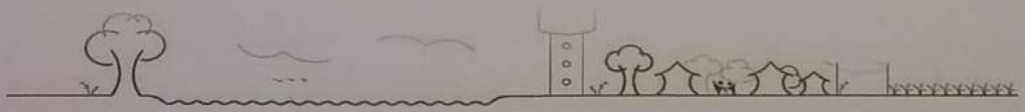
K.	**Health Facilities:**				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	Yes	–	–	Sub-center PHC
	Private Clinic/Private Hospital/ Nursing Home	Yes	–	–	Private clinic & Hospital
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					

L.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes	Yes	–	8 NOS
	Primary School	Yes	Yes	–	1
	Secondary school	Yes	Yes	–	1
	Higher sec. School	Yes	Yes	–	1
	ITI college/ vocational Training Center	–	–	–	–
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	Yes	Yes	–	1 Engineering
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					

M.	**Socio- Culture Facilities**				
	Community Hall (With or without TV) Location:	Yes –	Yes –	– –	– –



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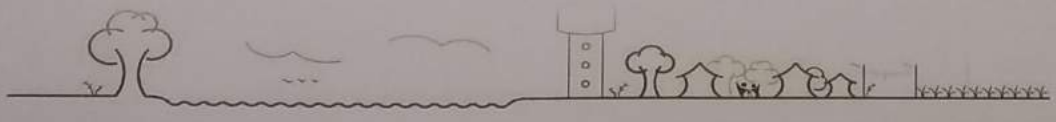
	Condition:				
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	Yes - Good	Yes - -	- - -	- - -
	Public Garden Location: Condition:	Yes 2 Nos Good	- - -	- - -	- - -
	Village Pond Location: Condition:	Yes 1 Nos Good	- - -	- - -	- - -
	Recreation Center Location: Condition:	Yes 4 Good	- - -	- - -	- - -
	Cinema/ Video Hall Location: Condition:	-	-	-	-
	Assembly Polling Station Location: Condition:	-	-	-	-
	Birth & Death Registration Office Location: Condition:	Panchayat - Good	- - -	- - -	- - -

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				
	Telecommunication Network/ STD booth				



	General Market	Small	Yes	–	–
	Shops (Public Distribution System)	–	–	–	–
	Panchayat Building	Yes	1 Nos	–	Good
	Pharmacy/Medical Shop	Yes	2-3	–	Good
	Bank & ATM Facility	Yes	3-4	–	Good
	Agriculture Co-operative Society	Yes	1 Nos	–	Good
	Milk Co-operative Soc.	–	–	–	–
	Small Scale Industries	–	–	–	–
	Internet Cafes/ Common Service Center/Wi Fi	–	–	–	–
	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	No	–	–	–
P.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	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	
Any NGO working for village development	

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)		
2.	Additional Information/ Requirement	All facilites available	-

9. Smart Village Proposal Design

Sr. No.	Descriptions	Information/ Detail	Remarks
1.			

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

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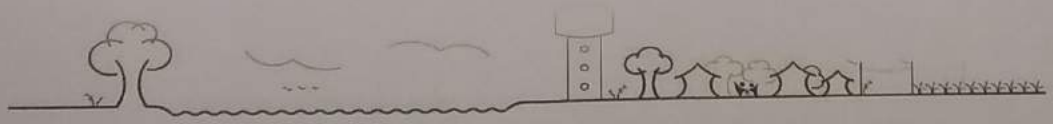

12.3 Survey form of Allocated Village Scanned copy attachment in the report for Part-I :

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

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

Name of District:	VALSAD
Name of Taluka:	VALSAD
Name of Village:	CHINCHWADA
Name of Institute:	GOVERNMENT ENG. COLLEGE, VALSAD
Nodal Officer Name & Contact Detail:	Proff. Dhaval Barot 9820957270
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	TUSHAR ANILBHAI PATEL
Date of Survey:	

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001				
2.	2011	1025	537	488	363

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	142.99 Hector
2.	Forest Area (In hect.)	25.48 Hector
3.	Agricultural Land Area (In hect.)	100.19 Hector
4.	Residential Area (In hect.)	0.2 Hector
5.	Other Area (In hect.)	3.24 (Gochar)
6.	Distance to the nearest railway station (in kilometers):	10 KM (Valsad)

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

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1. Vada 2. 3.

Major crops grown in the village:	1. Mango. 2. Chickoo 3. Rice

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
1.	**PIPED WATER** Piped Into Dwelling Piped To Yard/Plot Public Tap/Standpipe Tube Well Or Bore Well	Yes	✓		
2.	**DUG WELL** Protected Well Un Protected Well	Yes (16)	✓		
3.	**WATER FROM SPRING** Protected Spring Unprotected Spring				
	Rainwater Tanker Truck Cart With Small Tank				
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/** (1) Irrigation Channel Bottled Water Hand Pump Other(Specify)**Lake/ Pond**	Yes Yes Yes	✓ ✓		0.83 Hector 0.62 Hector

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Vishwakarma Yojana: Phase VIII
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Suggestions if any:						
B.	**Water Tank Facility**					
	Overhead Tank (2)	Capacity:	25K			
	Underground Sump (1)	Capacity:	50K			
Suggestions if any:						
C.	**The Type of Drainage Facility**					
	A. UNDERGROUND DRAINAGE 1 2 B. OPEN WITH OUTLET C. OPEN WITHOUT OUTLET	NO				
Suggestions if any:						
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**					
	Village approach road	Yes (2 Km)	✓			
	Main road					
	Internal streets					
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH-48 (2 Km)	✓			
Suggestions if any:						
E.	**Transport Facility**					
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	N				
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	N				
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Auto				
Suggestions if any:						
F.	**Electricity Distribution**					
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Y More than 6hr	✓			

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	Power supply for Domestic Use	Yes	✓		
	Power supply for Agricultural Use	Yes	✓		
	Power supply for Commercial Use	–			
	Road/ Street Lights	Yes	✓		
	Electrification in Government Buildings/ Schools/ Hospitals	Panchayat-✓ School-✓ Aangan wadi-✓			
	Renewable Energy Source Facilities (Y/ N)	N			
	LED Facilities	Y	✓		(In Street lights)
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	N (Private)			
	Location Condition	–			
	Community Toilet (With bath/ without bath facilities)	N			
	Solid & liquid waste Disposal system available	N			
	Any facility for Waste collection from road	Y	✓		Parodi - Panchayat & Gram Panchayat
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL. OTHER (SPECIFY)	Canal - ✓ Tubewell-✓ well - ✓ Private Boaring-✓			
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Kuchha-Less Puccal-More			363 - Total 60 - Kuccha

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	4			
	Sub-Centre	4			
	PHC				
	BLOCK PHC				
	CHC/RH				
	District/ Govt. Hospital	NO			
	Govt. Dispensary				
	Private Clinic				
	Private Hospital/ Nursing Home	NO			
	AYUSH Health Facility				
	sonography /ultrasound facility				
	If any of the above Facility is not available in village than approx. distance from village: 02...kms. Parmeshvar - Parodi				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes	✓		
	Primary School	Yes		✓	
	Secondary school	NO			
	Higher sec. School	NO			
	ITI college/ vocational Training Center	NO			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	NO			PTC - College in Parodi - Parmeshvar
	If any of the above Facility is not available in village than approx. distance from village: ...10...kms. to Valsad				

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Suggestions if any:

L.	Socio- Culture Facilities	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	NO			
	Public Library (With daily newspaper supply: Y/N)	NO			
	Public Garden	NO			
	Village Pond 01	Good	In Village		
	Recreation Center				
	Cinema/ Video Hall				
	Assembly Polling Station				
	Birth & Death Registration	Gram Panchayat			

If any of the above Facility is not available in village than approx. distance from village: ..10....kms.

Suggestions if any:

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

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	Credit Cooperative Society Agricultural Cooperative Society Milk Cooperative Society (1) Fishermen's Cooperative Society Computer Kiosk/ e-chaupal / Mills / Small Scale Industries				
	Other Facility	Wi-Fi			

Suggestions if any:

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

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

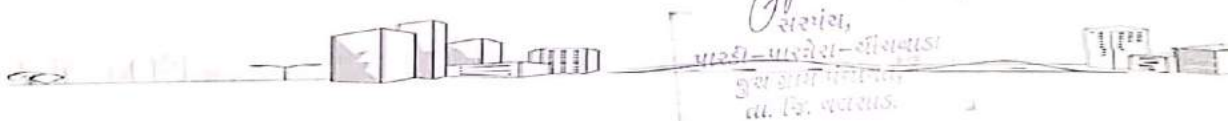
Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources				Required
2.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System				Required
3.	Any Other				

VII. DATA COLLECTION FROM VILLAGE

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

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 (Required)		
2.	Additional Information/ Requirement	Public Garden,	
3.	During the last six months how many times CLEANING ……………………………. FOGGING………………………………. Drive was undertaken in the village?		

IX. Smart Village / Heritage Details

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

> **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:
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Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

12.4 Gap Analysis of the Allocated Village: (T-12.4- Gap Analysis)

Facilities	**Planning Commission/UDPFI Norms**	**Village Name**	**Chinchwada**	
		Population	1025	
		Existing	**Required as per Norms**	**Gap**
Social Infrastructure Facilities				
Education				
Anganwadi	Each or Per 2500 population	1	1	0
Primary School	Each Per 2500 population	1(Inadequate)	1	0
Secondary School	Per 7,500 population	-	-	-
Higher Secondary School	Per 15,000 Population	-	-	-
College	Per 125,000 Population	-	-	-
Tech. Training Institute	Per 100000 Population	-	-	-
Agriculture Research Centre	Per 100000 Population	-	-	-
Health Facility				
Govt/Panchyat Dispensary or Sub PHC or Health Centre	Each Village	0	1	1
PHC & CHC	Per 20,000 population	-	-	-

Child Welfare and Maternity Home	Per 10,000 population	-	-	-
Hospital	Per 100000 Population	-	-	-
Public Latrines	1 for 50 families (if toilet is not there in home, especially for slum pockets & kutcha house)	0	1	1
Physical Infrastructure Facilities Transportation				
Transportation		Adequate/ Inadequate		
Pucca Village Approach Road	Each village		Adequate	-
Bus/Auto Stand provision	All Villages connected by PT (ST Bus or Auto)		No Bus Stand	1
Drinking Water (Minimum 70 lpcd)		Adequate/ Inadequate		
Over Head Tank	1/3 of Total Demand		No	1
U/G Sump	2/3 of Total Demand		No	1
Drainage Network		Adequate/ Inadequate		
open			No	1
cover			No	1
Waste Management System		Adequate/ Inadequate		
			No	1

Electricity Network		Adequate/ Inadequate		
			Adequate	0
Socio-cultural facilities				
Community Hall	Per 10000 Population	No	Required	-
Community hall cum Public Library	Per 15000 Population	No	Required	-
Cremation Ground	Per 20,000 population	No	Not Required	-
Post Office	Per 10,000 population	No	Required	
Gram Panchayat Building	Each individual/group panchayat	0	Inadequate	-
APMC	Per 100000 Population	No	Not Required	-
Fire Station	Per 100000 Population	No	Not Required	
Public Garden	Per village	No	Required	-
Police post	Per 40,000Population	No	Not Required	-

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

Sr. No.	Village Name	Discipline	Part-I	Part-II
1	**Bhagod**	Civil	Bus Stop	Hospital
			Community Hall / Meeting Room	Village Gate
			Primary School Toilet	Medical Shop
		Electrical	Smart Irrigation	Roof top Solar Panel

			Smart Dustbin	Electrical Layout of Hospital
			Home Automation	Electrical Layout of Medical Shop
2	**Bhadelijagalala**	**Civil**	Anganwadi	Community hall
			Gram panchayat	Design of street light points near existing pond
			Primary health center	Crematorium
		Electrical	IR based hand sanitizer dispenser	Electrical wiring layout of primary health center
			Automatic Solar panel cleaning machine	Electrical wiring concept of anganwadi
			Live energy monitoring	Automatic water level controller
3	**Kewada**	**Civil**	Anganwadi	Panchayat office
			Bus stop	Public toilet
			Pond	Library
		Electrical	Single phase to three phase converter	Electrical wiring layout of anganwadi
			Smart irrigation system	Electrical wiring layout of bus stop
			Solar street lights	Electrical wiring layout of panchayat office
4	**Chichwada**	**Civil**	Public Toilet	Primary School
			Village Gate	PHC Center
			Community Hall	BUS Stop
		Electrical	Automatic Water Level Controller	Solar panel Clearing
			Motion Activated Street Light	Off grid Solar System
			Roof Top Solar Panel	Primary School Wring

12.6 Drawings (If, required, A1, A2, A3 design is not visible then Only):

All the drawings and images are attached in their respective chapters along with designs and their listing are mentioned in the list of figures along with their page numbers. And we have

added A3 sheets of proposed designs at the end of the Vishwakarma Yojana Phase VIII part 1 report.

12.7 Summary of Good Photographs in Table Format (village visits, Ideal, Smart Village or any other) : (T-12.7- Summary of all village photographs)

❖ **Summary Of Photographs Of Chichwada – Allocated Village :**

Fig. 12.1 Summary Photographs of Chichwada village(Allocated Village)

❖ **Summary Of Photographs Of Baben – Ideal Village :**

Fig. 12.2 Summary Photographs of Baben Village(Ideal Village)

❖ **Summary Of Photographs Of Kmrej – Smart Village :**

Fig. 12.3 Summary Photographs of Kamrej village(Smart Village)

12.8 Village Interaction with sarpanch/talati Report with the photograph :

Letter of Interaction with Village Sarpanch

Vishwakarma Yojana project phase VIII

Chichwada Village, Valsad Taluka, Valsad District,

Pin Code: 396020

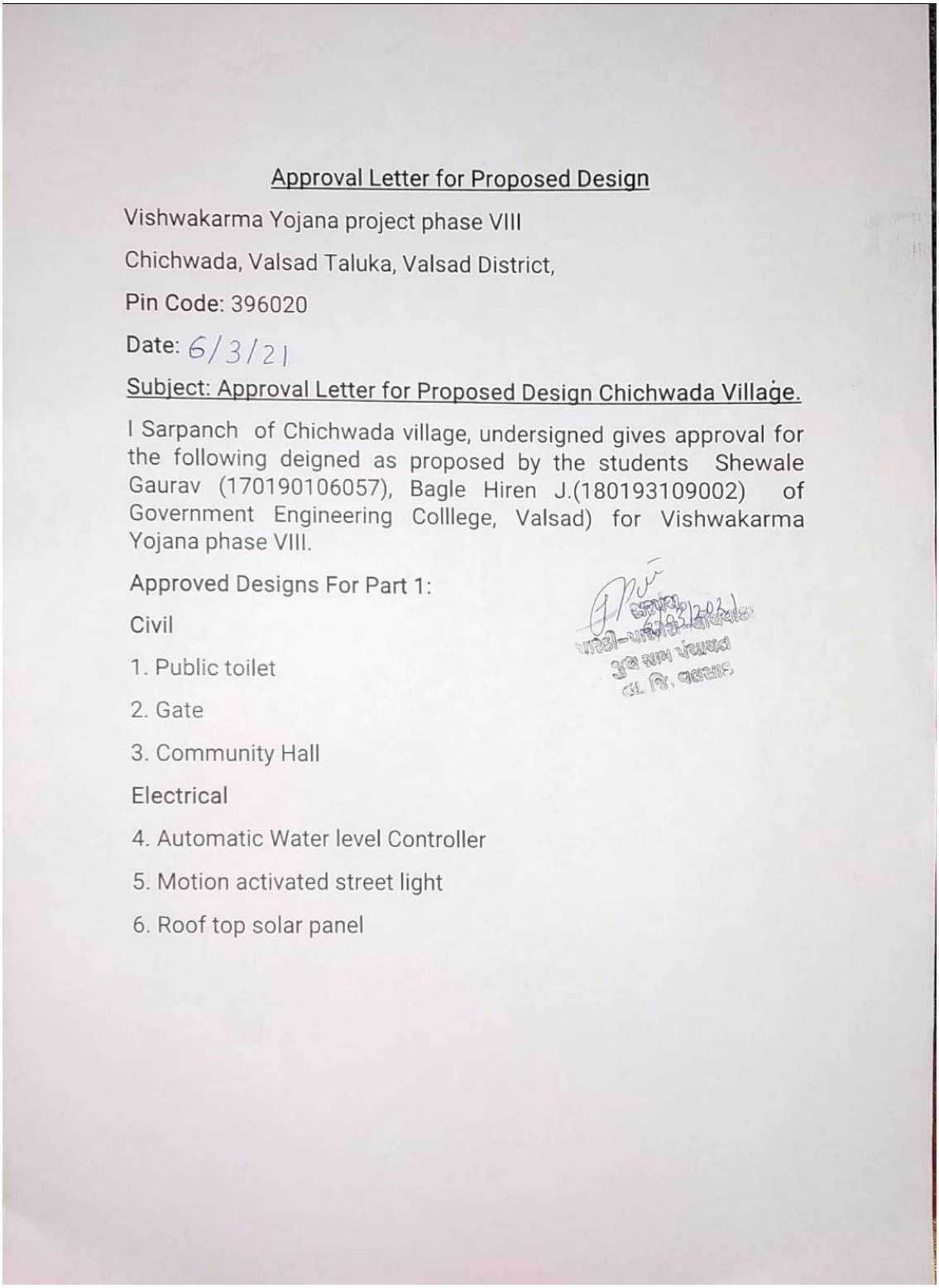
Date: 6/3/21

Subject: Interaction of Students with Sarpanch (Chichwada Village)

I sarpanch of Chichwada Village, undersigned had an interaction with the students(Shewale Gaurav B. (170190106057), Bagle Hiren J.(180193109002) of Government Engineering Colllege, Valsad) for Vishwakarma Yojana phase VIII.

Sign: 6/03/2021

12.9 Sarpanch Letter giving information about the village development:



Approval Letter for Proposed Design

Vishwakarma Yojana project phase VIII

Chichwada, Valsad Taluka, Valsad District,

Pin Code: 396020

Date: 6/3/21

Subject: Approval Letter for Proposed Design Chichwada Village.

I Sarpanch of Chichwada village, undersigned gives approval for the following deigned as proposed by the students Shewale Gaurav (170190106057), Bagle Hiren J.(180193109002) of Government Engineering Colllege, Valsad) for Vishwakarma Yojana phase VIII.

Approved Designs For Part 1:

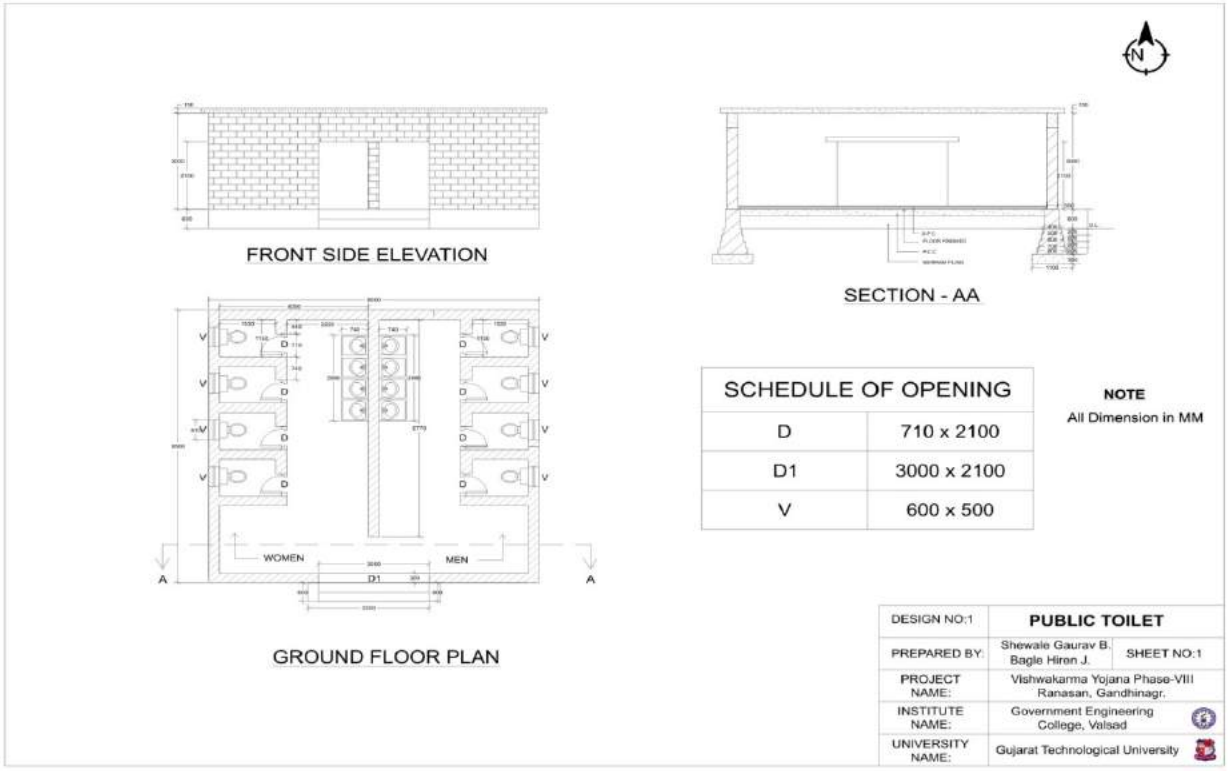
Civil

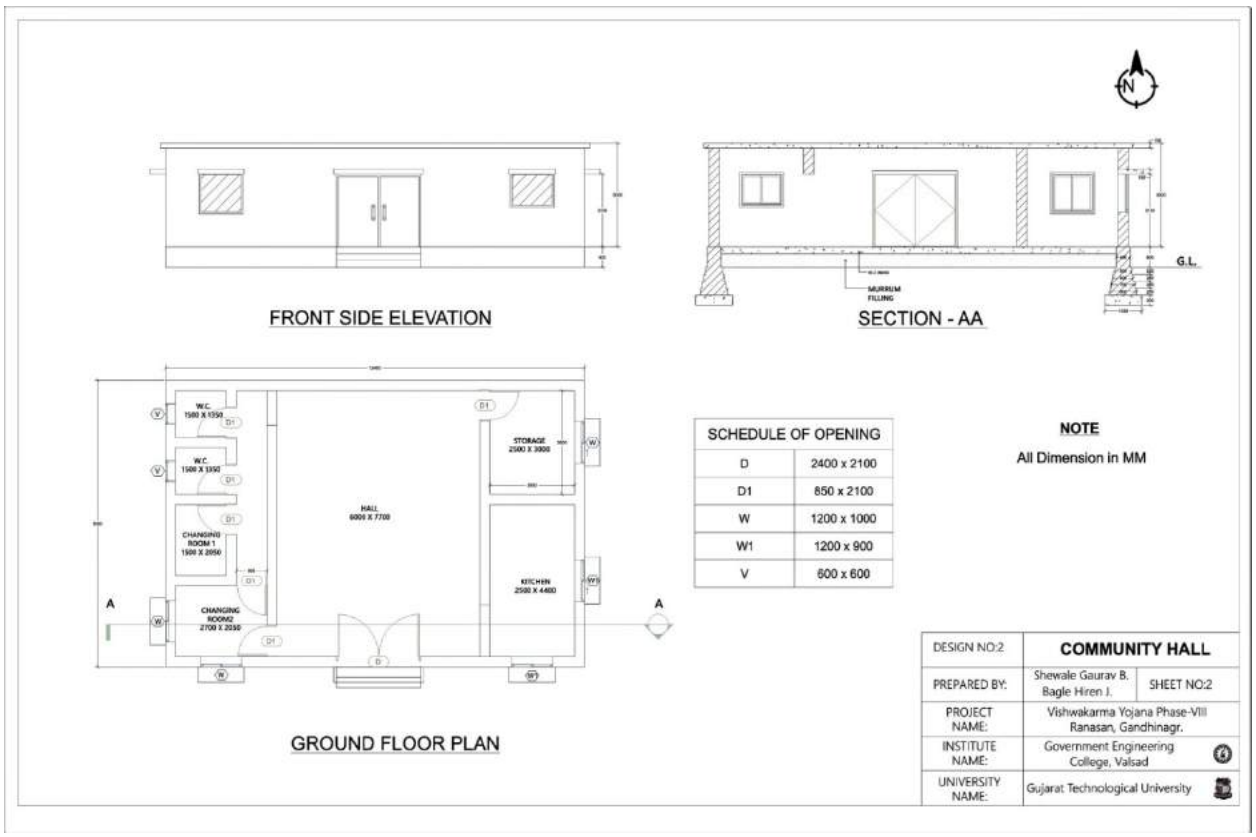
1. Public toilet
2. Gate
3. Community Hall

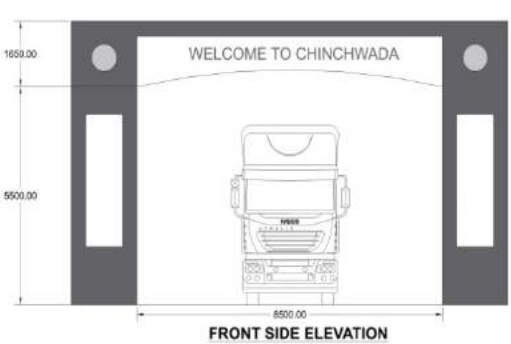
Electrical

4. Automatic Water level Controller
5. Motion activated street light
6. Roof top solar panel

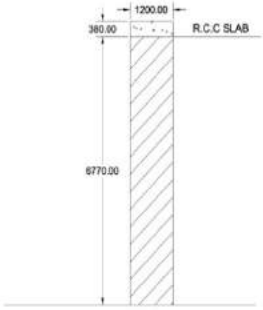
12.10 Comprehensive report preparation as per format




FRONT SIDE ELEVATION
SECTION - AA
G.L.
GROUND FLOOR PLAN
W.C.
W.C.
CHANGING ROOM 1
CHANGING ROOM2
HALL
STORAGE
KITCHEN
A
A
SCHEDULE OF OPENING
D 2400 x 2100
D1 850 x 2100
W 1200 x 1000
W1 1200 x 900
V 600 x 600
NOTE
All Dimension in MM
DESIGN NO:2
COMMUNITY HALL
PREPARED BY:
Shewale Gaurav B.
Bagle Hiren J.
SHEET NO:2
PROJECT NAME:
Vishwakarma Yojana Phase-VIII Ranasan, Gandhinagr.
INSTITUTE NAME:
Government Engineering College, Valsad
UNIVERSITY NAME:
Gujarat Technological University



FRONT SIDE ELEVATION



SECTION - AA

NOTE

All Dimension in MM

PLAN

DESIGN NO:3	**Village Gate**	
PREPARED BY:	Shewale Gaurav B. Bagle Hiren J.	SHEET NO:3
PROJECT NAME:	Vishwakarma Yojana Phase-VIII Ranasan, Gandhinagr.	
INSTITUTE NAME:	Government Engineering College, Valsad	
UNIVERSITY NAME:	Gujarat Technological University	

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

13.1 Design Proposals : Observation and brief write up about each design from 13.1.1 to 13.1.6

****All the drawings ,of proposed designs like plan, elevation, section and 3D model , have been added at the end of report of part 1 from page number 178 to 189. And all these drawings have also been added in their respective designs.**

13.1.1 Health Facility Design (Civil): PHC Center:

Scenario :

There is no PHC Center in chichwada village. For any emergency of village people they need to go primary health center at pardi. Pardi is 3km away form chichwada village.so village need one PHC Center for good health for village people.

Existing Situation in Chichwada :

By getting feedback form villages, they need one PHC Center. There is one Sub PHC Center but in Sub PHC Center only some find of facilities, like vaccination and new born baby care center.so they need one PHC Center with good health facilities.

Sustainability of the design :

Public Toilet as an important tool :

Design Utilized by,

All the people living in the village of even outsiders from nearby villages can use or utilize a PHC Center for their health use.

Needs :

Anyone using PHC Center for their good health use.

Design brief :

PHC Center has a good toilet facilities. Villages do their health work in PHC Cernter.

Proposed Design in Auto cad; Revit and Skech up :

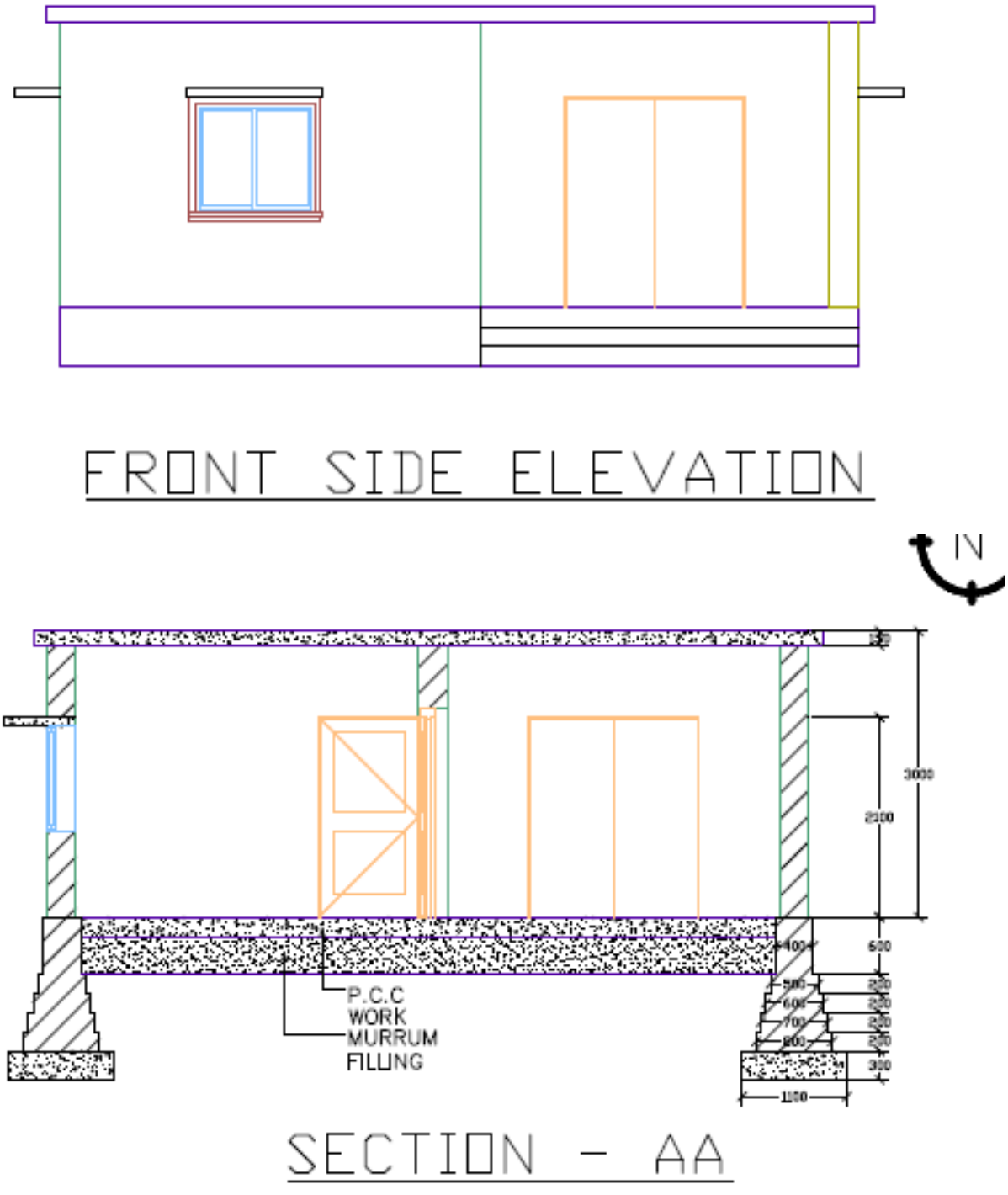
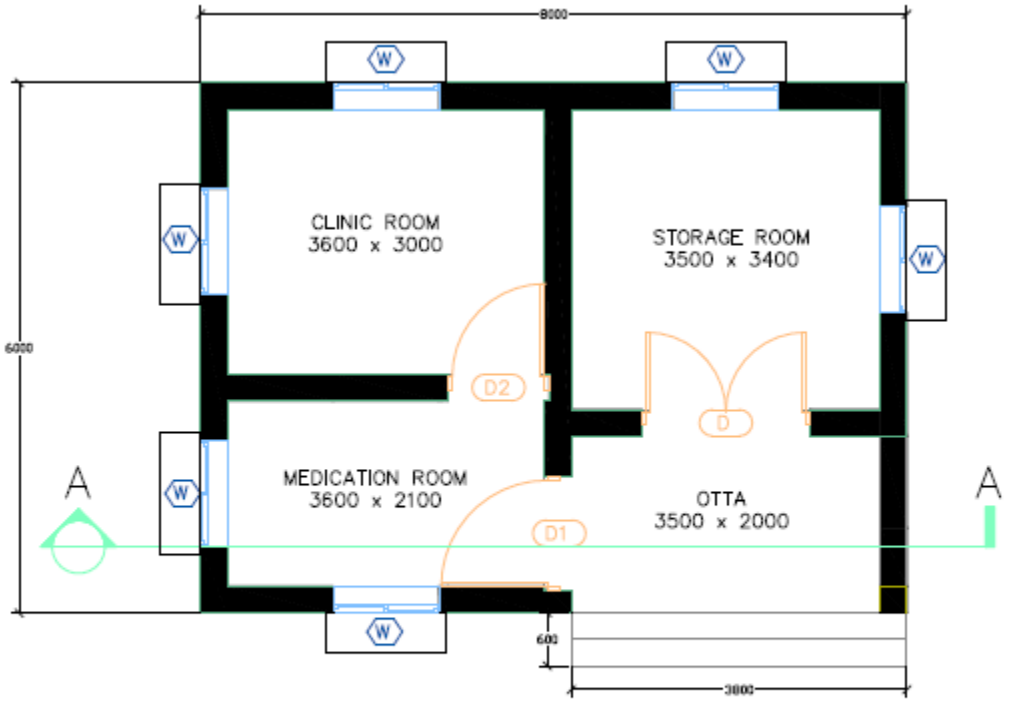


Fig. 13.1 Front side elevation and Section of PHC Centre

*All Dimensions are in mm



GROUND FLOOR PLAN

SCHEDULE OF OPENING	
D	1800 x 2100
D1	1200 x 2100
D2	1050 x 1000
W	1200 x 1100

Fig. 13.2 Ground floor plan and schedule of opening of PHC Center

*All Dimensions are in mm

PHC Center : Measurement Sheet (T-13.1- measurement sheet)

Table 13.1 PHC Center: Measurement Sheet						
Item No.	**Description**	**No.**	**Length (m)**	**Width (m)**	**Height (m)**	**Quantity**
1	Earthwork in excavation for foundation					
	Total center line length					
	L=7.7x3+5.7x3=40.2					
	No of junctions =6					
	L=40.2-(0.5x6x1.10)=36.9	1	36.9	1.10	1.10	44.649 m^3
2	PCC 1:4:8 for foundation	1	36.9	1.10	0.3	12.177 m^3
3	Brick masonry up to plinth in cm 1:6					
	First step					
	L=65.9	1	37.8	0.8	0.2	6.048
	Second step					
	L=66.6	1	38.1	0.7	0.2	5.334
	Third step					
	L=66.9	1	38.4	0.6	0.2	4.608
	Fourth step					
	L=67.6	1	38.7	0.5	0.2	3.87
	Fifth step					
	L=68.7	1	39	0.4	0.6	9.36
	Masonry for step					
	Step 1	1	3.8	0.6	0.2	0.456
	Step 2	1	3.8	0.3	0.2	0.228
					Total	29.904 m^3
4	Earth work in backfilling for plinth					
	Storage Room	1	3.5	3.4	0.6	7.14
	Clinic Room	1	3.6	3.0	0.6	6.48
	Medication Room	1	3.6	2.1	0.6	4.536
	Otta	1	3.5	2.0	0.6	7
					Total	25.156 m^3
5	Brick masonry above plinth up to slab level in cm1:6					
	L=39.3	1	39.3	0.3	3.0	35.37

	Deduction for door window and ventilation					
	D	1	1.8	0.3	2.1	1.134
	D1	1	1.2	0.3	2.1	0.756
	D2	1	1.050	0.3	2.1	0.6615
	W	6	1.2	0.3	1.10	2.376
					Total	-4.928
	Deduction for lintel					
	D	1	2.1	0.3	0.1	0.063
	D1	1	1.5	0.3	0.1	0.045
	D2	1	1.35	0.3	0.1	0.0405
	W	6	1.5	0.3	0.1	0.27
					Total	-0.4185
					Net Total	30.024 m^3

6	Smooth Plaster inside room & ceiling					
	Plaster of walls;					
	Storage Room	2 2	3.5 3.4	- -	3 3	21 20.4
	Clinic Room	2 2	3.6 3.0	-	3 3	21.6 18
	Medication Room	2 2	3.6 2.1	-	3 3	21.6 12.6
	Otta	1 1	3.5 2.0	- -	3 3	10.5 6
	Plaster for ceiling;					
	Storage Room	1	3.5	3.4	-	11.9
	Clinic Room	1	3.6	3.0	-	10.8
	Medication Room	1	3.6	2.1	-	7.56
	Otta	1	3.5	2.0	-	7
					Total	168.96
	Deduction for doors					
	D(2/2)	1	1.8	-	2.1	3.78
	D1(2/2)	1	1.2	-	2.1	2.52
	D2(2/2)	1	1.050	-	2.1	2.205
	W(6/2)	3	1.2	-	1.10	3.96
					Total	-12.465
					Net Total	156.495 m^2
7	RCC slab 0.15m thick 1:1.5:2	1	8	6	0.15	7.2
	RCC chajja for door window					
	W	6	1.36	0.45	0.10	0.3672
					Total	7.5672

8	1% steel of RCC work are used					594 kg
	Binding wire					6 kg

PHC Center : Abstract Sheet (T-13.2- PHC Center abstract sheet)

Table 13.2 PHC Center : Abstract Sheet

Sr. no	item Description	QTY	Rate (Rs.)	Per	Amount (Rs.)
1	Earthwork in excavation for foundation	44.649 cum	90.00	cum	4,018.41
2	PCC 1:4:8 for foundation	12.177 cum	3500.00	cum	42,619.50
3	Brick masonry up to plinth in cm 1:6	29.904 sq.m.	150.00	sq.m.	4,485.60
4	Earth work in backfilling for plinth	25.156 cum	500.00	cum	12,578.00
5	Brick masonry above plinth up to slab level in cm1:6	30.024 sq.m.	150.00	sq.m.	4503.60
6	Smooth Plaster inside room & ceiling	156.495 sq.m.	120	sq.m.	18,779.40
7	RCC slab and Chajja 0.15m thick 1:1.5:2	7.5672 cum	450	cum	3,405.24
8	1% steel of RCC work are used	600 kg	60	kg	36,000.00
				Total	1,26,389.75
			Add 1.5% Water Charge		1,895.84
			Add 10% con. Charge		12,638.975
			3% Contingency		3,791.69
			Total Estimate Cost in Rs.		1,44,716.25

The rates of their respective works provided in the abstract sheet along with quantities are inclusive of water charges, contractor's profit, contingencies, utilities and labor charges.

Total cost = ₹ 1, 44,716.25/-

13.1.2 Transportation Design (Civil): BUS Stop

Scenario:

Buses are the predominant mode of transportation for the village people. Bus stop is an essential part of bus transportation system. As the population of Chichwada village increases continuously, we propose construction of bus stop as a physical design.

Existing situation of Krushnapur village:

Currently there is no proper Bus stand in Chichwada village. Require one more bus stand.

Sustainability of design proposal:

By providing a Bus stand, the village would acquire proper identification on the route. Bus stand with shelter would also provide better facility to the villagers.

Proposed Design in Auto cad; Revit and Skech up:

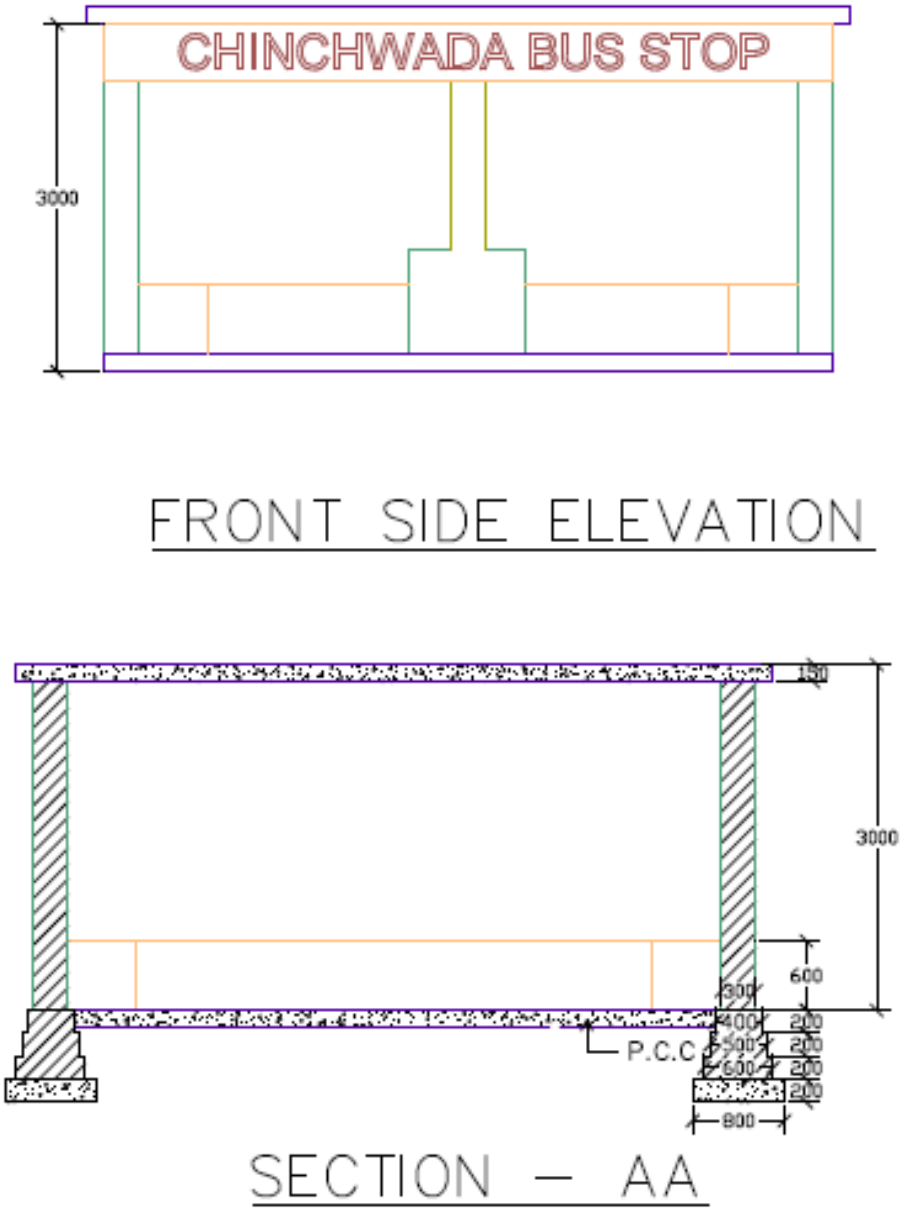
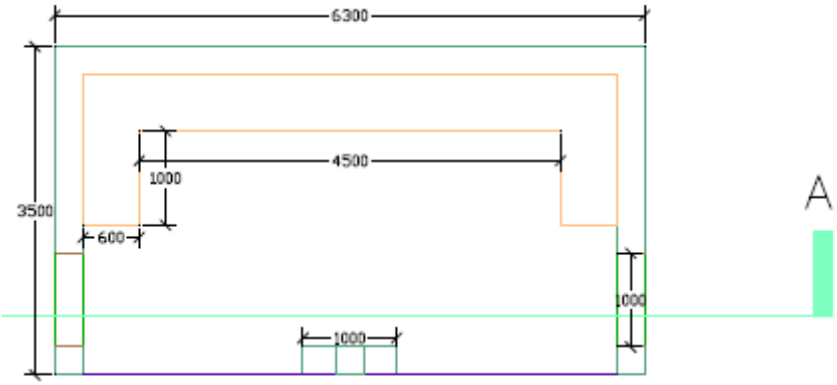


Fig. 13.3 Front side elevation, section of BUS Stop

*All Dimensions are in mm



PLAN

*All Dimensions are in mm

Fig. 13.4 Plan of BUS Stop

BUS Stop : Measurement Sheet (T-13.3- measurement sheet)

Table 13.3 BUS Stop : Measurement Sheet

Item No.	Description	No.	Length (m)	Width (m)	Height (m)	Quantity
1	Earthwork in excavation for foundation					
	Total center line length					
	L=6.3x2 + 3.5x2=19.6					
	No of junctions =0					
	L=19.6-(0.5x0x1.10)=19.6	1	19.6	0.8	0.8	15.544 m^3
2	PCC 1:4:8 for foundation	1	19.6	0.8	0.2	3.316 m^3
3	Brick masonry up to plinth in cm 1:6					
	First step					
	L=19.6	1	19.6	0.6	0.2	2.352
	Second step					
	L=66.6	1	19.6	0.5	0.2	1.96
	Third step					
	L=66.9	1	19.6	0.4	0.2	1.568
					Total	5.88 m^3
4	Brick masonry above plinth up to slab level in cm1:6					
	L=19.6	1	19.6	0.3	3.0	17.64

					Total	17.64 m^3
5	Smooth Plaster inside room & ceiling					
	Plaster of walls;					
	Waiting Room	2 2	6.3 3.5	- -	3 3	37.8 21
	Plaster for ceiling;					
	Waiting Room	1	6.3	3.5	-	22.05
					Total	80.85 m^3
6	RCC slab 0.15m thick 1:1.5:2	1	6.3	3.5	0.15	3.31
					Total	3.31 m^3
7	1% steel of RCC work are used					259.835 kg
	Binding wire					2.5 kg

BUS Stop : Abstract Sheet (T-8.4- BUS Stop abstract sheet)

Table 13.4 BUS Stop: Abstract Sheet

Sr. no	item Description	QTY	Rate (Rs.)	Per	Amount (Rs.)
1	Earthwork in excavation for foundation	15.544 cum	90.00	cum	1,398.60
2	PCC 1:4:8 for foundation	3.316 cum	3500.00	cum	11,606.00
3	Brick masonry up to plinth in cm 1:6	5.88 sq.m.	150.00	sq.m.	882.00
4	Brick masonry above plinth up to slab level in cm1:6	17.64 sq.m.	150.00	sq.m.	2,646.00
5	Smooth Plaster inside room & ceiling	80.85 sq.m.	120	sq.m.	9,702.00
6	RCC slab and Chajja 0.15m thick 1:1.5:2	3.31 cum	450	cum	1,489.5
7	1% steel of RCC work are used	262.33 kg	60	kg	15,740.10
				Total	43,464.20
			Add 1.5% Water Charge		651.96
			Add 10% con. Charge		4,346.42
			3% Contingency		1,303.926
			Total Estimate Cost in Rs.		49,766.506

The rates of their respective works provided in the abstract sheet along with quantities are inclusive of water charges, contractor's profit, contingencies, utilities and labor charges.

Total cost = ₹ 49,766.506/-

13.1.3 Education Design (Civil): Primary School

Scenario:

Chichwada village has one Primary school but Not in working condition. Primary Students of the Village are going for their study at pardi away 5km form Village. so by feedback of Students and their parents, they need one primary school at chichwada village.

Existing situation of Krushnapur village:

Currently there is no proper working school in village. students are going at pardi for their primary study.

Proposed Design in Auto cad; Revit and Skechup :

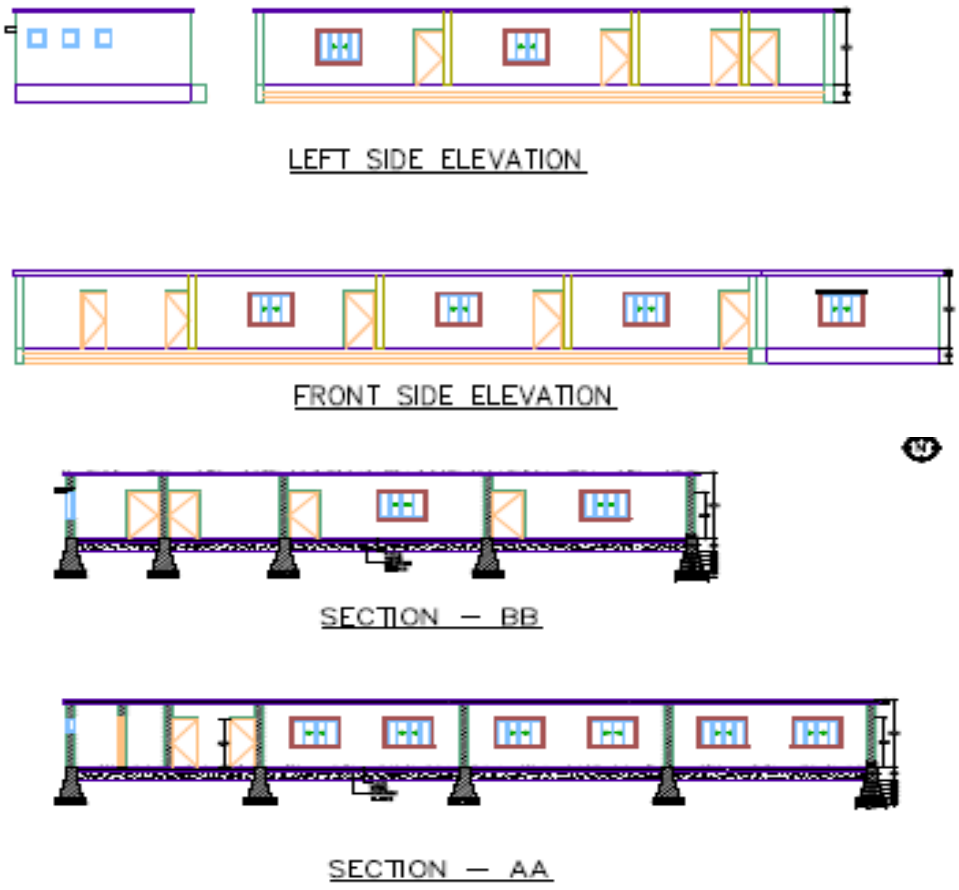


Fig. 13.5 Front side elevation, section of primary school

*All Dimensions are in mm

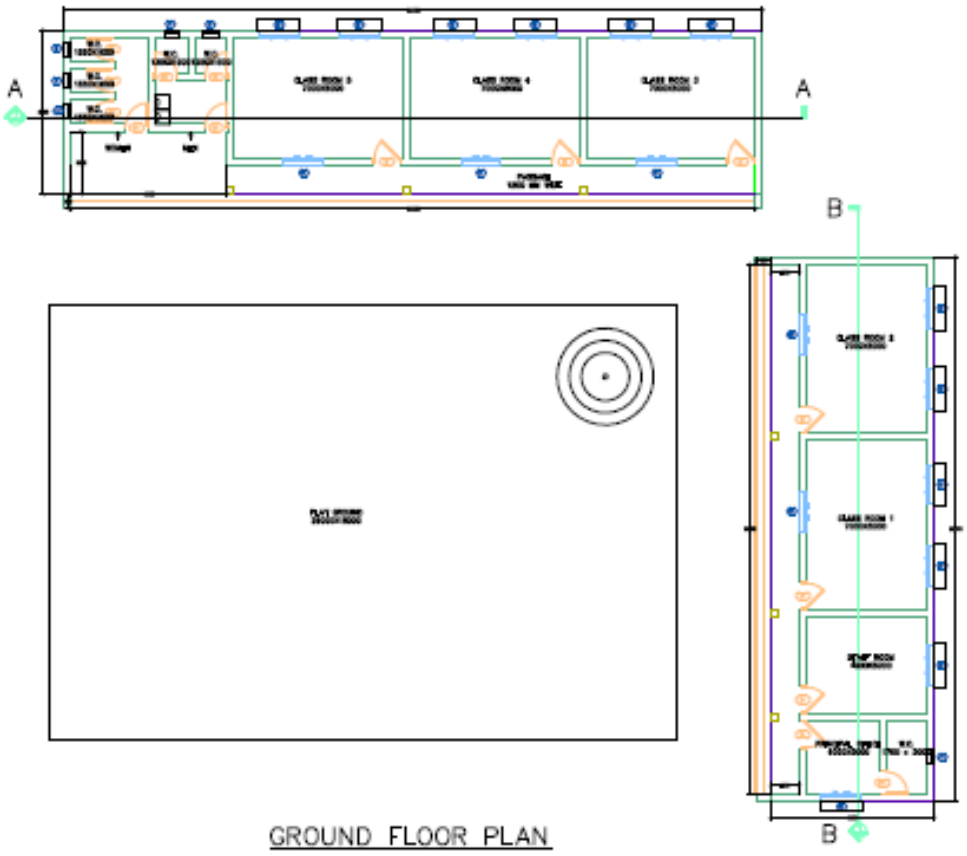


Fig. 13.6 Plan of primary school

Primary School : Measurement Sheet (T-13.5- measurement sheet)

Table 13.5 Primary School : Measurement Sheet

Item No.	Description	No.	Length (m)	Width (m)	Height (m)	Quantity
1	Earthwork in excavation for foundation					
	Total center line length					
	L=7.1x5+29.25x2+6.75+3.45x2+1.8+3.325+ 7.1x5+22.8x2+3.30+2.0=199.175					
	No of junctions =26					
	L=199.175-(0.5x26x1.10)=184.875	1	184.875	1.10	1.10	223.698 m^3
2	PCC 1:4:8 for foundation	1	184.875	1.10	0.3	61.00 m^3
3	Brick masonry up to plinth in cm 1:6					

	First step					
	L=188.775	1	188.775	0.8	0.2	30.204
	Second step					
	L=190.075	1	190.075	0.7	0.2	26.610
	Third step					
	L=191.375	1	191.375	0.6	0.2	22.965
	Fourth step					
	L=192.675	1	192.675	0.5	0.2	19.267
	Fifth step					
	L=193.975	1	193.975	0.4	0.6	46.554
	Masonry for step					
	Step 1	1	50.25	0.6	0.2	6.03
	Step 2	1	50.25	0.3	0.2	3.015
					Total	154.645 m^3
4	Earth work in backfilling for plinth					
	Class Room	5	7	5	0.6	105
	Staff Room	1	4	5	0.6	12
	Principal Office	1	4	5	0.6	12
	W.C. (Principal Office)	1	1.7	3.0	0.6	3.06
	W.C. (Female)	3	1.55	1.0	0.6	2.79
	W.C. (Male)	2	1.35	1.5	0.6	2.43
	Lobby	1	50.25	1.2	0.6	36.18
					Total	173.46 m^3
5	Brick masonry above plinth up to slab level in cm1:6					
	L=195.275	1	195.275	0.3	3.0	175.747
	Deduction for door window and ventilation					
	D	7	1.050	0.3	2.1	4.630
	D1	8	0.90	0.3	2.1	4.536
	W	17	1.65	0.3	1.22	10.266
	V	6	0.6	0.3	0.6	0.648
					Total	-20.08
	Deduction for lintel					
	D	7	1.35	0.3	0.1	0.283
	D1	8	1.2	0.3	0.1	0.288
	W	17	1.95	0.3	0.1	0.9945
	V	6	0.9	0.3	0.1	0.162
					Total	-1.727
					Net Total	153.94 m^3

6	Smooth Plaster inside room & ceiling					
	Plaster of walls;					
	Class Room	15 10	7 5	- -	3 3	315.0 150.0
	Staff Room	3 2	4 5	-	3 3	36.0 30.0
	Principal Office	3 2	4 5	-	3 3	36.0 30.0
	W.C. (Principal Office)	2 2	1.7 3.0	- -	3 3	10.2 18.0
	W.C. (Female)	6 6	1.55 1.0	- -	3 3	9.3 6.0
	W.C. (Male)	4 4	1.35 1.5	- -	3 3	16.2 18
	Plaster for ceiling;					
	Class Room	5	7	5	-	175
	Staff Room	1	4	5	-	20
	Principal Office	1	4	5	-	20
	W.C. (Principal Office)	1	1.7	3.0	-	5.1
	W.C. (Female)	3	1.55	1.0	-	4.65
	W.C. (Male)	2	1.35	1.5	-	4.05
	Lobby	1	50.25	1.20	-	60.3
					Total	289.1
	Deduction for doors					
	D(14/2)	7	1.050	-	2.1	3.78
	D1(16/2)	8	0.90	-	2.1	2.52
	W(22/2)	11	1.65	-	1.22	22.143
	V(6/2)	3	0.60	-	0.60	1.08
					Total	-29.523
					Net Total	259.577 m^2
7	RCC slab 0.15m thick 1:1.5:2	1 1	28.95 22.50	6.8 6.8	0.15 0.15	29.529 22.950
	RCC chajja for door window					
	W	12	1.810	0.45	0.10	0.977
					Total	53.456
8	1% steel of RCC work are used					4196.29 kg
	Binding wire					40 kg

Primary School : Abstract Sheet (T-8.6- Primary School abstract sheet)

Table 13.6 Primary School: Abstract Sheet					
Sr. no	**item Description**	**QTY**	**Rate (Rs.)**	**Per**	**Amount (Rs.)**
1	Earthwork in excavation for foundation	223.698 cum	90.00	cum	20,132.82
2	PCC 1:4:8 for foundation	61.00 cum	3500.00	cum	2,13,500.00
3	Brick masonry up to plinth in cm 1:6	154.645 sq.m.	150.00	sq.m.	23,196.75
4	Earth work in backfilling for plinth	173.46 cum	500.00	cum	86,730.00
5	Brick masonry above plinth up to slab level in cm1:6	153.94 sq.m.	150.00	sq.m.	23,091.00
6	Smooth Plaster inside room & ceiling	259.577 sq.m.	120	sq.m.	31,149.24
7	RCC slab and Chajja 0.15m thick 1:1.5:2	53.456cum	450	cum	24,055.20
8	1% steel of RCC work are used	4236.29 kg	60	kg	2,54,177.40
				Total	6,76,032.41
			Add 1.5% Water Charge		10,140.48
			Add 10% con. Charge		67,603.24
			3% Contingency		20,280.97
			Total Estimate Cost in Rs.		7,74,057.10

The rates of their respective works provided in the abstract sheet along with quantities are inclusive of water charges, contractor's profit, contingencies, utilities and labor charges.

Total cost = ₹ 7,74,057.10/-

13.1.4 Smart Village Design (Electrical): Solar Panel Cleaning Machine

Introduction

The sun emits energy at an extremely large rate hence there is abundant availability of solar energy in the nature. If all solar energy could be converted into usable forms, it would be more enough to supply the world's energy demand. However, this is not possible because of conditions in the atmosphere such as effect of clouds, dust and temperature. Solar energy can be converted to more usable
energy forms through solar panel. There is unprecedented interest in renewable energy, particularly solar energy, which provides electricity without giving rise to any carbon dioxide

emission. Of the many alternatives, photovoltaic method of extracting power from solar energy have been considered has promising toward meeting the continuously increasing demand for energy . The efficiency of solar panel is limited due natural conditions so it is very much essential to take care of parameters like dust, humidity and temperature.
The develop design includes implementation of microcontroller based dust cleaning system. The main aim of the project is provide automatic dust cleaning mechanism for solar panel. Traditionally cleaning system was done manually. The manual cleaning has disadvantages like risk of staff accidents and damage of the panels, movement difficulties, poor maintenance etc. Automatic
dust cleaning system of solar panels has taken to overcome the difficulties arise in the traditional cleaning and also produces an effective, non- abrasive cleaning and avoids the irregularities in the productivity due to the deposition of dust . The studies carried out to evaluate the efficiency of solar panel for dust collected on it for one day, one week and a month. The efficiency of solar panel also calculated after cleaning the surface for one day, one week and a month. Comparing both the efficiencies it is proved that solar panel efficiency increases considerably. Thus the developed design enhances the solar panel performance. Various source of energy like coal, gas, hydro, nuclear, renewable, diesel are going to be exhausted within few years.

Working Principle

Basically our project design is totally microcontroller based. It is a closed loop system, where we have provided feedback system for fault detection as well as system protection.When the system is switched ON ultimately the ARDUINO (i.e. microcontroller) starts functioning as per program uploaded in it.(The program for the system is to be pre-programmed and installed in the development board).The driving motors starts functioning in forward/reverse motoring mode as per the program. The rover continues its initial motoring action unless the NO (NORMALLY OPEN) contact of the contactor becomes NC (NORMALLY CLOSED).At this stage polarity of the motor will get reversed and reverse/forward motoring will start.The motoring action continues till the desired cycle is completed. But if there is any fault and the motoring action does not change in desired time interval then

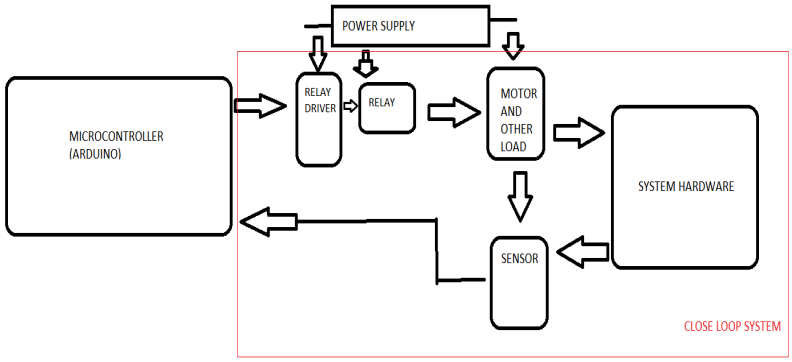


Fig. 13.7 Block diagram

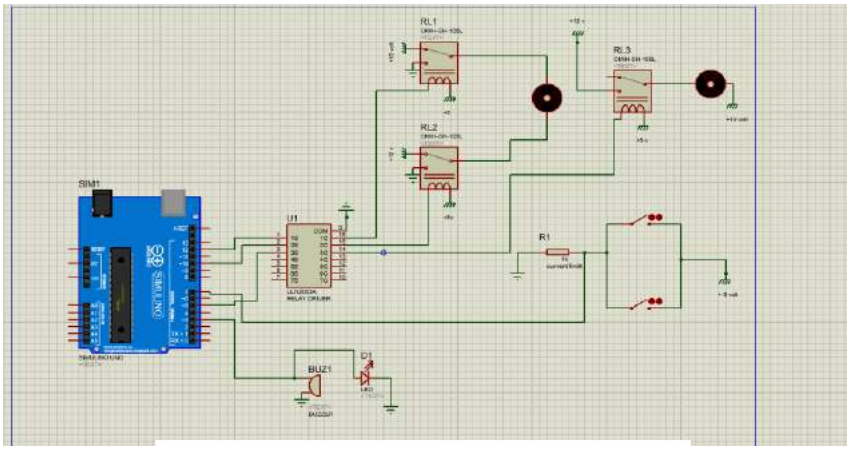


Fig 13.8 Circuit diagram

alarm system will come into action, parallely system gets shutdown.

Components

components	Ratings
CD4047 IC	5v-12v
Capacitor C1	0.22µf
Capacitor C2	1000µf
Resistance R1	19kΩ
Resistance R2	100Ω
Resistance R3	100Ω
Resistance R4	330Ω
Mosfet Q1	55v
Mosfet Q2	55v
Tranformer	12v/230v

Table 13.7 Components List

13.1.5 Smart Village Design (Electrical): Off Gird Solar System

Introduction

Energy is a necessity like food and water. Everything around us requires energy. Over the years there has been an increase in the earth's population which is directly proportional to the energy used as well. All the possible gadgets and equipment need some or the other kind of energy to function. With depleting fossil fuel reserves it becomes necessary to identify viable renewable energy resources that can decrease the dependency on fossil fuels. Solar energy is the most abundant form of energy available to us. It is approximated that 10000 TW worth of solar energy is incident on earth's surface in a day (Bosshard, 2006). According to a report, the world energy consumption in 2015 was 17.4 TW altogether (Seger, 2016). There has been a minimal increase in the energy consumption every year, approximately 1-1.5% annual growth. The world's total energy consumption is expected to grow by 56% by the year 2040 (U.S Energy Information Administration, 2013). Comparing current consumption, projected growth in two decades, and the amount of solar radiation received in an hour we can just imagine the potential solar energy holds. The total energy consumed is not small fraction of what we receive in an hour. Despite this energy potential available to us the current utilization of solar energy is less than 5% globally. There are countries that are taking initiatives to switch from using fossil fuels to solar applications. These countries form a pool called the G-20 countries which have taken the global leadership to adopt renewable resources of energy. Germany is one of the G20 countries that has switched its energy needs to approximately 38% to solar, and aims to go completely stop its dependency on nuclear and replace it with solar by the year 2050 (Richardson, 2017). Similarly, most of the countries have abundant solar potential and can take a lesson from Germany.

Off-Grid Systems

The off-grid system term states the system not relating to the gird facility. Primarily, the system which is not connected to the main electrical grid is term as off-grid PV system (Weis, 2013). Off-grid system also called standalone system or mini grid which can generate the power and run the appliances by itself. Off-grid systems are suitable for the electrification of small community. Off-grid electrification system is viable for the remote areas in the countries where they do have little or no access to
the electricity because of the distinct living and spread population in the vast area. The off-grid system refers to the support that would be adequate for a living without depending on the grid or other system. Electrical energy in the off-gird system produced through the Solar photovoltaic panels needs to be stored or saved because requirement from the load can be different from the solar panel output, battery bank is also used for the purpose generally.
There are steps for design Off gird solar plant for home:

Step 1: Calculate your load

Before choosing the components you have to calculate what is your load, how much time it will run etc. If anyone knows basic maths then It is very simple to calculate.

1. Decide what appliances (light, fan, tv, etc) you want to run and how much time (hour).

2. See the specification chart in your appliances for power rating.

3. Calculate the **Watt Hour** which is equal to the product of power rating of your appliances and time (hr) of the run.

Example :

Lets you want to run an 11W CFL for 5hour from the solar panel, then the watt-hour is equal to Watt Hour = 11W x 5 hr = 55

Fig. 13.9 Off-Grid Systems

4. Calculate the total Watt Hour: Just like a CFL calculate the watt-hour for all the appliances and add them together.

Example :

CFL =11W x 5 hr = 55 + Fan = 50 W x 3hr = 150 + TV = 80W x 2hr = 160

Total Watt Hour = 55+150+160 = 365

Considering 30% energy lost in the system.

So total Watt Hour per day = 365 x 1.3 = 474.5 Wh which can be round off to 475 Wh

Now the load calculation is over. The next thing is to choose the right components to match your load requirement.

Step 2: Solar panel selection

The Solar Panel converts the sunlight into electricity as direct current (DC). These are typically categorized as

monocrystalline or polycrystalline. Monocrystalline is costlier and efficient than the polycrystalline panel.

Solar panels are generally rated under standard test conditions (STC): irradiance of 1,000 W/m², the solar spectrum of AM 1.5 and module temperature at 25°C.

Rating of solar panel:

The solar panel size should be selected in such a way that it will charge the battery fully during the one day time.

During the 12hr day time, the sunlight is not uniform it also differs according to your location around the globe. So we can assume 4 hours of effective sunlight which will generate the rated power.

Total Wp of PV panel capacity needed = 475Wh /4 = 118.75 W

By taking some margin you can choose a 120 Watt, 12v solar panel.

Here you should not confuse with the 12V. I wrote 12V as it is suitable for charging the 12V battery. But actually the Solar panel voltage is around 17V or more.

Fig. 13.10 Battery

Step 3: Battery selection

The output from the solar panel is dc power. This power is generated during day time only. So if you want to run a dc load during day time then it seems to be very easy. But doing this is se

Most of the appliances need a constant rated voltage to run efficiently. Solar panel voltage is not constant it varies according to the sunlight.

If you want to run the appliances during the night then it is impossible.

The above problem is solved by using a battery to store the solar power during the day time and use it according to your choice. It will provide a constant source of stable, reliable power.

Fig. 13.11 Inverter

There is various kind of Batteries. Car and bike batteries are designed for supplying short bursts of high current and then be recharged and are not designed for deep discharge. But the solar battery is a deep-cycle lead-acid battery that allows for partial discharge and allows for deep slow discharge. The lead-acid tubular battery is perfect for a solar system.

Ni-MH batteries and Li-Ion batteries are also used in many small power applications.

Battery Capacity (Ah) = $\frac{\text{Total Watt-hours per day used by appliances}}{(0.85 \times 0.6 \times \text{nominal battery voltage})} \times \text{Days of autonomy}$

Step 4: Charge controller selection

A solar charge controller is a device that is placed between a solar panel and a battery. It regulates the voltage and current coming from your solar panels. It is used to maintain the proper charging voltage on the batteries. As the input voltage from the solar panel rises, the charge controller regulates the charge to the batteries preventing any overcharging.

Usually, the solar power systems use 12-volt batteries, however, Solar panels can deliver far more voltage than is required to charge the batteries. By, in essence, converting the excess voltage into amps, the charge voltage can be kept at an optimal level while the time required to fully charge the batteries is reduced. This allows the solar power system to operate optimally at all times.

MPPT Charge Controller is most effective under these conditions :

1. Cold weather, cloudy or hazy days

2. When the battery is deeply discharged

Try to avoid the ON/OFF charge controller as it is the least efficient.

Rating of charge controller:

Since our system is rated 12V, the Charge controller is also 12V

Current rating = Power output of Panels / Voltage = 120 W/ 12V = 10 A

By taking a 20% margin, you can choose a 10 x1.2 = 12A charge controller. But the next rating controller available in the market is 15A. So choose a Charge Controller of 12 V and a current rating of 15 A.

Step 5: Inverter selection

The solar panel (PV) that receive the sun's rays and convert them into electricity called direct current (DC). DC is then converted into alternating current (AC) through a device called an Inverter. AC electricity flows through every outlet of your home, powering the appliances.

Types

1. Square Wave 2. Modified Sine Wave 3. Pure Sine Wave

Square wave inverter is cheaper among the all but not suitable for all appliances. Modified Sine Wave output is also not suitable for certain appliances, particularly those with capacitive and electromagnetic devices such as a fridge, microwave oven and most kinds of motors. Typically modified sine wave inverters work at lower efficiency than pure sine wave inverters.

So as per my opinion choose a pure sine wave inverter.

It may be grid-tied or stand-alone. In our case, it is obviously stand alone.

Fig. 13.12 Charge Controller

RATING OF INVERTER:

The power rating should be equal or more than the total load in watt at any instant.

In our case the maximum load at any instant = Tv (50W) +Fan (80W) +CFL (11W) =141W

By taking some margin we can choose a 200W inverter.

As our system is 12 v we have to select a 12V DC to 230V/50Hz or 110V/60Hz AC pure sine wave inverter.

Step 6: Series and parallel connection

After calculating the battery capacity and solar panel rating you have to wire them. In many cases, the calculated solar panel size or battery is not readily available in the form of a single unit in the market. So you have to add a small solar panel or batteries to match your system requirement. To match the required voltage and current rating we have to use series and parallel connection.

1. Series Connection :

To wire any device in series you must connect the positive terminal of one device to the negative terminal of the next device. The device in our case may be a solar panel or battery.

In series connection the individual voltages of each device are additive.

Example :

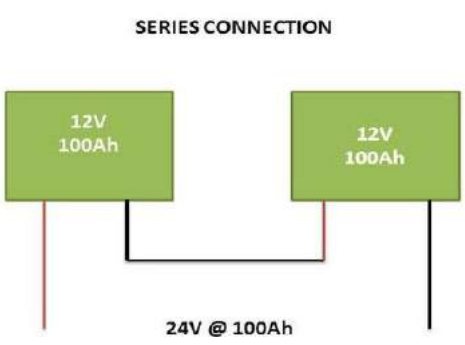
lets 4 12V batteries are connected in series, then the combination will produce 12 + 12 + 12 + 12 = 48 volts.

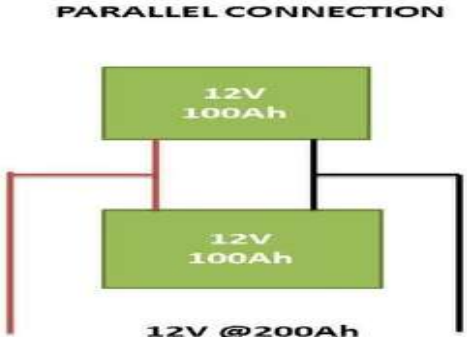
In a series combination, the current or amperage is the same.

So if these devices were batteries and each battery had a rating of 12 Volts and 100 Ah then the total value of this series circuit would be 48 Volt, 100Ah. If they were solar panels and each solar panel had a rating of 17 volts(Osc voltage) and were rated at 5 amps each then the total circuit value would be 68 volts, 5 amps.

2. Parallel Connection :

In a parallel connection, you must connect the positive terminal of the first device to the positive terminal of the next device and negative terminal of the first device to the negative terminal of the next device.





In a parallel connection, the voltage remains the same but the current rating of the circuit is a sum of all the devices.

Example :

Lets two batteries of 12v,100Ah are connected in parallel then the system voltage remains 12 volts but the current rating is 100+100=200Ah. Similarly, if two solar panels of 17V and 5 amps are connected in parallel then the system will produce 17 Volts, 10 amps.

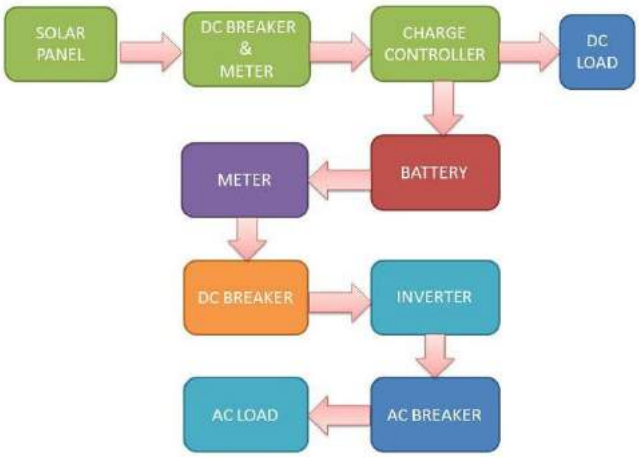


Fig. 13.13 Connation of Flow

Step 7: Wiring

The first component we are going to wire is the Charge Controller. At the bottom of the Charge Controller, there are 3 signs in my charge controller. The first one from the left is for the connection of the Solar Panel having positive (+) and negative (-) sign. The second one with plus (+) and minus (-) sign is for the Battery connection and the last one for the direct DC load connection like DC lights.

As per the charge controller manual always connect the Charge Controller to the Battery first because this allows the Charge Controller to get calibrated to whether it is 12V or 24V system. Connect the red (+) and black (-) wire from the battery bank to the charge controller.

After connecting the battery with charge controller you can see the Charge Controller indicator led lights up to indicate the Battery level.

After connecting this inverter terminal for battery charging is connected to corresponding positive and negative terminals of the battery.

Now you have to connect the solar panel to the charge controller. At the backside of the Solar Panel, there is a small junction box with 2 connected wires with positive(+) and negative (-) sign. The terminal wires are normally smaller in length. To connect the wire to the charge controller you need a special type connector which is commonly known as MC4 connector. See the picture. After connecting the solar panel to the charge controller the green led indicator will light if sunlight is present.

13.1.6 Smart Village Design (Electrical): Primary School Wring

Table 13.8 Overall calculation, Size and length of conduit and wires			
Name of Load	**No. of Load**	**Watt per unit**	**Total**
LED lamp	21	12W	252W
LED Tube light (T5)	34	40W	1360W
Fan (48'')	18	40W	720W
5 Amp socket	14	100W	1400W
16 Amp socket	7	1000W	7000W
			Net Load = 10732≅**10730W**
Total peak load current = 44.70 Ampere			
PVC coated copper wire of 1mm²is finalized for Sub circuit			
PVC coated copper wire of 1.5mm²is finalized for Power circuit			
Number of sub-circuit will be 4			
Number of power circuit will be 7			
Switch gear selected is 40A RCCB			
Selected size of Earth wire is 6mm²			
Total length of PVC conduit required is 200 meters			
Total length of copper wire required is 1180 meters(1^2mm+1.5^2mm+Earthing Wire)			

Table 13.9 Net cost estimation				
Sr. No.	**Item name with specification**	**Quantity required**	**Cost/Unit**	**Total Cost in Rs**
1	MCB 10A DP	5	390	1950
2	RCCB 40A	1	2500	2500
3	8 Modular D.B Board	2	1500	3000
4	Batten holder	72	40	2880
5	3 pin socket 5A	14	33	462
6	3 pin socket 16A	7	70	490
7	Single pole modular switch 5A	110	20	2200
8	Single pole modular switch 16A	7	65	455
9	Fan Regulator	18	150	2700
10	Fan Plate	18	15	270
11	¾ PVC conduit	200 Meter	12	2400
12	1mm² PVC coated single core copper wire(Red+Yellow+Green+Black)	810 Meter	10	8100
13	1.5mm² PVC coated single core copper wire(Red+Black)	360 Meter	15	5400
14	6mm² PVC coated single core copper wire(Green)	10 Meter	45	450
15	Selling Fan Box	18	50	900
16	3*1/2 selling Box	75	10	750
17	18 modular Switch plate with wooden housing	7	163	1141
18	12 modular Switch plate with wooden housing	1	115	115
19	8 modular Switch plate with wooden housing	2	95	190

20	6 modular Switch plate with wooden housing	6	78	468
21	Switch Dummy	10	5	50
22	Fan (48'')	18	1550	27900
23	12W LED lamp	21	150	3150
24	LED Tube light (T5)	34	200	6800
25	Earthling Kit	1	5000	5000
26	Servant bell	1	140	140
			Miscellaneous charges	5000
			Labor charges(With Earthling)	21270
			Overhead charges	4000
			Net Cost of Electrification	110131

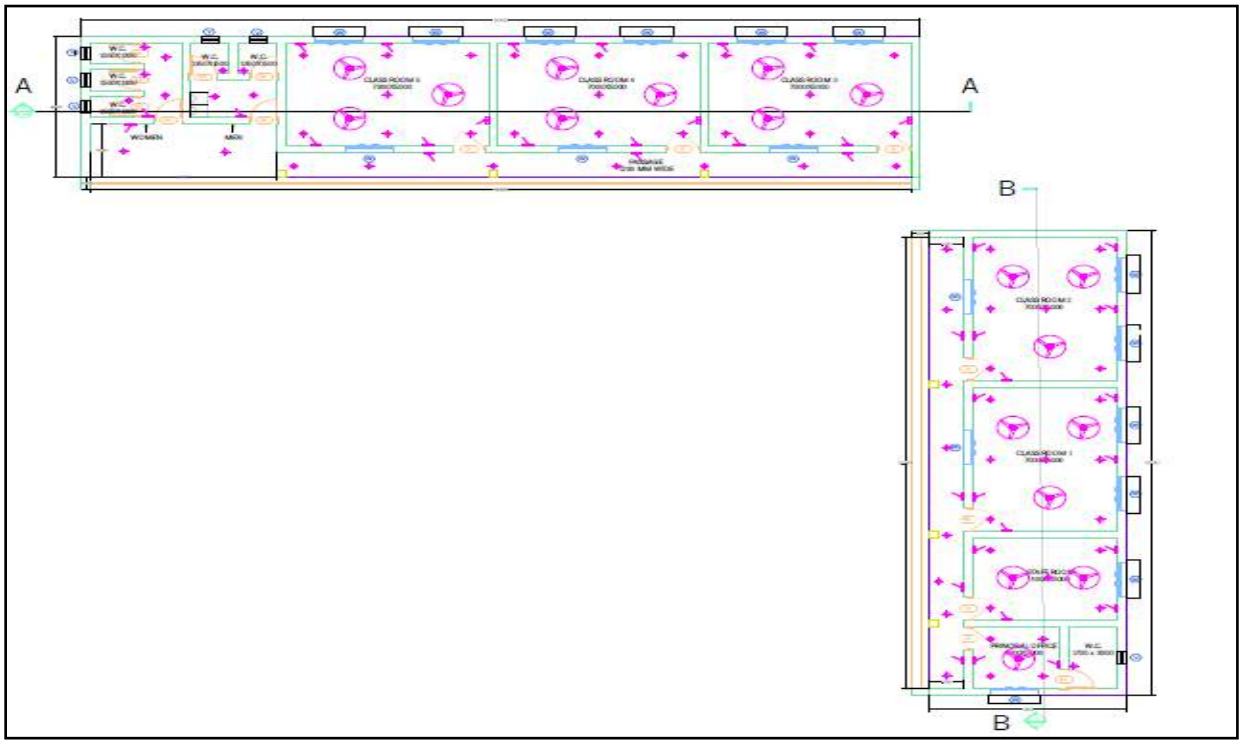


Fig. 13.14 Electrical layout of Primary school

*All Dimensions are in mm

13.2Reason for Students Recommending this Design

From the gap analysis it was found that there were many things which need to filled. So in order to fill this gap we have proposed some of the designs.

In order to have an overall development of the village we have proposed designs for various aspects such as health care facilities, infrastructure, physical. The designs cover civil as well as electrical aspects.

13.3About designs Suggestions / Benefit of the villagers

Benefits for Villagers:

- The villagers will have PHC Center, and then they will use services like, Provision of medical care, Maternal-child health including family planning. Safe water supply and basic sanitation. Prevention and control of locally endemic diseases. Collection and reporting of vital statistics, Education about health, National health programmers, as relevant, Referral services.
- The Villagers will get a Own BUS Stop so increase Transport facilities.
- The villagers need to be designed a School which would increase the primary Education facilities.
- The design of roof top solar panel Cleaning can help in reducing Efficiency as well moving towards clean and green energy.
- The School uses electrical equipment and for that a good electrical layout is to be provided.
- The Villagers will get own Off Grid Solar to produce electricity t free of cost also they used any time.

CHAPTER 14: Technical options with case studies

14.1 Civil Engineering

14.1.1 Advanced Earthquake Resistant

Earthquake resistant design of buildings depends upon providing the building with strength, stiffness and inelastic deformation capacity which are great enough to withstand a given level of earthquake-generated force. This is generally accomplished through the selection of an appropriate structural configuration and the careful detailing of structural members, such as beams and columns, and the connections between them. But more advanced techniques for earthquake resistance is not to strengthen the building, but to reduce the earthquake-generated forces acting upon it.

1. Base Isolation Method

A base isolated structure is supported by a series of bearing pads which are placed between the building and the building's foundation. (See Figure) A variety of different types of base isolation bearing pads have now been developed. The bearing is very stiff and strong in the vertical direction, but flexible in the horizontal direction. Base-Isolated and Fixed-Base Buildings Earthquake Generated Forces to get a basic idea of how base isolation works, examine Figure 2. This shows an earthquake.

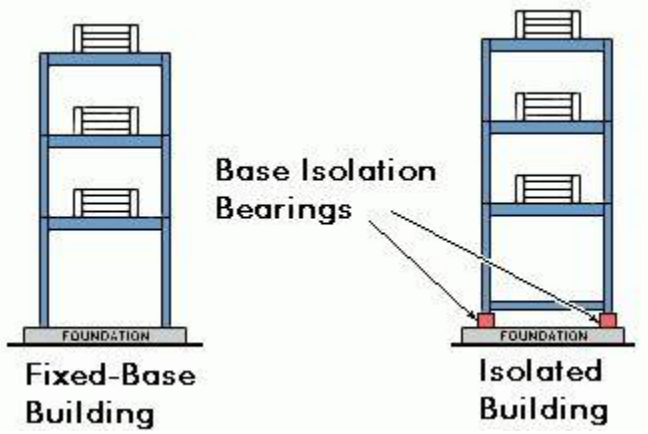


Fig. 14.1 Base isolation bearing

On both a base-isolated building and a conventional, fixed-base, building. As a result of an earthquake, the ground beneath each building begins to move. In Figure 2, it is shown moving to the left. Each building responds with movement which tends toward the right. The building undergoes displacement towards the right. The building's displacement in the direction opposite the ground motion is actually due to inertia. The inertial forces acting on a building are the most important of all those generated during an earthquake. It is important to know that the inertial forces which the building undergoes are proportional to the building's acceleration during ground motion. It is also important to realize that

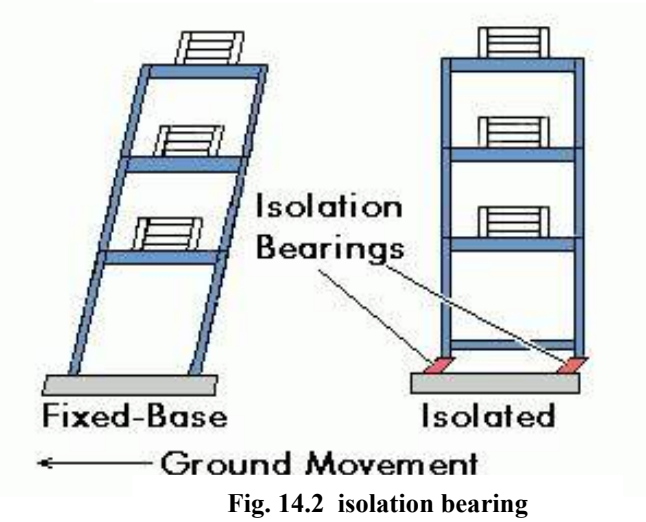


Fig. 14.2 isolation bearing

buildings don't actually shift in only one direction. Because of the complex nature of earthquake ground motion, the building actually tends to vibrate back and forth in varying directions.

2. Energy Dissipation Device's

The second of the major new techniques for improving the earthquake resistance of buildings also relies upon damping and energy dissipation, but it greatly extends the damping and energy dissipation provided by lead-rubber bearings. As we've said, a certain amount of vibration energy is transferred to the building by earthquake ground motion. Buildings themselves do possess an inherent ability to dissipate, or damp, this energy. However, the capacity of buildings to dissipate energy before they begin to suffer deformation and damage is quite limited. The building will dissipate energy either by undergoing large scale movement or sustaining increased internal strains in elements such as the building's columns and beams. Both of these eventually result in varying degrees of damage. So, by equipping a building with additional devices which have high damping capacity, we can greatly decrease the seismic energy entering the building, and thus decrease building damage. Accordingly, a wide range of energy dissipation devices have been developed and are now being installed in real buildings. Energy dissipation devices are also often called damping devices. The large number of damping devices that have been developed can be grouped into three broad categories:

- Friction Dampers: these utilize frictional forces to dissipate energy
- Metallic Dampers : utilize the deformation of metal elements within the damper
- Viscoelastic Dampers : utilize the controlled shearing of solids
- Viscous Dampers: utilized the forced movement (orificing) of fluids within the damper

14.1.2 Seismic Retrofitting of Buildings

Introduction

The aftermath of an earthquake manifests great devastation due to unpredicted Seismic motion striking extensive damage to innumerable buildings of varying Degree i.e. either full or partial or slight. This damage to structures in its turn Causes irreparable loss of life with a large number of casualties. As a result Frightened occupants may refuse to enter the building unless assured of the Safety of building from future earthquakes. It has been observed that majority of Such earthquake damaged buildings may be safely reused if they are converted Into seismically resistant structures by employing a few retrofitting measures. This proves to be a better option

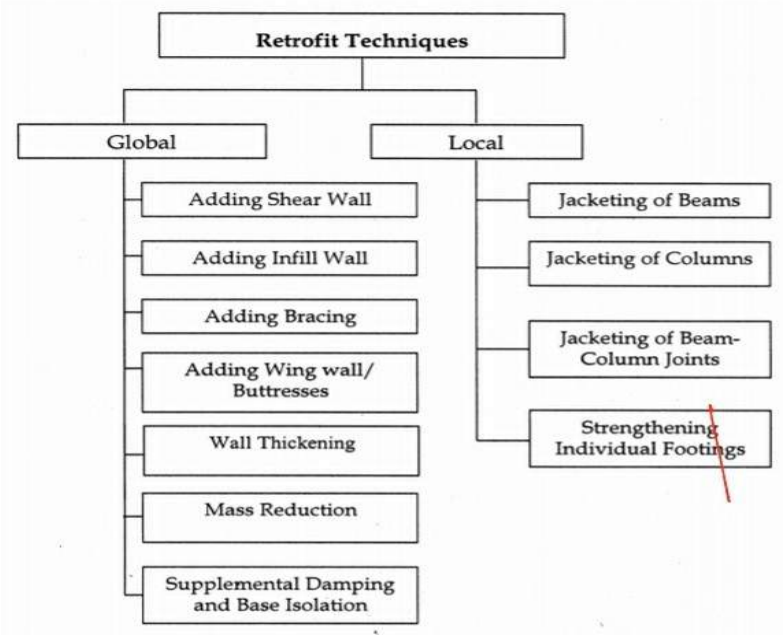


Fig. 14.3 Retrofit Techniques

catering to the economic considerations and Immediate shelter problems rather than replacement of buildings. Moreover it Has often been seen that retrofitting of buildings is generally more economical as Compared to demolition and reconstruction even in the case of severe structural Damage. Therefore, seismic retrofitting of building structures is one of the most Important aspects for mitigating seismic hazards especially in earthquake prone Countries. Various terms are associated to retrofitting with a marginal difference Like repair, strengthening, retrofitting, remoulding, rehabilitation, reconstruction Etc. But there is no consensus on them. The most common definition of these Terms may be summarized in The need of seismic retrofitting of buildings arises under two Circumstances (i) earthquake damaged buildings and (ii) earthquake vulnerable Buildings that have not yet experienced severe earthquakes. The problems faced By a structural engineer in retrofitting earthquake damaged buildings are (a) lack Of standards for methods of retrofitting (b) effectiveness of retrofitting techniques Since there is a considerable dearth of experience and data on retrofitted Structures (c) absence of consensus on appropriate methods for the wide range of Parameters like type of structures, condition of materials, type of damage, Amount of damage, location of damage, significance of damage, condition under Which a damaged element can be retrofitted etc. Therefore, a catalogue of Available options regarding feasible and practical retrofitting methods is needed For the structural engineer due to great variability of retrofitting requirements Differing from building to building. In addition experimental and analytical Research is urgently needed to strengthen different techniques of retrofitting. Classification of Retrofitting Techniques There are two ways to enhance the seismic capacity of existing structures. The First is a structural-level approach of retrofitting which involves global Modifications to the structural system. The second is a member level approach of Retrofitting or local retrofitting which deals with an increase of the ductility of Components with adequate capacities to satisfy their specific limit states. Based On the above concept the available techniques of retrofitting of reinforced Concrete buildings may be classified.

Limitations

1. The main limitations of this method are (i) increase in lateral resistance but it is
2. Concentrated at a few places (ii) increased overturning moment at foundation
3. Causes very high uplifting that needs either new foundations or strengthening of
4. The existing foundations (iii) increased dead load of the structure (iv) excessive
5. Destruction at each floor level results in functional disability of the buildings (v)
6. Possibilities of adequate attachment between the new walls and the existing
7. Structure. (vi) closing of formerly open spaces can have major negative impact on
8. The interior of the building uses or exterior appearance

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

1. Advanced construction equipments and techniques presented by, d.selvaganesh, 3rd year, department of civil, Fatima Michael college of engineering and technology, Madurai – 20. & g.mathan kumar, 3rd year, department of civil, kamarajar college of engineering and technology, virudunagar.

2. Content introduction under water construction and its classifications methods of placing the concrete and its types trenchless technology and its uses modern construction materials and its applications conclusion

3. Now a days the construction technology and equipments becomes very advanced. The advanced construction techniques such as under water construction, trenchless technology and many new innovative materials used in advanced construction techniques and equipments to speed up the construction of any building works. So that we will discuss about few techniques and materials used in that.

5. Under water construction during the construction of bridges, dams or any other structure where foundation part of the structure is mostly like to lie underwater, we have to opt for underwater construction. Construction in water poses many difficulties especially in the places where there the depth is considerable during underwater construction our main objective is to create a dry and water free environment for working in such a manner that the structural stability of the structure is not compromised.

6. Classifications of underwater construction under water construction construction techniques methods of placing of concrete underwater construction techniques caissons cofferdams methods of placing of concrete termite method pump method toggle bags bag works.

7. Caissons Caissons are the structure used in underwater construction work, consisting of an air tight chamber, open at the bottom and containing air under sufficient pressure to exclude the water.

8. Types of caissons box caisson open caisson pneumetic caisson

9. Box caisson

10. Open caisson

11. Cofferdams a cofferdam is a type of watertight construction designed to facilitate construction projects in areas that are normally submerged, such as bridges and piers.

12. Types of cofferdam Cantilever sheet piles Braced cofferdam Double wall cofferdam Cellular cofferdam Earth embankment Rock fill cofferdam

13. Cantilever sheet piles

14. Braced cofferdam

15. Double wall cofferdam

16. Cellular cofferdam

17. Earth embankment

18. Rockfill cofferdam

19. Methods of placing of concrete tremie method toggle bags pump method bag works

20. Tremie method

21. Pump method

22. Toggle bags bag work toggle bags are ideal for small amount of concrete placements. the bag is filled in the dry with wet concrete. Used for repair work. The concrete is squeezed out by a driver. Bags are made of open weave material. Diver -handled bags are usually of 10 – 20 litters capacity but 1 cub's bags can be placed using a crane.

23. Trenchless technology Trenchless technology methods include all methods of installing or renewing underground utility systems with minimum disruption of the surface or subsurface. Trenchless technology consists of various methods, materials and equipment for inspection, utilization and rehabilitation. Trenchless technology has become popular for underground utility construction road crossings. In recent years, there has been remarkable progress in development of new trenchless technology equipment and methods.

24. Objective of trenchless technology Cost-effectiveness Ease of Design Production rates Extends underground assets Benefits environment.

25. Site investigation Common problems at site are,
- Loss of invert walls, ceiling due to corrosion
- Settlement
- Shape deformation
- Leaking joints
- In adequate flow capacity
- Voids in embankment around and above the culvert Hence before take the trenchless excavation work the site investigation must be made.

26. Trenchless techniques inpipes

27. Techniques in lying of pipes pipe jacking The term pipe jacking can be used to describe a specific installation technique as well as a process applicable to other trenchless technology.

28. Auger boring If there are longer borings to be carried out or if the drilling precision has to be higher the borings are carried out as guided auger borings.

29. Micro tunnelling Pipes are jacked from a launch pit to a reception pit by means of a hydraulic jacking station in the launch pit

30. Utility tunnelling The Procedure consists of four major steps
- soil excavation.
- Segmental liner installations
- Soil removal.
- Line and grade control.

31. Pipe ramming Pipe ramming involves the use of the dynamic force and energy transmitted by a percussion hammer attached to the end of a pipe.

32. Advantages of trenchless technology Expenses and dates are much easier to calculate. Surface life stays mainly undisturbed. Up to 95 percent lesser load for landfills due to minimal excavations.

33. Introduction to modern construction materials Now –a- days many new innovative materials are being invented and many new materials are being in research. New innovative thinking and new invention is necessary to save our valuable time and energy. Some of the innovative materials are listed below.

34. Modern construction materials Fly ash bricks. Translucent concrete. Sense tiles. Liquid granite. Carbon Nano-tubes. Unfired clay bricks. Bendable concrete. Richlite. Radient barriers. Transparent aluminium. Carbon fiber. Solar pannel roofing tiles. These are the several materials used in advanced construction techniques and equipments such as

35. Fly ash bricks Fly ash bricks are building materials containing class c fly ash. In India, the fly ash was first used in rihad dam which is located at Piprisonbhadra district in uttar Pradesh. The composition of fly ash bricks are fly ash, lime, gypsum, sand, cement. These bricks are environment friendly and they can be manufactured at construction site itself.

36. Fly ash bricks

37. Translucent concrete They have been developed by Hungarian architect ARON LOSONCZI. It is mostly same as the regular concrete, visually appealing by mixing concrete with optical glass fibers and thus the result was light transmitting concrete. The glass fiber in the concrete act

like a slit and carry the light across and the light carried maintains its original colour. It carries the same amount of light through it, no matter how thick it is.

38. Translucent concrete

39. Sensi tile If you walk across your kitchen the floor to get something from the refrigerator, the floor twinkles with light path that guides your way through the dark room. The concrete of the tile is embedded with acrylic fiber optic channels that transfer the light from one point to another. As shadow move across terrazzo's surface , the light channels flicker with a randomized.

40. Sensi tiles

41. Liquid granite The material is light weighted and has the same load bearing capacity of cement but it is made of recycled materials. Liquid granite is not only a fire- resistant beyond 1,100 degrees celsius, it can also withstand high temperature for longer periods . So, It has moisture resisting properties also.

42. Liquid granite

43. Carbon nano-tubes
• Heralded as one of the "Top ten advances in materials science" over the last 50 years, Materials Today, 2016.
• Sales of carbon nano-tubes projected to exceed $2B, >103 metric tons annually in the next 4 – 7 years.
• Major use – electronics and composites.

44. Unfired clay bricks Unfired clay bricks are made up of earthy materials and are air-dried instead of fired like conventional bricks. It is eco- friendly and with additional construction properties. It have the benefit of reducing the energy used in manufacturing and increases strength and decreases shrinkage.

45. Unfired clay bricks

46. Bendable concrete A new type of fiber reinforced bendable concrete is used in various places. This new concrete is around 500 times more resistant to cracking than regular. The fibers slide within the concrete when bending occurs, providing with it is enough ton prevent breakage.

47. Bendable concrete

48. Richlite It is a dense material made from partially recycled paper and phenol resin. The 70 percentage of the material is made with recycled paper. It has high strength and has resistance to high temperature upto 350 F.

49. Radient barriers It can be applied anywhere in attic space of house. It keeps heat out in summer and warm in during winter. It is usually made up of aluminum. Radient barriers are widely used in many areas.

50. Transparent aluminium It is extremely durable material with excellent optical transparency. To be used for windows, domes, plates, rods and tubes with a wide range of sizes and varieties. It has excellent clarity. Outstanding strength and hardness. Cost effective advanced material solution. It is used in aerospace, security, defence,and energy and consumer products.

51. Transparent aluminium

52. Solar panel roofing tiles It transforms the solar energy into usable electricity which is required for our homes. Receives rebate from the government for installing them. Solar panel roofing tiles are play an important role in our field or profession.

53. Carbon fibre Carbon fiber is made up of carbon strands that are thinner than human hair. The strands can be woven together, like cloth, and then that can be moulded to any shape you might want.Carbon fiber is extremely strong, light weighted material. It is five times strong as steel, two times as stiff and weight is about two- thirds less.

54. Applications of modern materials Several modern construction materials have more strength, hardness, toughness and durability. For example, fly ash bricks have these characters when compared with normal bricks. From the above discussions the modern materials are mostly used in all over the world . We can make our nation as Hi-tech using these innovative materials.

14.1.4 Engineering Aspects of Soil mechanics – Environmental Impact Assessment

Components of an Environmental Impact Assessment Environmental Assessment; and Environmental Impact Statement. The Environmental Impact Assessment may be submitted as the three components Highlighted above or could be submitted as one document depending on the size And nature of the proposed project. The Environmental Baseline Study will record the present quality of the Environment within the area of influence before project implementation. This data Will then be analysed in the environmental assessment and will be used to Predict and quantify impacts. The Environmental Assessment is basically the identification and assessment of Impacts of the proposed project and of its alternatives. The EA will also consider Mitigation measures to offset negative impacts and will assess the impact of Implementing these measures

on the environment. The Environmental Impact Statement is a summary of the findings of the Environmental Baseline Study and the Environmental Assessment and includes An Environmental Management Plan. For large EIAs, the EIS will be the Document which decision makers and the public will use. The Environmental Baseline Study and the Environmental Assessment will then serve as reference Documents to the EIS. The EIA will comprise of three components: Environmental Baseline Study.

Environmental baseline study

The environmental baseline should be established in suitable detail to record the Environmental conditions and seasonal variability prior to development, to permit The assessment of potential effects and to provide a baseline with which to Monitor future changes. The needs will vary by project and potential Environmental effects but would normally encompass the following physical,
Biological and socioeconomic conditions.

Physical Environment:

• Air Quality- Information would be required on dust fall, suspended Particulates (total and PM10) and gases such as SO2 and NOx. Data Collection techniques would include literature surveys and field data Collection. For uranium extraction radon gas would also be monitored.
• Climate and Meteorology- Data is required on wind speed and direction, Rainfall (frequency, duration, mean averages, storm events and return Frequencies, Probable Maximum Precipitation), temperature and Evaporation. Data collection methods include interpretation of data from nearby climate stations and in many cases installation of an on-site Station.
• Physiography, Geology and Soils- Data is required on contour mapping, Regional geology, surgical soils, soil classification and soil chemical quality Where this could be effected by mining activities. Much of this data should Be available from geological maps and where not available should be Obtained from field studies. Soil chemistry data would be collected where Potential impacts could occur from mining emissions (eg. Concentrate Storage and handling.
• Hydrogeology- Data is required on the groundwater flow patterns, aquifer Characteristics (tranmissivity, porosity, and permeability), and depth to water table, Pieziometric level and ground water quality. Ground water would be analyzed for the same parameters as surface water. The extent of data Will be site specific and will be extensive where acid rock and tailings are Stored.

Environmental assessment

The environmental assessment will provide technical detail on the environmental Effects of the project. The EA will focus on the proposed project but must also Address alternatives. A

summary of the data in the EA would be incorporated Into the Environmental Impact Statement (see below). The EA should provide.

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

An important part of the environmental degradation suffered by the planet is caused by the discharge of untreated or poorly treated wastewater. Industrial, urban, and agricultural wastewater contain many different types of pollutants such as biodegradable and no biodegradable organic matter, suspended solids, turbidity, nutrients, heavy metals, pesticides, pathogens, etc. All of these pose a threat to the environment and human health, so the selected treatment techniques must be adapted to their nature in order to optimize their removal. In addition to efficiency, wastewater treatment methods must be sustainable, not only from an environmental point of view, but also economically and ethically. As a result, no technological dependence should be generated in less developed countries or communities. Therefore, this Special Issue deals with improvements in various aspects of wastewater treatment including different aspects of water treatment such as the development of mathematical models, the application of life cycle techniques, or the experimental optimization of wastewater treatment methods. Thirteen articles were accepted covering some of the most relevant fields of wastewater treatment: activated sludge, nanoparticle treatment, constructed wetlands, energy–water nexus, nutrient recovery, eco-friendly sorbents, and reverse osmosis.

Pollutants in sewage

•BOD(Bio Chemical Oxygen demand)
•COD(Chemical Oxygen demand)
•TSS(Total Suspended Solids)
•PH

BOD(Biochemical Oxygen demand) The BOD is an important measure of water quality .It is measure of the amount of oxygen needed by bacteria and other organisms to oxidize the organic matter present in a water sample over a period of 5 days at 20 degree C.

COD (Chemical Oxygen Demand) COD Measures all organic carbon with the exception of some aeromatics (BENZENE,TOLUENE,PHENOL etc.) which are not completely oxidized in the reaction. COD is a chemical oxidation reaction Ammonia will not be oxidized. Total Suspended Solids Total suspended solids

(TSS) include all particles suspended in water which will pass through a filter. As levels of TSS increase, a water body begins to lose its ability to support a diversity of aquatic life. Suspended solids absorb heat from sunlight, which increases water temperature and subsequently decreases levels of dissolved oxygen(warmer water holds less oxygen than cooler water)

Components of Sewage Treatment Plants

• Pumping of Sewage

A pumping station is made up of a large tank, known as a wet well, that acts as the receiver for sewage from a building or a group of buildings. Sewage from individual houses flows into the wet well.

The sewage will then sit in the well until it reaches a predetermined level. Once it reaches this level, a pump will kick in to pressurise the sewage so that it will travel out of the wet well, uphill, to a point where it enters the main sewer, or that it can then travel into the main sewer.

• Primary Treatment

The objective of primary treatment is the removal of settleable organic and inorganic solids by sedimentation, and the removal of materials that will float (scum) by skimming. Approximately 25 to 50% of the incoming biochemical oxygen demand (BOD_5), 50 to 70% of the total suspended solids (SS), and 65% of the oil and grease are removed during primary treatment. Some organic nitrogen, organic phosphorus, and heavy metals associated with solids are also removed during primary sedimentation but colloidal and dissolved constituents are not affected. The effluent from primary sedimentation units is referred to as primary effluent. Table 12 provides information on primary effluent from three sewage treatment plants in California along with data on the raw wastewaters.

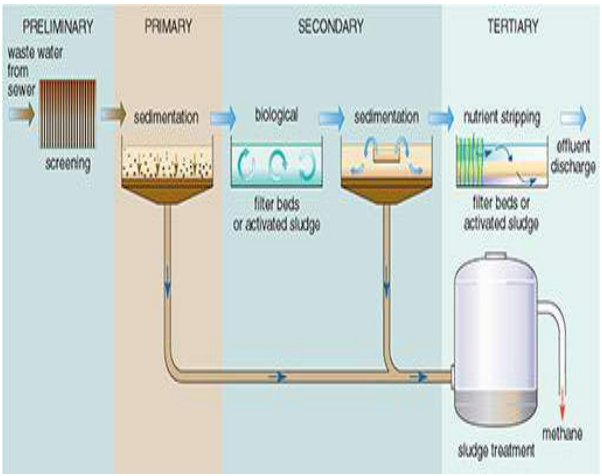


Fig. 14.4 Secondary treatment

• Secondary treatment

The objective of secondary treatment is the further treatment of the effluent from primary treatment to remove the residual organics and suspended solids. In most cases, secondary treatment follows primary treatment and involves the removal of biodegradable dissolved and colloidal organic matter using aerobic biological treatment processes. Aerobic biological treatment (see Box) is performed in the presence of oxygen by aerobic microorganisms (principally bacteria) that metabolize the organic matter in the wastewater, thereby producing more microorganisms and inorganic end-products (principally CO_2, NH_3, and H_2O). Several aerobic biological processes are used for secondary treatment differing primarily in the manner in which oxygen is supplied to the microorganisms and in the rate at which organisms metabolize the organic matter.

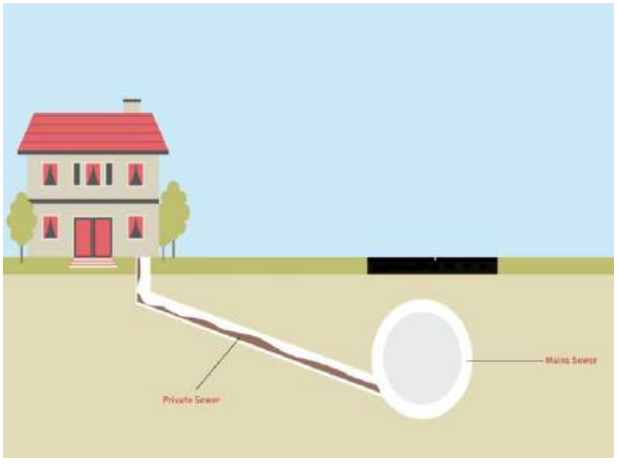


Fig. 14.5 Primary treatment

14.1.6 Technical Case Study on "Seismic Retrofitting of Reinforced Concrete Buildings"

Introduction

This chapter deals with a few case studies in which the applications of the most common retrofitting schemes are employed to improve the efficiency and proficiency of either the seismically deficient vulnerable buildings or earthquake damaged buildings. In view of the mixed and complex seismic responses of retrofitted structures, heterogeneous nature of different constructions along with the strain dependent elastic properties of various materials hamper to bring a complete justification of the application of analytical studies. A sound qualitative basis of experimental studies or the experience of retrofitted structures during future earthquake will exactly judge and reveal the success of retrofitted structures. Since we have a considerable dearth of experience and experimental data on the behaviour and response of retrofitted structures, the case studies presented here are based on the experience obtained by the others. Incidentally, two major earthquakes of March 14 and September 19, 1979 hit a large number of reinforced concrete buildings in Mexico. Some of them were retrofitted whose efficacy came to be actually judged by the reoccurrence of an earthquake in the same region in 1985. Similar experience has been initially obtained from Turkey earthquake, 1988 in which a large number of buildings were damaged and retrofitted. This proved to be a good learning opportunity about the behaviour of the retrofitted structures. A few available case studies presented in this chapter serve as good instances for a better understanding of conventional retrofitted schemes. Some of the studies referred here are based on advance technological devices like base isolation and supplemental dampers. The information regarding suitability, effectiveness, test results of the analytical or experimental recommendations are based on the studies and experience obtained by individual authors as expressed in the published work.

Methodology for Seismic Retrofitting of RC Buildings

A brief outline procedure followed for seismic assessment and retrofit works for a reinforced concrete building has been described here. This procedure has been
adopted by the inspection team for retrofitting of reinforced concrete buildings in Turkey after the Adana – Ceyhan earthquake in Southern Turkey on June 27, 1998 (Sucuoglu, Gur and Glkan, 2000). The survey team recommended 120 moderately damaged reinforced concrete residential apartment buildings in Ceyhan. The procedure of the method employed for 3 –9 storey building stock may be followed as:

- Visit to the actual site with all documentation of buildings should be made and all structural dimensions and details should be verified. If necessary, reinforcement has to be checked on selected elements by rebar locator with some non-destructive testing (NDT) and by stripping concrete cover. Foundations should be inspected by excavating trenches at one or two exterior footings.
- An intense investigation has to be made regarding the existing concrete quality by taking 1-3 core specimens from each building and taking rebound hammer readings on a large number of structural elements calibrated with the core test results.
- Inspection of each structural and architectural element for damage should be done and the observed damage grade (none, light, moderate or heavy) on the structural and architectural plans should be accordingly marked.

- Three-dimensional linear elastic model of the existing building should be prepared and subjected to code specified vertical and lateral loads. The modulus of elasticity on concrete is to be reduced in accordance with material test results.
- The method for temporary shoring of damaged elements in buildings should be recommended. The damaged structures should be shored for vertical loads and braced for 25% of the estimated lateral loads and taking into account the live loads that will exist during construction. The most commonly used elements have been timber elements, steel elements, and tubular scaffolding (Iglesias, 1989).
- The buckling of longitudinal reinforcement, rupture of ties and crushing of concrete is often observed in columns of damaged building. In that case, the original geometry of columns is recovered by the use of hydraulic jacks.
- The seismic retrofit strategy for the building after considering all aspects should be recommended.
- The upgraded building is analyzed under code specified loading and its compliance with the code is verified.
- For selected buildings, capacity spectrum method is employed to assess the seismic performance of the retrofitted building.

Case Study 1: Seismic Retrofitting of RC Building with Jacketing and Shear Walls

Source	The Mexico Earthquake of September 19, 1985 – Typical Cases of Repair and Strengthening of Concrete Buildings *M. Jara, C. Hernandez, R. Garcia, and F. Robles* Earthquake Spectra, Vol. 5, No. 1, 1989
Typical Features of the Building	• Number of Stories - Eight stories with basement • Year of Construction - 1966 • Lateral load Resisting System - Reinforced concrete frames • Floor system - two-way slab with beam • Foundation - Grid foundation with retaining walls around the perimeter • Typical floor plan and elevation shown in Figure
Features of Damages in Mexico earthquake, 1979	• Minor cracks in beams and columns
Retrofitting Techniques Employed	• **Addition of concrete shear wall** in axes 2 and A • **Addition of masonry wall** in axes 5

Behaviour of Retrofitted Building in Mexico Earthquake, 1985	• Severe damage such as spelling of the concrete cover and buckled bar at the interface of the walls and beam-column joints • Main reinforcement in the columns located at the ground floor buckled and crushing of the concrete core • Most damaged columns were the columns adjacent to the added walls • Damage attributed to the inadequate connection between the added walls and original frame connection and the poor quality of the concrete
Retrofitting Techniques Employed after Mexico earthquake, 1985	• **Minor cracks -** Repaired by injecting epoxy resins • **Buckled longitudinal reinforcement, broken ties, and crushed concrete** – Replacement of new reinforcement welded with the existing bars and new additionally closed ties were placed, concrete with low shrinkage properties were placed • **Severely damaged columns adjacent to added walls** – Retrofitted with encasing in concrete with appropriate longitudinal and transverse reinforcement, existing surface should be chipped and cleaned of all loose materials. The surface was moistened before the new concrete was placed.

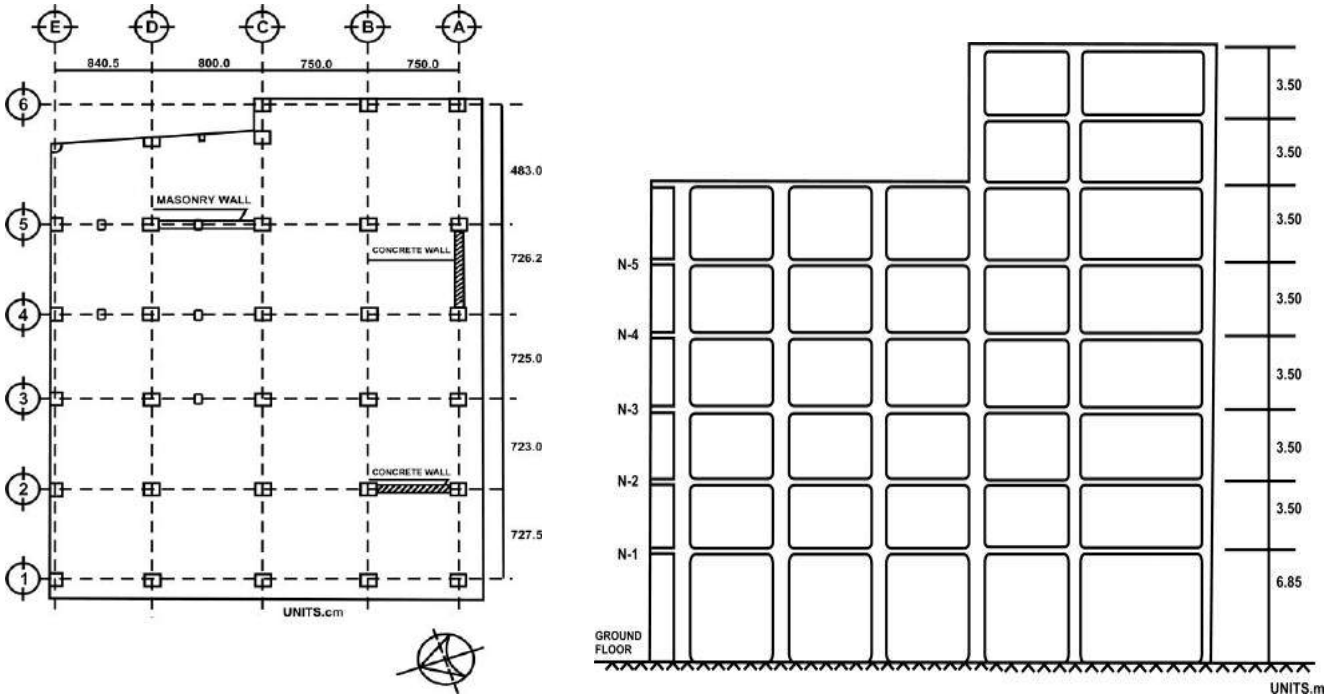


Fig. 14.6 Plan and elevation of the building

Case Study 2: Seismic Retrofitting of RC Building with Steel Bracing and Shear Wall

Source	Seismic Retrofit of a RC Building: A Case Study *Enrique DEL VALLE CALDERON, Douglas A. FOUTCH, Keith D. HJELMSTAD, Eduardo FIGUEROA – GUTIERREZ and Arturo TENA - COLUNGA* Proceedings of Ninth World Conference on Earthquake Engineering, Tokyo-Kyoto, Japan (Vol. VII)
Typical Features of the Building	• Number of Stories – Twelve, acting as Hotel building • Year of Construction – 1927 • Lateral Load Resisting Systems - Non-ductile reinforced concrete frames • Floor system - Cast-in-place concrete joist beam construction with 2.5-inch concrete slab • Foundation system - Mat foundation (2.4m thick) on concrete friction piles. • Typical floor plan and elevation shown in Figure.

Features of Damages in Michoacan earthquake, 1979	• Extensive damage to first four stories in transverse direction. • The spandrel beams and columns in Frame 1 and 5 experienced diagonal cracking over much of their length in the first floor. In addition, the beam – column joints of these frames suffered severe cracking and spalling. • The medium column in the fourth storey of Frame 3 suffered cracking and crushing. • The foundation performed well
Retrofitting Techniques Employed	• Cracked beams and columns – **repaired with epoxy injection** • The columns of Frames 1 and 5 – **encased in steel through the fourth storey level** • Frame 1 and 5 – **Braced steel frames were attached on the outside of the building in E-W direction**. *The columns of the frames and diagonal bracing at the first level were fabricated steel boxes. The other bracing members were made from 2 channels placed toe-to-toe with gusset plate between them. New footing and piles were placed under the columns of the new frames and were attached to the original foundation to ensure monolithic action. A 1.3 wide section of the floor slab was strengthened at each location where the new steel frame was attached to existing structure.* • Insertion of new infill reinforced concrete shear walls

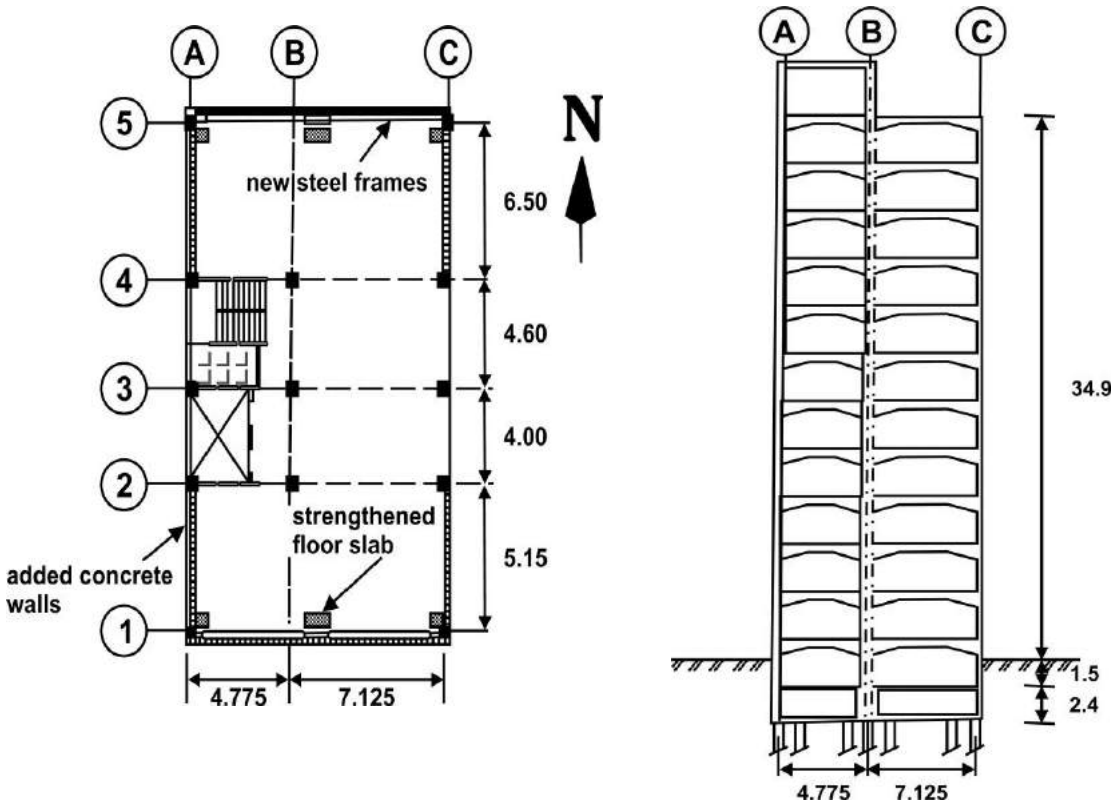


Fig. 14.7 Plan and elevation of the building

Case Study 3: Seismic Retrofitting of RC Building with Steel Bracing

Source	Forced Vibration Studies of an RC Building Retrofit with Steel Bracing *Keith D. HJELMSTAD, Douglas A. FOUTCH, Enrique DEL VALLE, Ruth E. DOWNS* Proceedings of Ninth World Conference on Earthquake Engineering, Tokya-Kyoto, Japan (Vol. VII)
Typical Features of the Building	• Number of Stories – 12-storey reinforced concrete condominium apartment building • Building Details- Plan size 10.8 x 17.45 m and height is 28.2m above the foundation level, including penthouse • Lateral Load Resisting Systems - Moment resisting RC frames • Floor system - Reticular waffle slab 5

	cm thick with 35 cm deep ribs • Foundation system - Mat foundation (15 cm thick) underlain by deep, slender stiffening beams (140 cm x 40 cm N-S and 140 cm x 30 cm E-W) located along the column lines. The stiffening beams are supported on concrete friction piles • Typical floor plan and elevation shown in Figure 3
Features of Damages in Mexico earthquake, 1979	• The building suffered extensive damage at the fourth storey columns due to pounding against an adjacent four-storey building located approximately 5 cm north of the this building. • The building also experienced large inter-storey deformations of its frame; resulting in damage to the exterior walls (both longitudinal and transverse). In addition, the longitudinal and transverse partition walls were badly cracked at several levels. • No indications of the foundation failure were observed
Retrofitting Techniques Employed	• **Diagonal steel bracing** was added to the central bay of frames 1, 2 and 3 in the transverse direction. *The cross-braces were fabricated by continuously welding of two angles together toe-to-toe to form a structural box. The columns of the three braced bays were encased in a steel lattice composed of angles at the corners and diagonal flat plates. This encasement provided the additional strength necessary to carry the increased axial forces anticipated in the columns of the braced bays.*

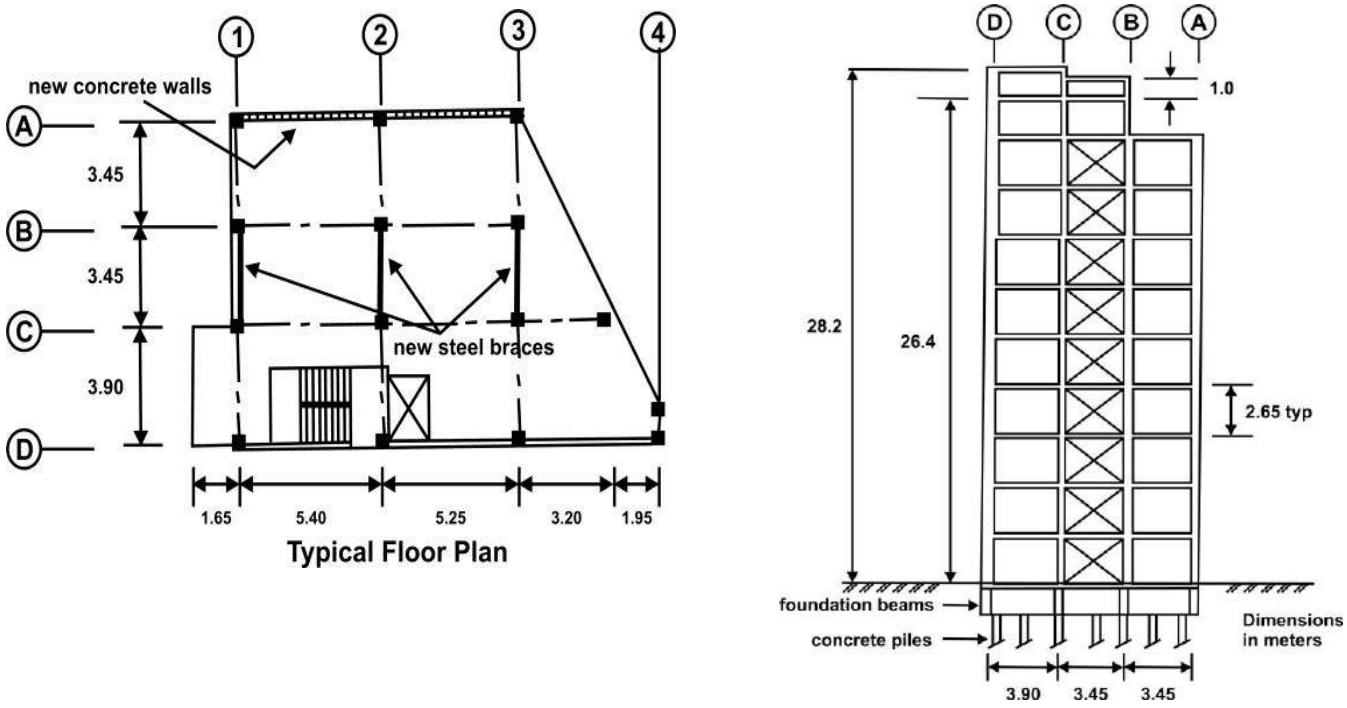


Fig. 14.8 Plan and elevation of the building

Case Study 4: Seismic Retrofitting of RC Building by Complete Jacketing of Frames

Source	The Mexico Earthquake of September 19, 1985 – Typical Cases of Repairs and Strengthening of Concrete Buildings *M. Jara, C. Hernandez, R. Garcia, and F. Robles* Earthquake Spectra, Vol. 5, No. 1, 1989
Typical Features of the Building	• Number of Stories – Four storey with basement, ground floor and three upper floors act as a warehouse • Typical Features – Corner building • Year of Construction – 1959 • Lateral load Resisting System - Reinforced concrete frames • Floor system - two-way slab with beam • Foundation - Mat foundation with retaining walls around the perimeter • Typical floor plan and elevation shown in Figure.

Features of Damages in Mexico earthquake, 1985	• Severe damage at second floor level columns • Damage consists of cracks more than 1 mm in width, loss of material and buckled bars • The façade walls suffered extensive cracking • Short column effect • Excessive splicing of the longitudinal reinforcement at the same section
Retrofitting Techniques Employed	• **Concrete Jacketing** - Both beams and columns
Expected Performance	• Static analysis was performed taking into account the torsional effects • Retrofitted building was analyzed with the assumption of monolithic behaviour between the old and the new material.

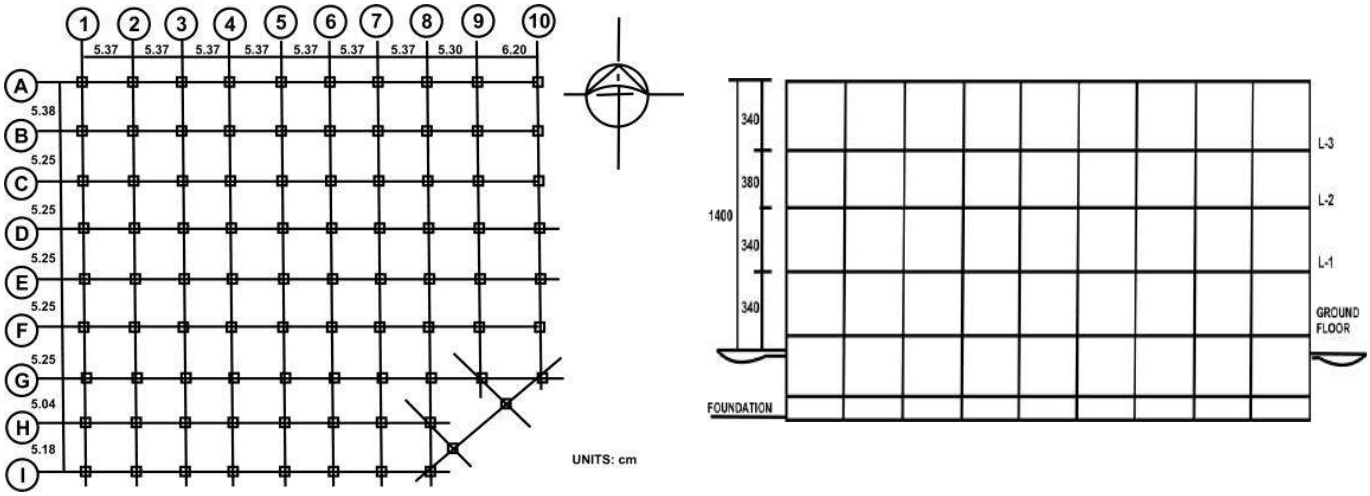


Fig. 14.9Plan and elevation of the building

Case Study 5: Seismic Retrofitting of RC Building with RC Shear Walls and Jacketing of Columns

Source	The ADANA – CEYHAN Earthquake of June 27,1998: Seismic Retrofit of 120 R/C Buildings *Haluk SUCUOGLU, Turel GUR and Polat GULKAN* 12th World Conference on Earthquake Engineering, 2000
Typical Features of the Building	• Number of Stories - 8-storey reinforced concrete apartment building. • Building Dimensions - Floor area 245 m2 and storey height is 3.0m above the foundation level, including penthouse. • Design and Construction -1984 • Lateral Load Resisting Systems - Moment resisting RC frames. A structural wall around the elevator. • Floor system - Concrete slabs in the first six stories and joist slabs in the top two stories. • Foundation system - Strip foundation in both the orthogonal directions
Features of Damages in Adana-Ceyhan (Turkey) earthquake, 1998	• Building under moderate damage category. • Extensive damage was observed in beams especially between the first and fifth floors.
Retrofitting Techniques Employed	• Infilling of appropriate frame bays by in-situ **reinforced concrete shear walls** with proper anchorage to the existing frame designed for these shear walls (Figure 5). • Damaged columns or columns lacking required vertical load carrying capacity are **jacketed**. Where feasible, use of composite reinforced polymer fabric is recommended.

Expected Performance	• Free vibration test results indicate the lowest mode vibration periods of the original (as built) building are calculated as 0.85 s (torsion), 0.68 s (translation in the short direction) and 0.65 s (translation is long direction). In the damaged state, these periods become 1.09, 0.87 and 0.84 respectively. After adding the shear walls periods are reduced to 0.65s (torsion), 0.50 (translation in the long direction) and 0.43 s (translation in short direction). • Naturally, the reduction in natural vibration periods

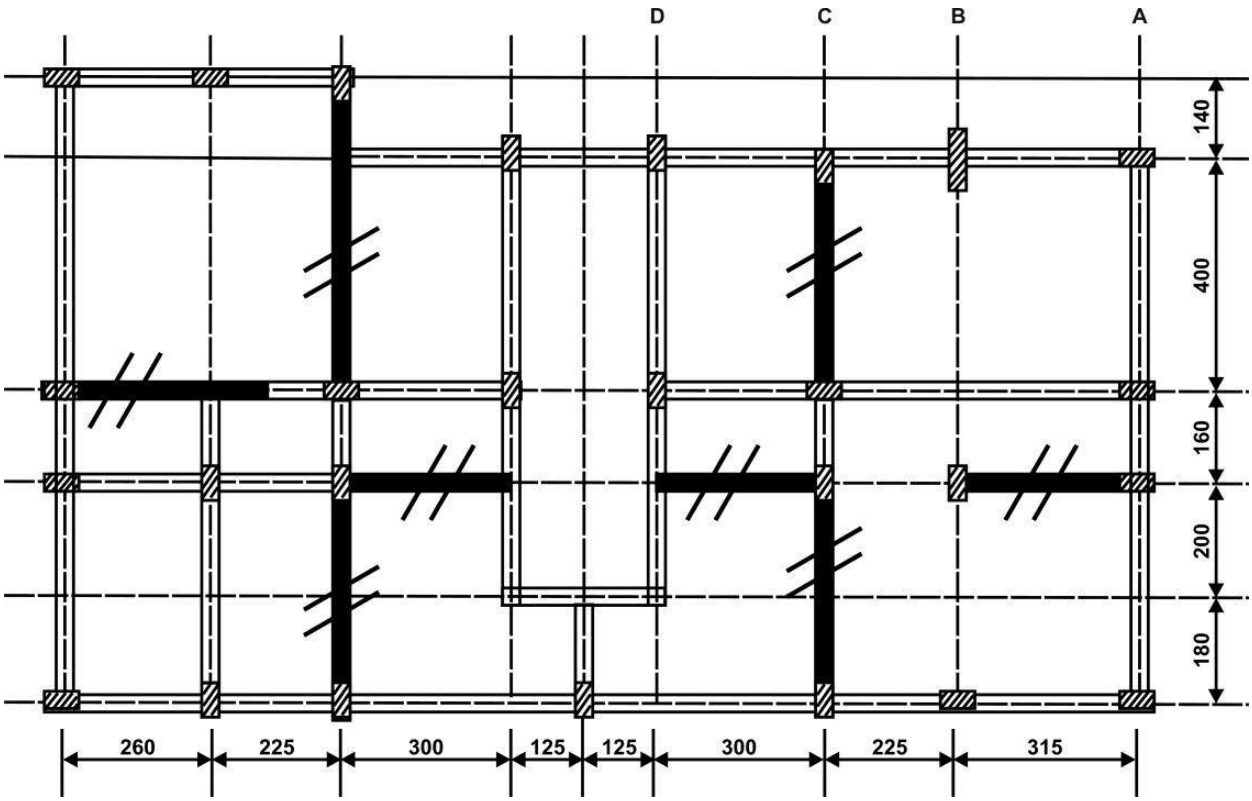


Fig. 14.10 Strengthening schemes applied to the building (darker shading shows newly added RC walls)

14.2 Electrical engineering

14.2.1 Design of Power Electronics converter

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.

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.

Dual Converter

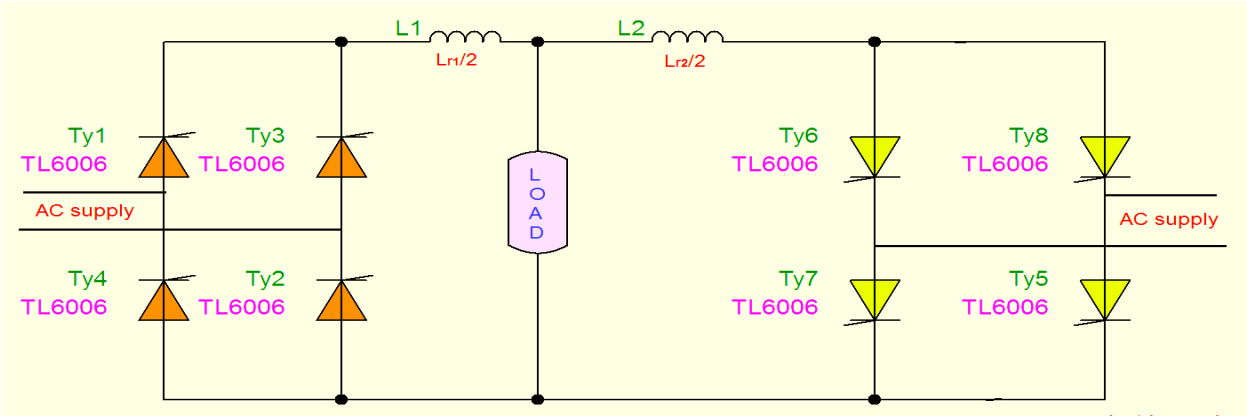


Fig. 14.11 Single Phase Dual Converter

Dual converter is a combination of a rectifier and inverter in which the conversion of A.C to D.C happens and followed by D.C to A.C where load lies in between. A dual converter can be of a single phase or a three phase. A dual converter consists of two bridges consisting of thyristors in which one for rectifying purpose where alternating current is converted to direct current which can be given to load. Other bridge of thyristors is used for converting D.C to A.C.

Single Phase Dual Converter

Single phase dual converter uses a single phase as source which is given to converter 1 of dual converter for rectification followed to load.

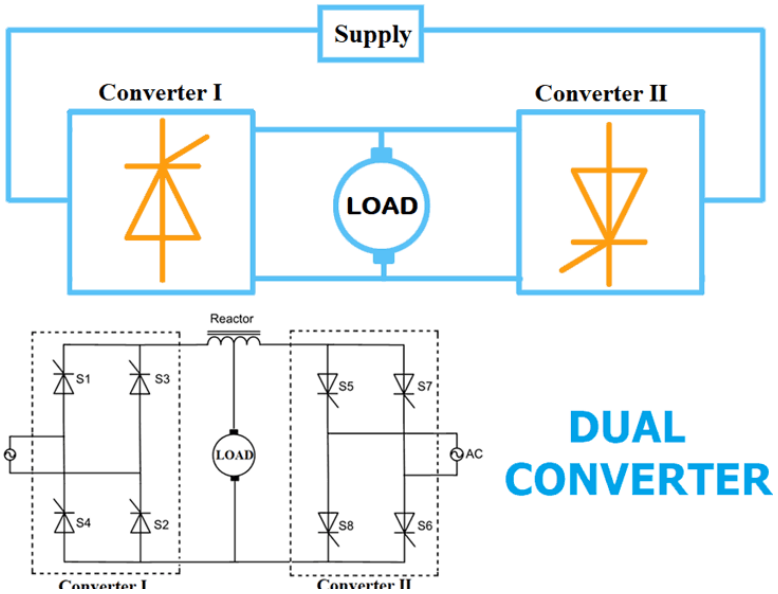


Fig. 14.12 Single Phase Dual Converter

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.

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 thyristors 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. Asingle-

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 consist 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:

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.

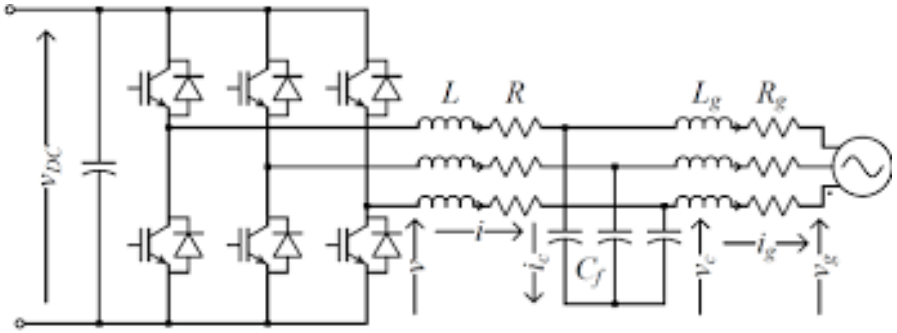


Fig. 14.13 Three leg converter

14.2.2 Electronic Soft Starter for 1/3 Phase Induction Motor for Agriculture

Soft Starting

In technical terms, a soft starter is any device that reduces the torque applied to the electric motor. It generally consists of solid-state devices like thyristors to control the application of

supply voltage to the motor. The starter works on the fact that the torque is proportional to the square of the starting current, which in turn is proportional to the applied voltage. Thus the torque and the current can be adjusted by reducing the voltage at the time of starting the motor.

There can be two types of control using soft starter:
Open Control: A start voltage is applied with time, irrespective of the current drawn or the speed of the motor. For each phase, two SCRs are connected back to back and the SCRs are conducted initially at a delay of 180 degrees during the respective half-wave cycles (for which each SCR conducts). This delay is reduced gradually with time until the applied voltage ramps up to the full supply voltage. This is also known as Time Voltage Ramp System. This method is not relevant as it doesn't control the motor acceleration.

Closed-Loop Control: Any of the motor output characteristics like the current drawn or the speed is monitored and the starting voltage is modified accordingly to get the required response. The current in each phase is monitored and if it exceeds a certain set point, the time voltage ramp is halted.Thus the basic principle of the soft starter is by controlling the conduction angle of the SCRs the application of supply voltage can be controlled.

Components of a basic soft starter

- Power switches like SCRs which need to be phase controlled such that they are applied for each part of the cycle. For a 3 phase motor, two SCRs are connected back to back for each phase. The switching devices need to be rated at least three times more than the line voltage.
- Control Logic using PID controllers or Microcontrollers or any other logic to control the application of gate voltage to the SCR, i.e. to control the firing angle of SCRs to make the SCR conduct at the required part of the supply voltage cycle.

Working Example of Electronic Soft Start System for 3 phase induction motor

The system consists of the following components.

- Two back-to-back SCRs for each phase, i.e., 6 SCRs in total.
- Control Logic circuitry in the form of two comparators- LM324 and LM339 to produce the level and the ramp voltage and an opt isolator to control the application of gate voltage to each SCR in each phase.

A power supply circuitry to provide the required dc supply voltage.

The level voltage is generated using the comparator LM324 whose inverting terminal is fed using a fixed voltage source and the noninverting terminal is fed through a capacitor connected to the collector of an NPN transistor. The charging and discharging of the capacitor cause the output of the comparator to change accordingly and the voltage level to change from high to low. This output level voltage is applied to the noninverting terminal of another comparator LM339 whose inverting terminal is fed using a ramp voltage. This ramp voltage is produced using another comparator LM339 which compares the pulsating DC voltage applied at its inverting terminal to the pure DC voltage at its noninverting terminal and generates a zero voltage reference signal which is converted to a ramp signal by the charging and discharging of an electrolyte capacitor.

The 3rd comparator LM339 produces a High pulse width signal for every high-level voltage, which decreases gradually as the level voltage reduces. This signal is inverted and applied to the opt isolator, which provides gate pulses to the SCRs. As voltage level falls, the pulse width of the opt isolator increases and more the pulse width, lesser is the delay and gradually the SCR is triggered without any delay. Thus, by controlling the duration between the pulses or delay between applications of pulses, the firing angle of SCR is controlled and the application of supply current is controlled, thus controlling the motor output torque.
The whole process is an open-loop control system where the time of application of gate triggering pulses to each SCR is controlled based on how earlier the ramp voltage decreases from the level voltage.

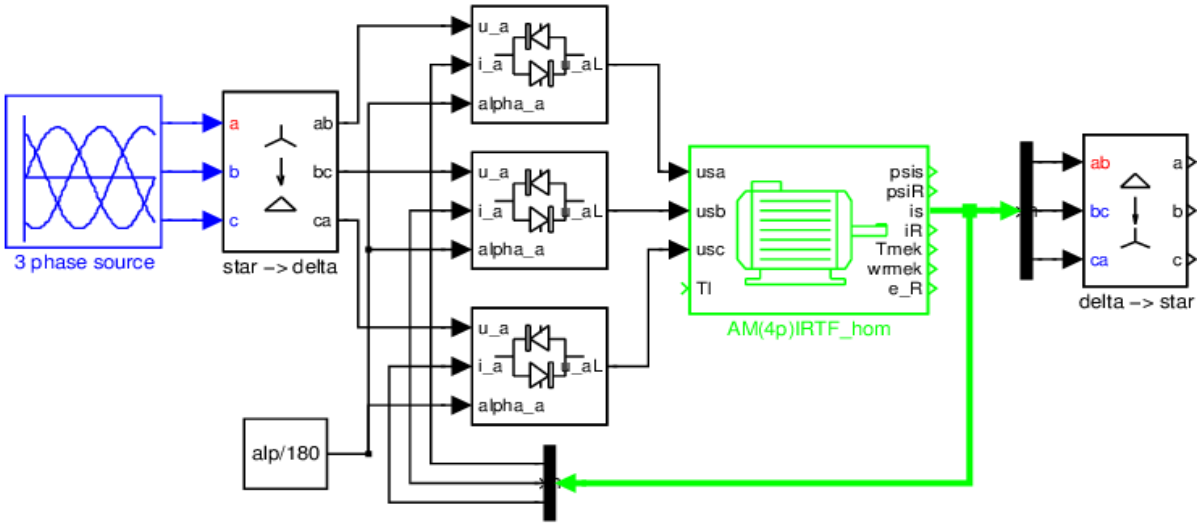


Fig. 14.14 Block Diagram showing Electronic Soft Start System for 3 phase Induction

Advantages of Soft Start

Now that we have learned about how an electronic soft start system works, let us recollect a few reasons why it is preferred over other methods

- **Improved Efficiency**: The efficiency of the soft starter system using solid-state switches is more owing to the low on-state voltage.
- **Controlled startup**: The starting current can be controlled smoothly by easily altering the starting voltage and this ensures smooth starting of the motor without any jerks.
- **Controlled acceleration**: Motor acceleration is controlled smoothly.
- **Low Cost and size**: This is ensured with the use of solid-state switches.

14.2.3 Advanced Wireless Power Transfer System

Wireless power can be defined as the transmission of electrical energy from a power source to an electrical load without connecting wires. It is reliable, efficient, fast, low maintenance cost, and it can be used for short range or long range. The basic working principle of wireless power transfer is, two objects having similar resonant frequency and in magnetic resonance at powerfully coupled rule tends to exchange the energy, while dissipating relatively little energy to the extraneous off-resonant objects.

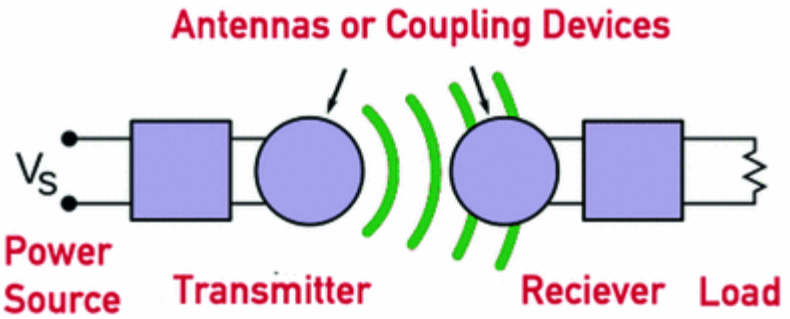


Fig. 14.15 Wireless Power Transfer

Moreover, this method can be involved in a variety of applications, like to charge mobile phones, laptops wirelessly. And also, this kind of charging gives a far lower risk of electrical shock as it would be galvanically isolated. This is an emerging technology, and further, the distance of power transfer can be improved as the study across the world is still going on.

Hardware Requirements of Wireless Power Transfer The hardware requirements of wireless power transfer include HF-Transformer, HF-diodes, rectifier, basic Transistors, Two air filled inductor coils, Voltage regulator and BLDC fan.

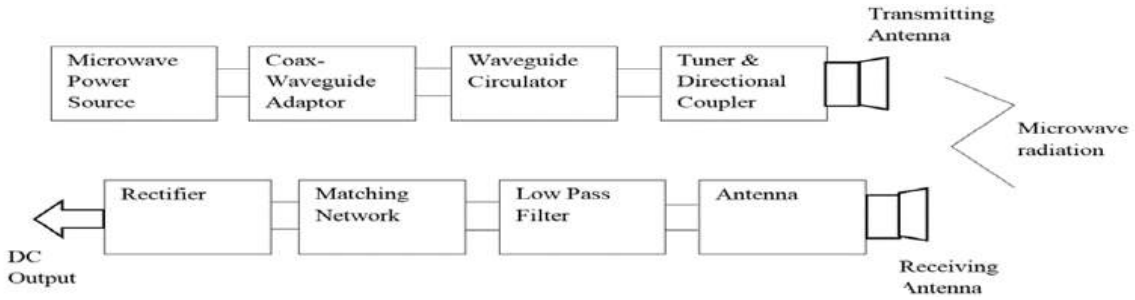


Fig. 14.16 Wireless Power Transfer Block Diagram

HF-Transformer

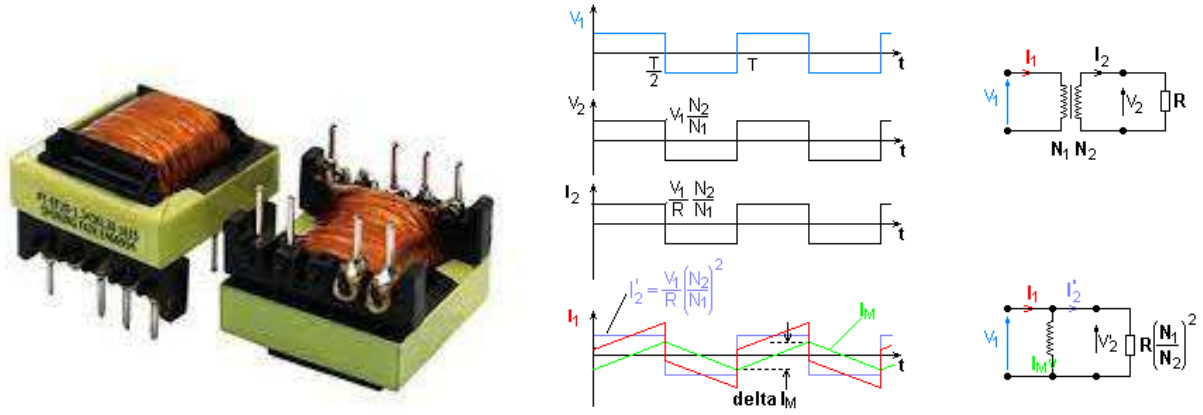


Fig. 14.17 HF Transformer

High frequency (HF) transformers transfer electric power and the physical size are reliant on the power to be transformed as well as the operating frequency. The emf equation of universal transformer indicates that at a higher frequency, the core flux density will be lower for a given voltage. This implies that a core can have a smaller cross-sectional area.

Voltage Regulator

A voltage regulator is an electrical regulator, designed to maintain a constant level voltage automatically.

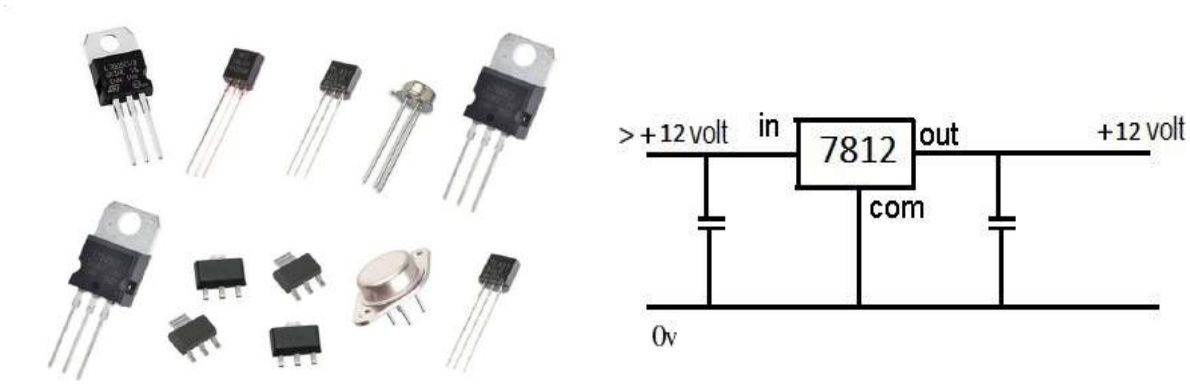


Fig. 14.18 Voltage Regulator

Coil

- An electromagnetic coil is formed when a conductor is wound around a core
- Primarily used to transfer energy from one electrical circuit to another by magnetic coupling
- Common types of electrical coils are Tesla, Barker, Choke, Maxwell coil, etc.

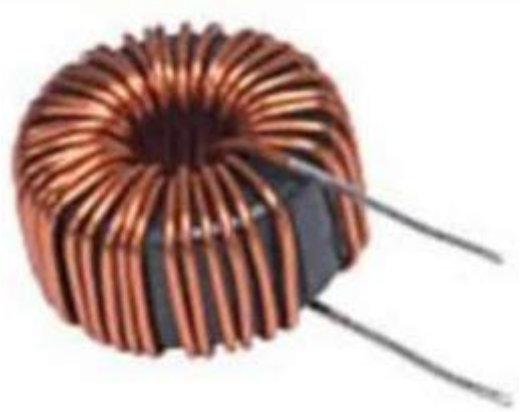


Fig. 14.19 Coil

IN4007 Diode

- This diode is used as full wave bridge rectifier circuit in this project
- Maximum reverse bias voltage capacity of 50V and max forward current capacity of 1Amp.

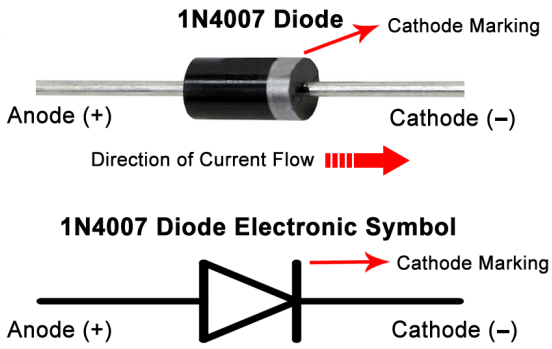


Fig. 14.20 IN4007 Diode

Project Working

The main concept of this project is to design a device for the concept of wireless power transfer to eliminate the use conventional copper cables and also current carrying wires.

This project is built upon using a circuit which converts AC 230V 50Hz to AC 12V, High frequency (HF). The output is fed to a tuned coil shaping as main of an air core transformer. The minor coil develops a voltage of HF 12volt.

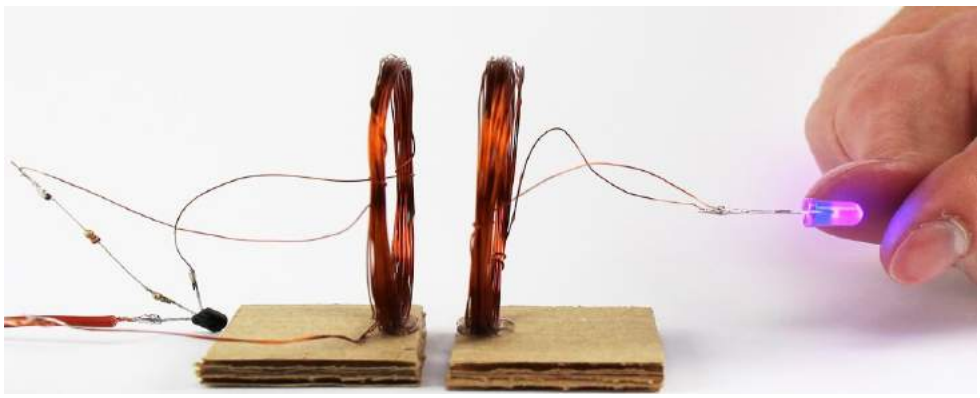


Fig. 14.21 Wireless Power Transfer Project

Thus, the power transfer can be done by the primary to the secondary that is divided with 3cm distance. So, the transfer could be seen as the primary transmits and the secondary receives the power to run a load.

In addition, this method can be used in several applications, like to charge gadgets like mobile phone, laptop battery, iPod, propeller clock wirelessly. And also this type of charging offers a far lower risk of electrical shock as it would be galvanically isolated.

This is an Emerging Technology, and in future, the distance of power transfer can be improved as the study across the world is still going on.

Wireless Power Transfer Advantages

The advantages of WPT include the following

- Simple design
- Lower frequency operation
- Low cost
- Practical for short distance

Wireless Power Transfer Disadvantages

The disadvantages of WPT include the following

- High power loss
- Non-directionality
- Inefficient for longer distances

Wireless Power Transfer Applications

The applications of WPT include the following

- Consumer electronics
- Transport
- Heating and ventilation
- Industrial engineering
- Model engineering

14.2.4 Industrial Temperature Controller

A Temperature Controller is a device that is used to control a heater or other equipment by comparing a sensor signal with a set point and performing calculations according to the deviation between those values. Devices that can handle sensor signals other than for temperature, such as humidity, pressure, and flow rate, are called Controllers. Electronic controllers are specifically called Digital Controllers.

Temperature Control Configuration Example

The following example describes the basic configuration for temperature control.

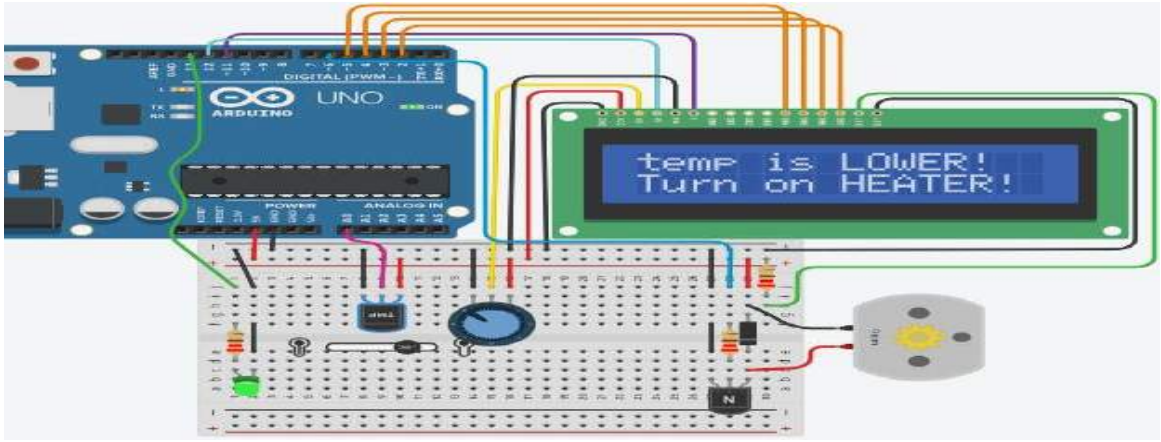


Fig. 14.22 Wireless Power Transfer Project

Temperature Controller Principle

The following figure shows an example of a feedback control system used for temperature control.

The major parts of the feedback control system are built into the Temperature Controller. A feedback control system can be built and temperature can be controlled by combining a Temperature Controller with a controller and temperature sensor that are suitable for the controlled object.

Temperature Controller Principle

The following figure shows an example of a feedback control system used for temperature control.

The major parts of the feedback control system are built into the Temperature Controller. A feedback control system can be built and temperature can be controlled by combining a Temperature Controller with a controller and temperature sensor that are suitable for the controlled object.

Configuration of a Feedback Control System

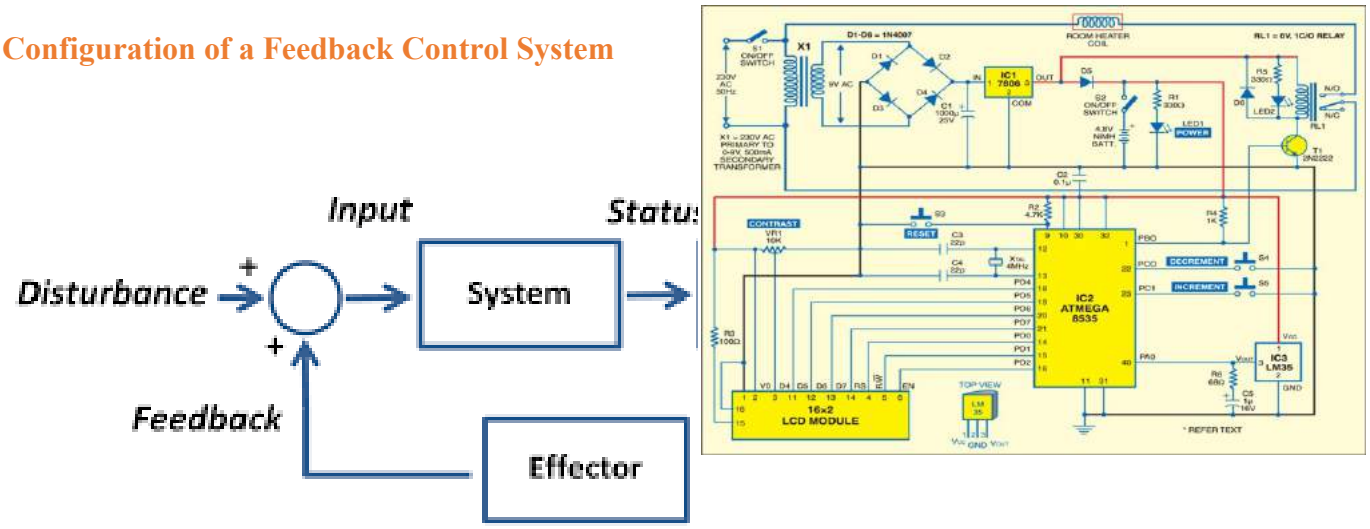


Fig. 14.23 Feed back control system

Characteristics of the Controlled Object

Before selecting a Temperature Controller or temperature sensor, it is necessary to understand the thermal characteristics of the controlled object for proper temperature control.

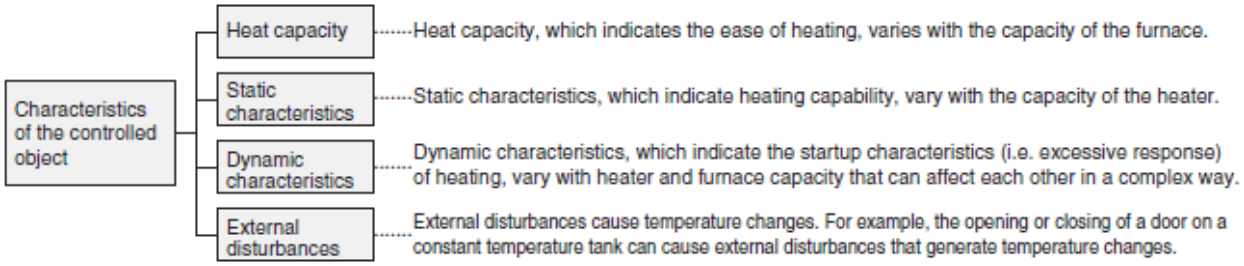


Fig. 14.24 Characteristics of the Controlled object

Digital Temperature Controller Circuit

A Digital temperature controller circuit is a precise temperature controller in medical, industrial and home applications. This system is better than analogue/thermostat system, which has poor accuracy. For example, it can use for temperature control of an incubator where maintaining a precise temperature is very important.

Digital Temperature Controller Block Diagram Description

This proposed Digital temperature controller system provides the temperature information on a display and, when the temperature exceeds the set point, then the load (i.e. Heater) switches OFF. In this project, a lamp is provided as a load for demonstration purpose. The Block Diagram of Digital Temperature Control System is given below.

The proposed Digital temperature controller system uses a Microcontroller of 8051 family, which is the heart of the application. The display unit consists of four- seven segment display, Temperature sensor and are interfaced to the Microcontroller.
The digital temperature sensor interfaced to the Microcontroller for sensing the temperature conditions. This system also provides four push button switches for adjusting the temperature settings.

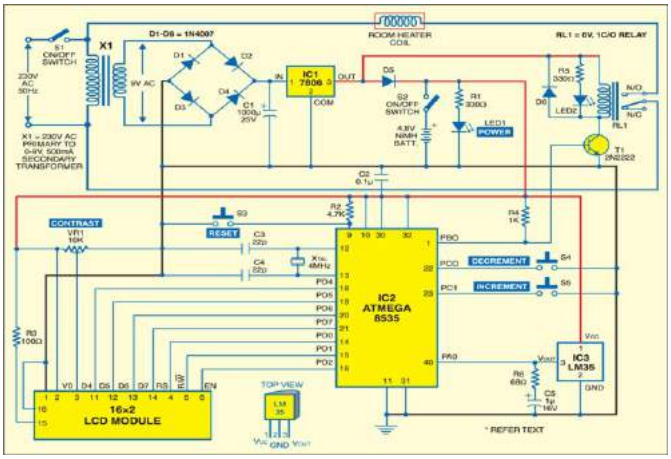


Fig. 14.25 Block Diagram of Digital Temperature

Then the Microcontroller continuously polls the temperature information through a digital temperature sensor and displays over the 7-segment display unit and automatically switches OFF the lamp, when the corresponding temperature exceeds the set point.

Fig. 14.26 Digital Temperature Control System

Hardware Requirements

- Transformer (230 – 12 v ac)
- BC547
- Voltage regulator (LM 7805)
- Rectifier
- Filter
- Microcontroller (at89s52/at89c51)
- Resistors
- DS1621 Temperature sensor
- Capacitors
- Push buttons
- 7 segment display

14.2.5 Accident Alerts in Modern Traffic Signal Control System – Camera Surveillance System

Accident Alert System Features This system is based on new technology, its main purpose is to detect an accident and alert to the control room, so the victim can find some help. It can detect accidents the intensity of the accident without any visual contact from control room. If this system is inserted in every vehicle then it is easy to understand how many vehicles are involved in a particular accident and how intense is it. So that the help from control room will be according to the control room. The present board designed has both vehicle tracking and accident alert systems, which make it more valuable and useful. This board alerts us from theft and on accident detection also. This device detects fire accidents also by placing fire detector in one of the interrupt pins

Video Surveillance for Traffic

Traffic cameras are an innovative and extremely functional use of video surveillance technology. You've seen their footage during traffic reports on the TV news. They're atop traffic signals and placed along busy roads, and at busy intersections of the highway. Whether they're recording traffic patterns for future study and observation or monitoring traffic and issuing tickets for moving violations, traffic cameras are an explosively popular form of video surveillance.

Advantages of Traffic Surveillance Cameras

Aid commuters - Traffic cameras placed at common congestion points on highways, freeways, interstates and major arteries often share feeds with news outlets - both radio and TV, which in turn pass them onto commuters in the form of traffic reports. Normally, traffic flows do not vary much from day to day, but in the event of a severe accident or road closure, a traffic alert can be extremely valuable for a time-crunched commuter.
Valuable data - Traffic cameras that simply monitor car flows on roads and major arteries are often maintained by state departments of transportation. Along with monitoring the roads for accidents or major closures, footage from traffic cameras is influential in decisions regarding future road development and construction.
Enforce laws - Cameras used to enforce speed and red light laws are effective in catching moving violations and issuing tickets.
Encourage safe driving - Visible surveillance cameras posted at intersections can encourage safe driving habits and discourage moving violations.

Risky Aspects of Traffic Security Cameras

Weather - Whether they're monitoring intersections or looking out for traffic jams, traffic cameras are subject to damage caused by weather. Heat, wind, rain, snow and ice can all damage or ruin a traffic security camera.
Accidents - Since they're placed on busy roads and intersections, there is also a chance that accidents could damage traffic cameras.

Configuration Considerations for Roadway Cameras Traffic monitoring cameras and red light or speed cameras have different purposes and therefore deserveseparate consideration when installing. Consider the following when looking to install traffic monitoring or red-light cameras

For traffic surveillance cameras:

- What are the major roadways in your area?
- At what time is traffic in your area the heaviest (aka "Rush Hour")?
- Are there certain features in roadways where traffic naturally congests?

For speed and red-light cameras:

- Are there any particular intersections in your area where accidents and violations are common?
- Are moving violations a particular problem in your area?

Setup Advice for Traffic Surveillance Cameras

For speed and red-light cameras:

- When installing cameras, make sure that all areas of the intersection are covered. Usually, cameras are placed above the signals or mounted on each corner of the intersection
- Consider installing a flash or other light source for night recording
- Consult with local law enforcement to find the most troublesome intersections
- Make sure your cameras are placed and calibrated to record the license plate data off of violating cars.
- To protect cameras against the elements, place them in environment-controlled housings.

For road surveillance and monitoring cameras:

- Place cameras so they overlook common congestion areas.
- Make sure cameras have adequate visibility and a good view of all lanes involved.
- Temperature and humidity-controlled camera housings can help protect the camera against weather.

14.2.6 Technical Case Study on "Short Range Wireless Network"

Introduction

The WiFi and WiMax are spearheading the technologies for inter networking in data communication world. The cellular technology has virtually replaced land line phone networks laid across the world. Another type of wireless network, Short range wireless networks are slowly advancing to replace wired devices. These technologies; Bluetooth, 802.15.4 LR-WPANs for small size networks are making their significant impact in real world. However they are far from competing with wired communication in terms of robustness, reliability and speed in general.

The benefits of the wireless network are superseding the wired networks. Ease of use, less time to market, easy to install at difficult places are some of the benefits of wireless technology. These features are very appealing for small networks in physically bounded areas like smart homes, industrial network, special purpose embedded device network etc. Availability of plethora of short range wireless transreceivers has made it mandatory for the industry not to overlook wireless alternative for such networks.

The foremost problem for not deep penetration of wireless technology in industrial and commercial application areas is lack of standard network suits or protocols which will allow end user to smoothly transit on to wireless communication. The working groups such as wireless industrial networking alliance (WINA), Wireless HART from HART communication foundation (HCF), and ISA100 have tried to define and establish industrial wireless-technology standards for different application domains. More specific groups working on similar short distance wireless communication standards are Bluetooth, UWB, ZigBee, IEEE 802.15.4a, WiBree, and Rubee. They bring multiple choices for various short range wireless applications. These groups

are working towards evolving protocol standards satisfying industrial needs and challenges. The standards are based on focused application areas thus not satisfying application independent network protocol requirement.

There are some real time implementations carried out using different technologies showing strengths and weaknesses of the short range wireless communication. The Bluetooth has been implemented for wireless sensor network for security systems. Use of Zigbee technology has been demonstrated for industrial control specifically for loom control, Automatic Meter reading systems and intra-car wireless communication network. There is a transport system implementation using WSN. A survey of application distribution in wireless sensor network, has presented various wireless sensor network technologies in turn short range wireless networks. Author has observed that Operating systems (OSs) and middleware architectures for WSN implements separate services for distribution within existing constraints but an approach providing a complete distributed environment for applications is absent.

The present work examines challenges, real time characteristics and advantages of wireless networks. A real time case study of Indian Railways is presented with proposed solutions to alleviate implementation challenges. the wireless media behavioral characteristics, their impact on communication protocols, other problems faced by application developer to use wireless communication media and necessity of application independent network protocols. Section 3 presents case for consideration of using wireless media for communication. Section 4 provides proposed solutions with implementation details of system under transformation. Section 5 presents experimentation and results to validate proposed solutions and requirement specifications of the system. Section 6 gives conclusion inspecting the solutions, results and their reusability in the different application scenarios.

Challenges for Short Range Wireless Communication

Short range wireless technologies suffer heavily in their performance metrics due to wireless-link quality dynamics, noise, interference and environmental impact on communication range and reliability as compared to WiFi and Wimax wireless technologies. Following section discusses major impacting factors and other aspects prohibiting the growth of short range wireless networks.

Irregularity of Radio Communication

In models and solutions for radio irregularity has noted three properties of radios which has maximum impact on short range wireless communication; Anisotropy, continuous variation and heterogeneity. The radio signal from a transmitter has different path losses in different directions and the wireless coverage is not spherical as is widely assumed. Secondly the signal path loss varies continuously with incremental changes of the propagation direction from a transmitter and the differences in hardware properties and battery status lead to different signal sending powers, hence different received signal strengths. Further with an experimental study in understanding packet delivery performance in dense WSN has shown that asymmetric link percentage can be as high as 40% in short range radios greatly affecting the network performance. This issue becomes crucial for short range radio network as the percentage of irregularity is severely high as compared to its coverage capability. Empirical measurements has demonstrated that the average LQI values provided by WSN radio components are closely correlated with PRR and can be used as a reliable metric for wireless-link-quality assessment during the deployment of the proposed WSN scheme. LQI as function for packet yield has been used and have observed that LQI is a

quite good indicator of packet yield, as there is a strong correlation between LQI and packet yield for similar experiments. Author has also noted that packet yield as a function of distance depends very heavily on height of both the sending and receiving motes. In most situations sensor nodes will have to be deployed on walls and floors, where they will not be able to achieve their full range. Use in the intra-car sensor network has reported two issues due to low LQI values, fading ("long-term" problem): passengers causing channel fading and Interference ("shortterm" problem): frequency hopping interference.

Software and Hardware Issues for Transitioning to Wireless Communication

Another issue is software and hardware for switching to the wireless network for existing wired networks and new applications. Merill in "Where is the return on investment in Wireless Sensor Networks?" , has observed that there is too much diversity of hardware and application building platforms. The author has also noted that application specific software development cost exceeds hardware design and manufacturing cost due to excess availability of various wireless and embedded hardware devices and unavailability of standard framework to work in this heterogeneous.

Economics of wireless networks

The cost difference between wireless media devices than their wired counterpart is aggressively decreasing due to availability of many radio trans-receivers in various shapes, types, forms and strengths. It can be proved that the cost is near to same or even less than the cost of wired network. Major cost saving is achieved in terms of system installation, commissioning and maintenance of the system. It has been pointed out that at present the real time application needs to be analyzed with application specific testbeds at high cost. We argue that if network protocol component is separated from application framework there will be large cost saving in application development as focus will be application specific requirements only.

Other Issues

Other issues are security, authentication and optimized energy consumption routing in wireless networks. There is no doubt that these issue would be of importance depending upon the application requirement. This paper considers these issues as out of scope for this work.

Short Range Wireless Communication Test Bed for Railways

The system for migration to wireless communication is passenger amenity system installed at Indian railway stations. The system disseminates bogie information of the arriving train for passengers through coach indicators installed at each bogie position of the arrived train on the platform.

Present System

The deployed network is LED dot matrix display devices referred as coach indicators display (CI). These devices are installed on the railway platform, hanged from the ceiling or on poles. These displays are used for showing train number, coach type details like S1, AC I, PANTRY etc. for each of the bogie of arrived train on platform. There are 26 such coach indicator displays on every platform each 22 meters apart. All these devices are networked through RS485 multidrop bus controlled through platform router. The router in turn is connected to the main system comprising of desk top machine and multiport serial RS485 bus controller.

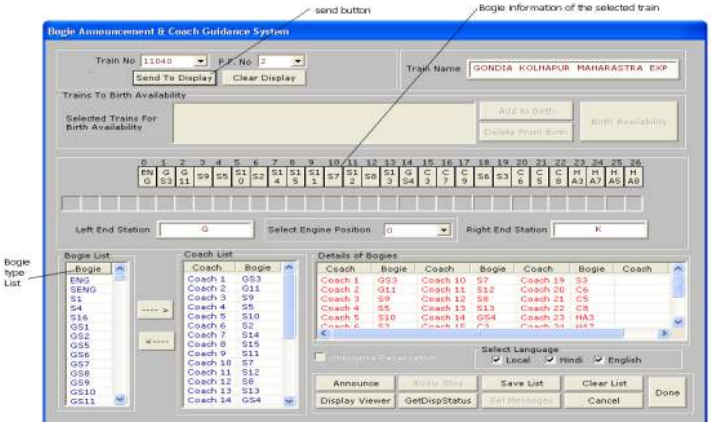


Fig. 14.27 Coach guidance system GUI

The desk top machine is used for running Coach Guidance System (CGS) application. CGS GUI is shown in the figure 1.0. GUI allows operator to feed coach information for each bogie. The CGS GUI contains list of all probable coach types that might get attached to the trains. Another list contains coach number 1 to 26. Coach type placement information is received by station prior to the arrival of the train. This data is fed to the system by the operator. Operator selects train number and platform number of the arriving train and populates the list as per bogie placement information received. Bogie information of the selected train is displayed in the middle portion of GUI showing bogie selection against coach positions as shown in figure. The information is converted into a sequential ASCII file containing train number and bogie type with coach number. Upon pressing "Send to Display" button this file is transmitted via serial port connected to RS485 Bus driver. All coach display indicators receive the same file. Each coach indicator extracts train number and bogie type against each of coach number acting as device ID. After the train departs, operator presses "Clear Display" button which sends clear display message, all indicators returns to default mode displaying default message. The system uses duplex connectivity for enquiring coach display indicator about health and data displayed on the indicator.

Hardware and Software Design Issues

Figure shows arrangement of the wireless devices on the railway platform. M is main controller interfaced to the desk top running CGS GUI via serial RS232 port. R1 and R2 are wireless routers. CI01 to CI26 are coach display indicators equipped with wireless trans-receivers. The network architecture is designed as three tier architecture. At first tier main controller acting as master controller of the network. The router act as local cluster controller at second tier and coach indicators treated as slave devices forms the third tier of this network. The coach indicators are 22 m apart. The length of the platform is 572m. The routers are positioned at 66m on both sides from the centre of the platform.

Hardware

A 32 bit RISC CPU integrated with radio peripheral is used to develop main controller M, routers R1,R2 and coach indicators CI01-CI26 radio interface module. The radio is 2.4 GHz, 802.15.4 compliant. Receiver sensitivity is -97 dBm and transmitting power set at +3dBm. Other features are MAC accelerator with packet formatting, auto-ack mechanism and security co-processor. Radio module at CI is interfaced with serial port to coach indicator display controller.

Network Layer

The network layer uses centralized control paradigm as is normal case with wired embedded device network. In this network architecture main controller acting as master controller carries out all network functionalities under his supervision and control. All network and data transfer events are controlled by master controller there by message collision is virtually avoided. A basic network layer is based on fixed topology and is designed on the top of 802.15.4 PHY/MAC layer. The network layer functionality includes establishing the network connectivity, data routing and data transport handling. Transport layer handles sequential file communication of wired network through packetized data communication and packet sequence control. Application layer uses services of network layer and transport layer for data transfer to destination devices. This minimizes the changes in the existing software and distributes the development cost on other applications. As regards with the issues raised in with this facility a effort has been made to develop a application independent model which would allow the developer to treat network device as simple wired network device.

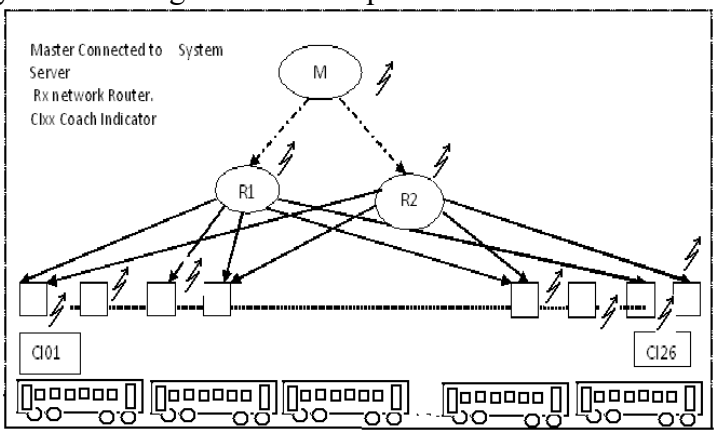


Fig. 14.28 Arrangement of wireless devices on railway platform

Link quality, asymmetric links and robustness.

To bring robustness in network connectivity LQI is used as critical value to join devices in the network. These devices are joined under supervision of master controller if LQI satisfies LQI threshold value criteria. In figure. if routers receiving LQI value with respect to particular CI is above threshold and CI receiving LQI value with respect to router is above threshold level then these devices are joined in the network. This ensures link quality control and symmetric link between these devices. In the above network two routers R1, R2 are used with position offset of two coach indicators from central CI on the platform. The range of radio is such that both routers can cover all coach indicators on the platform. However as expected LQI values will differ with distance of CI from router. CI is allotted to router based on LQI strength received by the router for that CI. Since care has been taken that LQI of the farthest CI is above threshold value for each router, all CIs will have communication route to master through both routers. This gives redundancy in the path towards master in case one of the routers fail, adding more robustness in network connectivity. Philosophy used herein is backed up by experimental work presented by However the difference is we have used LQI threshold value at protocol design stage. This

overcomes the problems discussed about irregularity of radio communication discussed in section 2.

Data Transport Layer

The transport layer provides different mechanisms for packet transmission. NOACK packet: This is like UDP packet, receives no feed back from destination device. AUTOACK packet: The device transmits the packet with hardware acknowledgment (HACK) request. If hardware ack is not received in specific time the packet is retransmitted. Max_retry is set to 3. SOFTACK packet: The device transmits packet with end to end ack is request. The destination device issues specific SOFTACK (SACK) packet to the source device. If SACK is not received, packet is retransmitted with Max_retry set to 3.

System Operation

The network organization is dynamically formed. Routers (R1, R2) and End devices (CI01-CI26) broadcast hello packets after they are powered. Master controller (M) listens to routers' hello packets. Master issues JOIN command to the routers. Routers will accept JOIN command using received LQI value as described in section 4.2.1. Once these routers are connected to the master, they forward hello packets of neighboring CI devices to the master. Master prepares a routing database of these devices and assigns CI devices to router having higher value of LQI as primary router. Router having low LQI value with respect to same CI is assigned as secondary router having path towards the master. List of CIs attached to router is forwarded to corresponding router. The routers in turn issues JOIN command to CIs in the received list.

Results & discussion

Experimentation is conducted to verify the design stability as per design parameters and application requirements. Main focus was on reliable and robust communication between the devices and a cost effective solution.

Setup

Devices were setup at the railway platform as per topology shown in figure at a height of around 4 m from the level of platform. The radio power was fixed at +3dBm, max packet retry value 3, packet payload 32 bytes, packet rate at 4 packets per seconds. The application required only master (M) to end device (CI) communication. This avoided problem of message collision and congestion. Devices were programmed to generate packets at rate of 4 packets per second for duration of 20 seconds for each experimental run. Three sets of experiment were carried out. Average of the three experimental set results are plotted for each parameter.

Determination of LQI threshold value

Experimental results are used to decide the threshold LQI value as connectivity metrics for devices in the network. This value is not particular to the field conditions presented for experimentation but can be used for all other application field situations.

As explained in section 4.2.1 LQI value is used as critical value to join the devices in the network. Table 1 shows LQI versus packet delivery efficiency with respect to NOACK; no feedback mechanism, HACK with auto-ack feature of the radio and SACK; software acknowledgment packet sent by the destination device for each of the data packet received. It was observed that packets with NOACK reach to 100 % efficiency at LQI value of 38. This

value seems to guarantee 100 confidence level of message reaching to the destination even in the absence of feedback mechanism. Packets with auto ack and soft ack have reached to 100 % efficiency at LQI values lower than this. However the bandwidth overhead is significantly more at lower LQI values, which is expected as more number of repeat transmissions of data packet has to be made (refer table no.1). More bandwidth overhead also indicates increase in average packet delivery time.

Table 14.1 Variation of efficiency with LQI for different ACK schemes and respective bandwidth overheads

LQI	NOACK		HACK		SACK	
Efficiency	**Bandwidth Overhead**	**Efficiency**	**Bandwidth Overhead**	**Efficiency**	**Bandwidth Overhead**	
19	13.33	1.033	98.68	1.579	100	2.223
24	72.2	1.064	100	1.118	97.87	2.085
26	95.83	1.033	100	1.041	100	2.077
38	100	1.034	100	1.033	100	2.173
46	100	1.033	100	1.033	100	2.124
59	98.33	1.033	100	1.033	100	2.107
62	100	1.017	100	1.033	100	2.033
137	100	1.033	100	1.033	100	2.033

At LQI value 38, 100% packets are received without any feedback mechanism. At the same LQI value with feedback mechanism gives minimum BW overhead indicating there are no repeat transmissions required. This value can be safely used to as threshold LQI value which ensures confidence of 100% reliable communication between two radios.
Figure shows LQI values received by router and CI devices with respect to each other plotted against coaches spaced at distance of 22 meters. It confirms that farthest CI (end node) has LQI value greater than 38 , injecting 100% confidence of success rate for the communication. LQI of the devices with each other do vary but the difference is not that significant which may lead to asymmetric link between these devices. The graph also confirms radio irregularity of short range radio trans-receivers.

Packet Transmission Delays

Average packet delay between master (M) and end device (CI) was found to be 14 ms at 250 kbps transfer rate, that means platform having 26 coaches (CI) would require 364 ms to update all CI's. In case of wired communication sequential file of size 320 byte was transferred at 9600 BPS, required 370 ms to transfer the file. The wireless media transfer did not incur additional delay due to individualized packet transfer to each device.

Software and Hardware Changes

A plug in module acting as wireless network connection device is introduced. This module is interfaced through serial port to the end device that is CI. An application independent network layer coupled with cross layer data transport mechanism was built for this module. The master uses same hardware with a serial interface with application GUI running on the desktop. The interface facilitated to read network topology and data communication with individual CI devices. The router is independent device which uses same hardware as of end device module.

Software changes at server side was to deliver packet for each device in the network as against one sequential file for whole platform network which amounted to less than 5% change in the application software code. No change was done at coach Indicator embedded software side as the delivered data format was not changed.

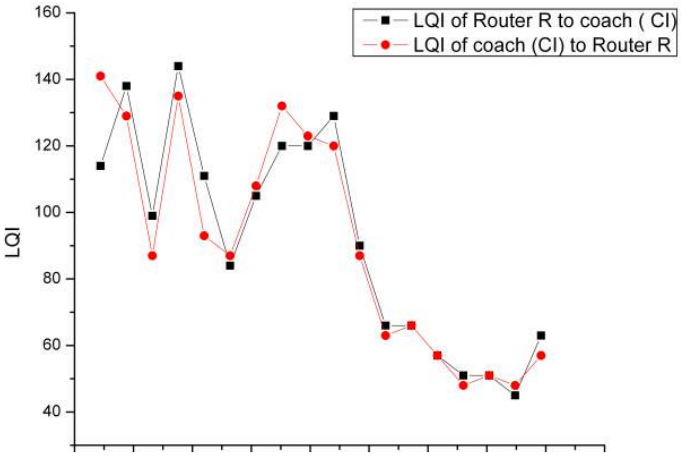


Fig. 14.29 Radio irregularity of short range radio trans receiver

Cost

A multiport RS-485 data disseminator at server side, platform RS-485 routers and RS-485 trans-receivers with coach indicator were replaced by wireless devices. These were replaced by Wireless master controller at server side, two wireless routers on platform, and wireless plug-in modules to be attached to each of the coach indicators. Total of 1500 m data cable with cable laying labor charges was saved. Around 20 % cost was saved with wireless devices in material and installation cost as compared to wireless network setup. The radio module development cost is not included in this however it is generic as same modules can be used for other applications as well. The issue raised in [13] is alleviated by developing application independent network and data transport mechanism as there is reusable software and hardware design which is a significant advantage.

Results

There is no such provision of guaranteed communication linking of end node on the basis of LQI or any other parameter to authors notice as discussed in section 4.2.1. Real time experimentation results have confirmed that for reliable and robust communication linkage between devices, introduction of LQI as link quality metrics greatly helps. The advantage of this mechanism is directly reflecting in 100 % communication efficiency and least bandwidth overhead. Another advantage is that it reduces possibility of asymmetric links in the network allowing user to view wireless network as normal wired network.

CHAPTER15: Smart and /or Sustainable features of Chapter 8 & 13 Designs, impact on society. (For Allocated village development, villagers happiness, comfortable and for enhancement of the village) (With the Smart village development Concept as Per Your Idea And Village Visit, modern technology with innovation) with doing small changes, Period, Amount Expenditure and Benefit

Physical design (Civil): Public Toilet

The population of chichwada village is 1025 as per 2011 census. So it is required to have one public Toilet in the village. The villagers have to go at open lend. So that we have decided and finalized the design of Public Toilet.

Social Design (Civil): Community Hall

There is no Community hall in the chichwada village. Community hall is a public location where members of a community gather for group activities, events, festivals and social purpose. A community hall of village generally consists of a hall, storage or kitchen area and washroom.

Heritage Village Design (Civil): Entrance gate

The chichwda village has no main entrance gate at the village approach road. So that we have designed the village entrance gate as heritage village design.

Health Facility Design (Civil): PHC Center

Chichwada village has one sub PHC center, but in Sub PHC Center only Pregnant lady and new bone babies are get doctor Facilities. Other people of village are going for their primary health facilities at 3 km away haria village.

Transportation Design (Civil): BUS Stop

Chichwada villagers have one BUS Stop in very bed condition. All people of village going for their work and some special work. So people wait for bus also old people sir on lend, so redesign of BUS Stop is required in village.

Education Design (Civil): Primary School

In chichwada village have one primary school but it is not in working as well as good condition. All students of chichwada village going for their primary education at atul village (5 km avary).the major problem is student need to cross national high way. So village need one Primary school.

Smart Village Design (Electrical): Automatic water level controller

In Chichwada village no any automation in public property. At overhead tank and also please which required water controller, water level controller is use their and reduced west of water. So we designed design of automatic water level controller.

Smart Village Design (Electrical): Motion activated street light

During a night time Street light are ON for hole night. Because of that the energy bill become very high and also Maintenance of street light also become required. By using this design the required man power is less and also save water. So we make Motion Activated Street Light.

Smart Village Design (Electrical): Roof top solar panel

Now a days solar energy is used at wild range of energy. Village has some open lend ad also puchaa makn has open place. So to use their lends solar is best option. So we design roof top solar system.

Smart Village Design (Electrical): Solar Panel Cleaning Machine

Solar system is placed at open lend so atmosphere effects like Wind, Dust, Solid West, etc. are placed on it so solar penal need to clean regular. So automatic solar cleaning system is used to clean solar penal at given particular time.

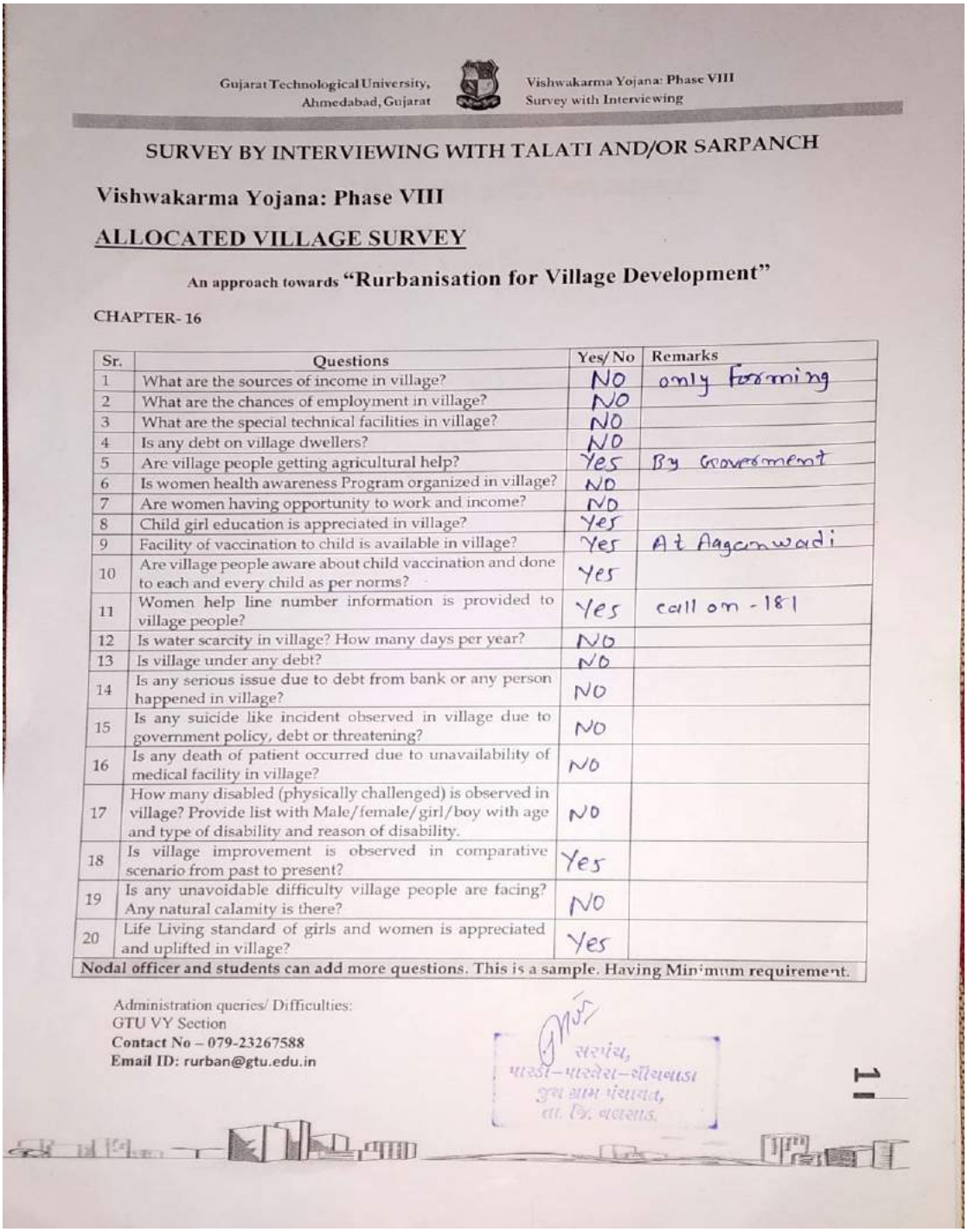
Smart Village Design (Electrical): Off Gird Solar System

By Using the battery unit people of village used solar electricity at any time. In the night people used electricity which generated by solar system during day. So electricity bill reduced and proper use of sun light.

Smart Village Design (Electrical): Primary School Wring

In a part 2 primary school is smarty design by us so in school Electrical wring diagram and also many electrical facilities design given by us.

CHAPTER16: Survey by Interviewing with Talati and /Or Sarpanch



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Survey with Interviewing

SURVEY BY INTERVIEWING WITH TALATI AND/OR SARPANCH

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

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

CHAPTER- 16

Sr.	Questions	Yes/ No	Remarks
1	What are the sources of income in village?	NO	only farming
2	What are the chances of employment in village?	NO	
3	What are the special technical facilities in village?	NO	
4	Is any debt on village dwellers?	NO	
5	Are village people getting agricultural help?	Yes	By Government
6	Is women health awareness Program organized in village?	NO	
7	Are women having opportunity to work and income?	NO	
8	Child girl education is appreciated in village?	Yes	
9	Facility of vaccination to child is available in village?	Yes	At Aagamwadi
10	Are village people aware about child vaccination and done to each and every child as per norms?	Yes	
11	Women help line number information is provided to village people?	Yes	call on - 181
12	Is water scarcity in village? How many days per year?	NO	
13	Is village under any debt?	NO	
14	Is any serious issue due to debt from bank or any person happened in village?	NO	
15	Is any suicide like incident observed in village due to government policy, debt or threatening?	NO	
16	Is any death of patient occurred due to unavailability of medical facility in village?	NO	
17	How many disabled (physically challenged) is observed in village? Provide list with Male/female/girl/boy with age and type of disability and reason of disability.	NO	
18	Is village improvement is observed in comparative scenario from past to present?	Yes	
19	Is any unavoidable difficulty village people are facing? Any natural calamity is there?	NO	
20	Life Living standard of girls and women is appreciated and uplifted in village?	Yes	

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

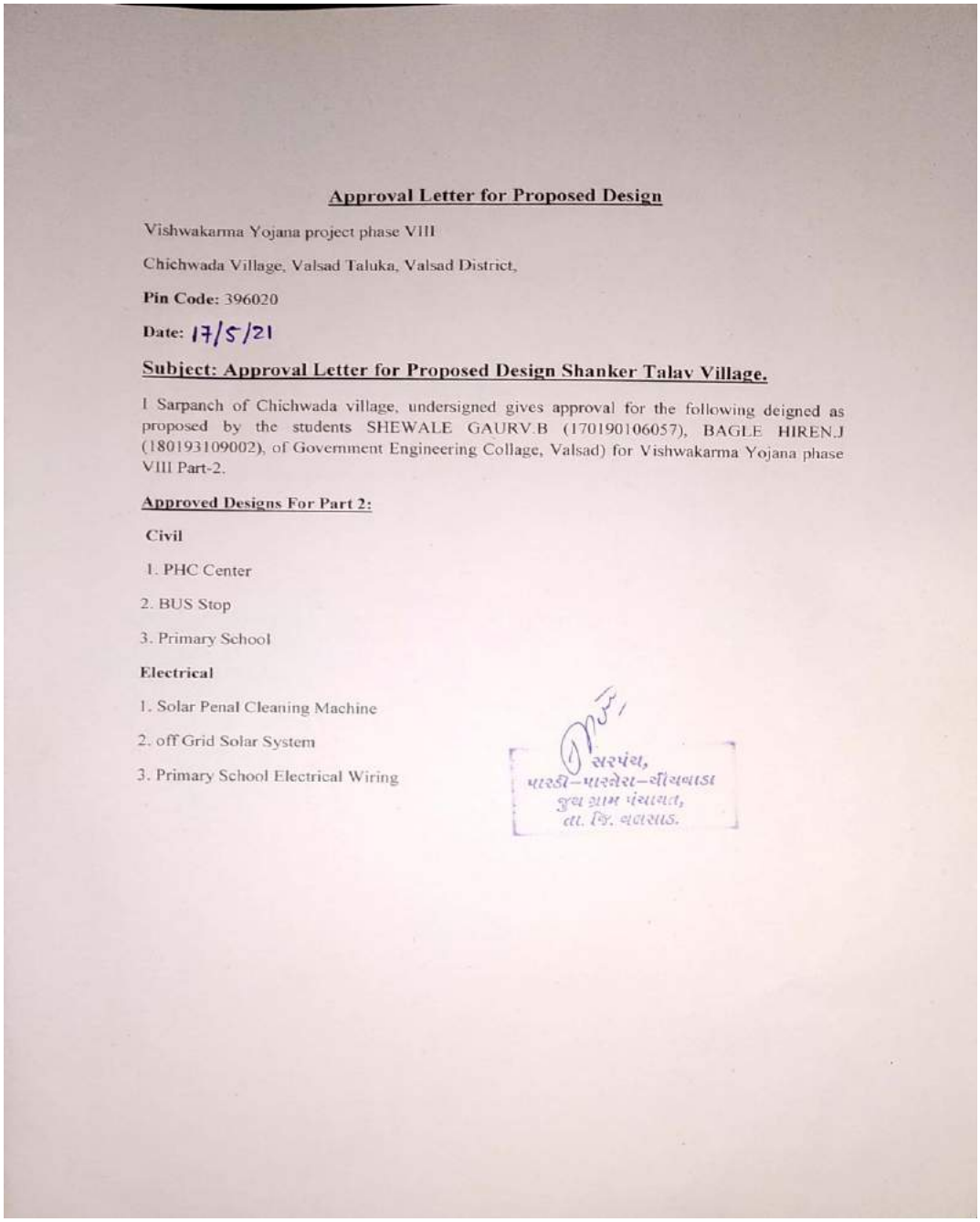
Administration queries/ Difficulties:
GTU VY Section
Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

સરપંચ,
પારડી-પારનેરા-ચીંચવાડા
ગ્રુપ ગ્રામ પંચાયત,
તા. જિ. વલસાડ.

11

Sarpanch Letter giving information about the village development

Approval Letter for Designs



Approval Letter for Proposed Design

Vishwakarma Yojana project phase VIII

Chichwada Village, Valsad Taluka, Valsad District,

Pin Code: 396020

Date: 17/5/21

Subject: Approval Letter for Proposed Design Shanker Talav Village.

I Sarpanch of Chichwada village, undersigned gives approval for the following deigned as proposed by the students SHEWALE GAURV.B (170190106057), BAGLE HIREN.J (180193109002), of Government Engineering Collage, Valsad) for Vishwakarma Yojana phase VIII Part-2.

Approved Designs For Part 2:

Civil

1. PHC Center
2. BUS Stop
3. Primary School

Electrical

1. Solar Penal Cleaning Machine
2. off Grid Solar System
3. Primary School Electrical Wiring

સરપંચ,
પારડી-પારનેરા-ચીચવાડા
જુથ ગ્રામ પંચાયત,
તા. જિ. વલસાડ.

Letter of Interaction with Village Sarpanch

Vishwakarma Yojana project phase VIII

Chichwada Village, Valsad Taluka, Valsad District,

Pin Code: 396020

Date: 17/5/21

Subject: Interaction of Students with Sarpanch (Chichwada Village)

I sarpanch of Chichwada Village, undersigned had an interaction with the students (Shewale Gaurav B. (170190106057), Bagle Hiren J. (180193109002) of Government Engineering Colllege, Valsad) for Vishwakarma Yojana phase VIII part 2.

Sign:

CHAPTER17: Irrigation /Agriculture Activities And Agro Industry, Alternate Techniques And Solution

Irrigated agriculture is one of the primary water consumers in most parts of the world. With developments in technology, efforts are being channeled into automation of irrigation systems to facilitate remote control of the irrigation system and optimize crop production and cost effectiveness. This paper describes an on-going work on GSM based irrigation monitoring and control systems. The objective of the work is to provide an approach that helps farmers to easily access, manage and regulate

The management of irrigation in India differs conceptually from that practised in those developed countries where limited water is not a constraint. Good management, efficient operation and well-executed maintenance of irrigation systems are essential to the success and sustainability of irrigated agriculture. They result in better performance, better crop yields and sustained production. One of the key objectives in the management of an irrigation system is to provide levels of service as agreed with the relevant government authorities and the consumers at the minimum achievable cost.

Different types of modern farming methods:

Aeroponics System of Modern Farming Methods

The basic principle of aeroponic growing is to grow plants suspended in a closed or semi-closed environment by spraying the plant's dangling roots and lower stem with an atomized or sprayed, nutrient-rich water solution.[1] The leaves and crown, often called the canopy, extend above. The roots of the plant are separated by the plant support structure. Often, closed-cell foam is compressed around the lower stem and inserted into an opening in the aeroponic chamber, which decreases labor and expense; for larger plants, trellising is used to suspend the weight of vegetation and fruit.

Ideally, the environment is kept free from pests and disease so that the plants may grow healthier and more quickly than plants grown in a medium. However, since most aeroponic environments are not perfectly closed off to the outside, pests and disease may still cause a threat. Controlled environments advance plant development, health, growth, flowering and fruiting for any given plant species and cultivars.

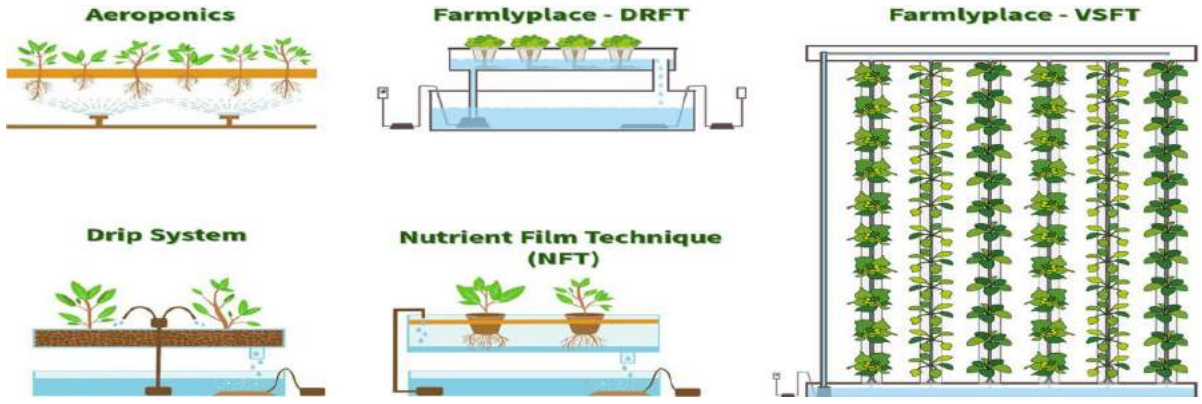


Fig. 17.1 Aeroponics System

Aquaponics of Modern Farming Methods

Fig. 17.2 Aeroponics System

Aeroponics system culture differs from conventional Hydroponics, Aquaponics, and in-vitro growing. Unlike hydroponics, which uses a liquid nutrient result as a growing medium and essential mineral to maintain plant growth; or aquaponics which uses water and fish waste, Aeroponic is conducted without a growing medium. It is considered a type of hydroponics since water is used in Aeroponics to transmit nutrients.

Aeroponic systems are additional cost-efficient than other systems. Because of the reduced volume of solution throughput, less water, and fewer nutrients are needed in the system at any given time compared to other nutrient delivery systems. The need for substrates is eliminated, as is the need for many moving parts.

A mid stories of agrarian crisis everywhere, Anubhav Das has a happy tale to tell. The founder of Red Otter Farms in Kotabagh village at the foothills of Nainital has no problem selling 125-150 kgs of green exotic vegetables he produces every day, that too at a premium. His clients include Taj Hotel, Modern Bazaar and families in South Delhi and Gurgaon.

If his story sounds different at a time when farming is becoming unsustainable, thanks to falling yields, increasing costs and low prices along with water scarcity and soil degradation, his farm looks different, too.

Green leafy vegetables such as kale, spinach, tomato, arugula and lettuce grow on a one-foot bed of flowing water — and, no soil — in a specially designed 10,000-sq-ft greenhouse at Red Otter Farms.

REPORTING WATER USE

In the summer of 2012, Illinois struggled greatly with a lack of water. Farmers saw the direct hit as yields plummeted due to a dire need for moisture. One Illinois farmer yielded just 50 bushels per acre on one plot but harvested 190-bushel corn on a plot just 20 miles away that received .4 inches more rain. That farmer, along with many other Illinois producers, invested in an irrigation system to combat seasonal shortages after 2012.

Irrigation water application regulation has lots of room for improvement—particularly in Illinois. Only in 2015, when it became required, did Illinois farmers start reporting water use on irrigated land. The state has no water-use restrictions, no laws in place for future groundwater conflicts, and no restrictions on new system installations. Only half of the total use is actually reported, as of 2017.

REDUCING WATER USE

Drought and water shortages have farmers and consumers alike looking for ways to conserve the water supply. While some farmers are facing low aquifers and others have hard limits on what is allowed legally, water conservation is constantly being studied and implemented on United States operations. In an effort to save water, University of Nebraska experts suggest adjusting levels based on soil type to keep the available soil water level above the 50% depletion level. When it comes to soybeans, moisture needs can differ vastly.

FERTIGATION AND CHEMIGATION

Irrigation systems are more than just water-delivery systems for plants. The advanced systems can also be a critical tool in farmers' nutrient management plans. Fertigation injects fertilizers, soil amendments, and water-soluble products into an irrigation system while chemigation injects chemicals. Today, farmers can use efficient variable-rate fertigation systems.

One Idaho farmer has been saving on fuel and avoiding driving on his crops with chemigation and fertigation for 37 years. His crops get 15 to 18 fertilizer applications and four to six chemical applications via his pivot systems each year.

Fig. 17.3 fertigation and chemigation

IMPORTANCE OF AGRICULTURAL TECHNOLOGY

Farmers no longer have to apply water, fertilizers, and pesticides uniformly across entire fields. Instead, they can use the minimum quantities required and target very specific areas, or even treat individual plants differently. Benefits include:

- Higher crop productivity
- Decreased use of water, fertilizer, and pesticides, which in turn keeps food prices down
- Reduced impact on natural ecosystems
- Less runoff of chemicals into rivers and groundwater
- Increased worker safety

In addition, robotic technologies enable more reliable monitoring and management of natural resources, such as air and water quality. It also gives producers greater control over plant and animal production, processing, distribution, and storage, which results in:

- Greater efficiencies and lower prices
- Safer growing conditions and safer foods
- Reduced environmental and ecological impact

Agro-Industries

Fig. 17.4 Agro Industries

agro-industry is an enterprise that processes bio-mass, i.e., agricultural raw materials, which include ground and tree crops as well as livestock and fisheries, to create edible or usable forms, improve storage and shelf life, create easily transportable forms, enhance nutritive value, and extract chemicals for other uses. As the products of agro-industries are both edible and non-edible, the agro-industries can be classified as agro-food industries (or merely food processing industries) and agro-non-food industries. The agro-industry provides the crucial farm-industry linkage which helps accelerate agricultural development by creating backward linkages (supply of credit, inputs and other production enhancement services) and forward linkages (processing and marketing), adding value to the farmer's produce, generating employment opportunities, and increasing the farmer's net income. This in turn motivates the farmer for better productivity and further opens up possibilities of industrial development. The agro-industry generates new demand on the farm sector for more and different agricultural outputs which are more suitable for processing. An agro-processing plant can open up new crop and livestock opportunities to the farmer and thus increase the farm income and employment. The paper identifies following major issues to be discussed and researched: 1. Organizational Patterns for Agro-Processing. 2. R&D Inputs and Technology Upgradation. 3. Market Development. 4. Need for Confessional Finance and Larger Margin Money for Working Capital. 5. Tax Incidence. 6. Linkage Agro-industry with Planning for Agro-Climate Regions. 7. Strengthening of the Data Base. 8. Need for Further Research.

Applying modern tech to agriculture

Farmers today can use the benefits of the technological revolution to increase their yields from farming and livestock rearing. Modern agriculture is driven by continuous improvements in digital tools and data as well as collaborations among farmers and researchers across the public and private sectors. During the Green Revolution in the 1960s, India could achieve self-sufficiency in food grain production by using modern methods of agriculture like better quality of seeds, proper irrigation, chemical fertilizers and pesticides. As time passed, more technological advances appeared in agriculture. The tractor was introduced, followed by new tillage and harvesting equipment, irrigation and air seeding technology, all leading to higher yields and improved quality of the food and fiber that was grown. It is possible for farmers to utilize scientific data and technology to improve crop yields and keep themselves up-to-date with cutting edge methods of farming.

Soil and Water Sensors

Perhaps the equipment having the most immediate effect are soil and water sensors. These sensors are durable, unobtrusive and relatively inexpensive. Even family farms are finding it

affordable to distribute them throughout their land, and they provide numerous benefits. For instance, these sensors can detect moisture and nitrogen levels, and the farm can use this information to determine when to water and fertilize rather than rely on a predetermined schedule. That results in more efficient use of resources and therefore lowered costs, but it also helps the farm be more environmentally friendly by conserving water, limiting erosion and reducing fertilizer levels in local rivers and lakes.

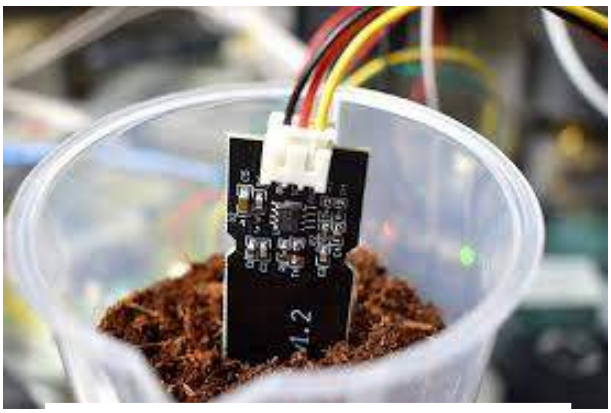


Fig. 17.4 Soil and Water Sensors

2. Weather Tracking

Although we still make jokes about our local meteorologists, the truth is that computerized weather modeling is becoming increasingly sophisticated. There are online weather services that focus exclusively on agriculture, and farmers can access these services on dedicated onboard and handheld farm technology but also via mobile apps that run on just about any consumer smartphone. This technology can give farmers enough advanced notice of frost, hail and other weather that they can take precautions to protect the crops or at least mitigate losses to a significant degree.

Fig. 17.5 Weather Tracking

Satellite Imaging

As remote satellite imaging has become more sophisticated, it's allowed for real-time crop imagery. This isn't just bird's-eye-view snapshots but images in resolutions of 5-meter-pixels and even greater. Crop imagery lets a farmer examine crops as if he or she were standing there without actually standing there. Even reviewing images on a weekly basis can save a farm a considerable amount of time and money. Additionally, this technology can be integrated with crop, soil and water sensors so that the farmers can receive notifications along with appropriate satellite images when danger thresholds are met.

Pervasive Automation

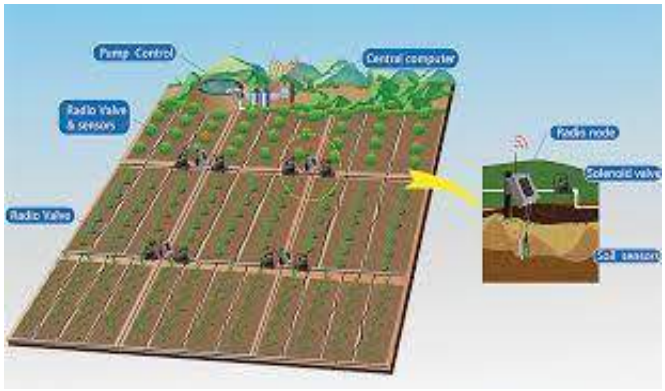


Fig. 17.6 Pervasive Automation

Pervasive automation is a buzz term in the agriculture technology industry, and it can refer to any technology that reduces operator workload. Examples include autonomous vehicles controlled by robotics or remotely through terminals and hyper precision, such as RTK navigation systems that make seeding and fertilization routes as optimal as possible.Most farming equipment already adopts the ISOBUS standard, and that puts on the precipice of a farming reality where balers, combines, tractors and other farming equipment communicate and even operate in a plug-and-play manner.

Minichromosomal Technology

Perhaps one of the most exciting advents in agriculture technology is coming in a very tiny package. A minichromosome is a small structure within a cell that includes very little genetic material but can, in layman's terms, hold a lot of information. Using minichromosomes, agricultural geneticists can add dozens and perhaps even hundreds of traits to a plant. These traits can be quite complex, such as drought tolerance and nitrogen use. However, what is most intriguing about minichromosomal technology is that a plant's original chromosomes are not altered in any way. That results in faster regulatory approval and wider, faster acceptance from consumers.

Fig. 17.7 RFID Technology

RFID Technology

The soil and water sensors mentioned earlier have set a foundation for traceability. The industry has only begun to realize this infrastructure, but it's taking shape quickly. These sensors provide information that can be associated with farming yields. It may seem like science fiction, but we're living in a world where a bag of potatoes can have a barcode that you can scan with your smartphone in order to access information about the soil that yielded them. A future where farms can market themselves and have loyal consumers track their yields for purchase is not far-fetched.

CHAPTER18: Social Activities– Any Activities Planned By Students

Vaccine Awareness Campaign

To win this war against COVID-19, we have to ensure that everyone who is eligible gets vaccinated. Many people are still not taking the vaccine as there has been a lot of misinformation surrounding the vaccines and their development. To raise awareness among the people and debunk the myths related to vaccinations, Save the Children initiated the COVID 19 Vaccination Awareness Campaign in Chichwada village.

Free Mask Distribution in Village

At village Chichwada we interacted with Sarpanch and of Chichwada and after interaction with the sarpanch and we come to know that for reducing the spreading of covid-19 sarpanch want to distribute mask and sanitizer in village and they want some volunteer for distribute the masks and hand sanitizer in village. So, we have helped to distribute as a volunteer. We were discussed about required social activity in village so already some activity for reducing the spreading of covid 19 were arranged by sarpanch so we also participated as a volunteer.


Fig. 18.1 Interaction with sarpanch and nurse of sub PHC Center


Fig. 18.2 Mask distribution in village

Socialization Modality

Video Chat, Audio Chat, Art, Games, Exercise, Music, Facilitated Communications and Conversations.

CHAPTER19 :<<ALLOCATED VILLAGE>>SAGY Questionnaire survey form with the Sarpanch Signature (Scanned copy attachment in the soft copy report and original copy in hardbound report)

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Chichwada Gram Panchayat: Chichwada Ward No. –

Block: Valsad District: Valsad

State: Gujarat L S Constituency: Valsad Parlament

1. Family Identity and Size

Name of Head of Household	Kantibhai Somabhai Patel						Male/ ~~Female~~	M
SECC Survey ID:		Family Size	05	Over 18	4	6 to 18	1	Under 6	–

2. Category & Entitlement Details (Tick as appropriate)

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

2. Adults (above 18 years)

Name	Age	Sex M/F / O	Disability Status Y/N	Marital Status[3]	Education Status[4]	Adhaar Card (Y/ N)	Bank A/C (Y/N)	Social Security Pension[5]
Kantibhai. S. Patel	55	M	N	Yes	12 Pass	Y	Y	N
Sumitra. K. Patel	51	F	N	Yes	10 Pass	Y	Y	N
Ramila . K. Patel	22	F	N	NO	B.E	Y	Y	N
Hitesh. K. Patel	17	M	N	NO	12 Running	Y	Y	N

3. Children from 6 years and up to 18 years (~~NO~~)

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
Hitesh . K. Patel	17	M	N	NO	12 Running	Y	12	Y

4. Children below 6 years (NO)

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

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

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

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

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

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

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

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

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

7. Do members take Regular Physical Exercise

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

8. Consumption of Tobacco

	Smoking	Chewing
Adults	NO	NO
Children		

9. House & Homestead Data

Own House: Yes / No	No. of Rooms: 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	0.0213	2. Cultivable Area	–
3. Irrigated Area	–	4. Uncultivable Area	0.2113

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 NO

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) NO

Name	Unit	Quantity

17. Livestock Numbers NO

Cows:____	Bullocks:____	Calves:____
Female Buffalo:____	Male Buffalo:____	Buffalo Calves:____
Goats/ Sheep:____	Poultry/ Ducks:____	Pigs:____
Any other: Type _____		No.____
Shelter for Livestock: Pucca / Kutcha / None		
Average Daily Production of Milk(Litres):____		

18. What games do Children Play NO children

19. Do children play musical instrument (mention)

Schedule Filled By: Bagle Hiren J.
Principal Respondent: Tushargbhai Patel
Date of Survey: 17-5-2021

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

I. Basic Information

a. Gram Panchayat: Chichwada

b. Block: valsad

c. District: valsad

d. State: Gujarat

e. Lok Sabha Constituency: valsad Parliamentary

f. Number of Wards in the Gram Panchayat: -

g. Number of Villages in the Gram Panchayat: 02

h. Names of Villages:

chichwada
Pameraa - Paardi.

Demographic Information

Number of Households 363 Total Population 1025 Male 537 Female 488

SC HHs 0 ST HHs 92 OBC HHs _____ Other HHs _____

I. Access to Infrastructure / Facilities / Services

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
a.	ANM/ Health Sub Centre	N	
b.	Nearest Primary Health Centre (PHC)	N	Sub PHD
c.	Nearest Community Health Centre (CHC)	N	
d.	Nearest Post Office	Y	7 km
e.	Nearest Bank Branch (Any)	Y	7.8 km
f.	Nearest Bank with CBS Facility	Y	7.8 km
g.	Nearest ATM	Y	7.8 km
h.	Nearest Primary School	Y	5 km
i.	Nearest Middle School	N	
j.	Nearest Secondary School	Y	9 km
k.	Nearest Higher Secondary School / +2 College	Y	9 km
l.	Nearest Graduate College	Y	10 km
m	Nearest ITI / Polytechnic Centre	N	
n	Kisan Seva Kendra	N	

1

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
o	Agriculture Credit Cooperative Society	N	
p	Nearest Agro Service Centre	N	
p	MSP based Government Procurement Centre	N	
q	Milk Cooperative /Collection Centre	N	
r	Veterinary Care Centre	N	
s	Ayurveda Centre	N	
t	E – Seva Kendra	N	
u	Bus Stop	Y	< 5 km
v	Railway Station	Y	< 5 km
w	Library	N	
x	Common Service Centre	N	

IV. Sports Facilities in the Gram Panchayat

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

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

V. Education, ICDS

a. Number of Angan Wadi Centres:

b. Number of villages without Angan Wadi Centres

Names of such villages:

c. Schools (Number)

Primary Private: — Primary Govt.: 1

Middle Private: — Middle Govt.: —

Secondary Private: — Secondary Govt.: —

Higher Secondary Private: — Higher Secondary Govt: —

VI. Public Distribution System

	Item	Private Contractor	Women's SHG	Gram Panchayat	Cooperative	Other (Mention)	Location in GP (mention Location)	If outside GP, Location & distance from GP HQrs)
a.	Cereal (Rice/ Wheat/ Millets)				✓			Pantoda 3km
b.	Kerosene							
c.	Other (mention)							

2

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

VII. Coverage of Villages under different Facilities & Services

	Parameter	Villages Status[1]	Names of Villages Covered	Names of Villages not Covered
a.	Piped Water Supply Coverage to Villages	Covered / Not Covered	Chichwada Pameora Peerdi	
b.	Hand Pump Coverage in Villages:	Covered / Not Covered	Chichwada Pameora Peerdi	
c.	Coverage under Covered Drains:	Covered / Not Covered		Chichwada Pameora Peerdi
d.	Coverage under Open Drains:	Covered / Not Covered	Chichwada Pameora Peerdi	
e.	Villages with Household Electricity Connection (Numbers)	Connected / Not Connected		

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	142.99 H	d.	Pasture / Grazing Land	–	g.	Check Dam	–
b.	Irrigated Land	100.19 H	e.	Forests/ Plantations	25.49 H	h.	Wells/Bore Wells	2
c.	Un-irrigated Land	–	f.	Other Common Land	3.24 H	i	Tanks/Ponds	3

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

3

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire
(Note: Please aggregate information from village level questionnaires wherever relevant)

IX. Parameters relating to Households & Institutions

		Number
a)	Number of eligible Households for pension (old age, widow, disability)	25
b)	Number of Households receiving pension (old age, widow, disability)	25
c)	Number of eligible Households who are not receiving pension	-
d)	Number of Households eligible for Ration Card	363
e)	Number of eligible HHs having ration cards	363
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	15
i)	Number of Job Card holders who completed 100 days of work during 2013-14	-
j)	Number of shops selling alcohol	-
k)	Number of BPL families	All
l)	Number of landless households	-
m)	Number of IAY beneficiaries	-
n)	Number of FRA[2] beneficiaries	-
o)	Number of Community Sanitary Complexes	All
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	0
w)	Number of Bharat Nirman Volunteers	0

Name and Signature of Surveyor and Respondent'

Surveyor	PRI Respondent (Preferably Gram Panchayat Chairperson)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey
	સરપંચ, પારડી-પારનેરા-ચીંચવાડા જીલ્લા પંચાયત, વલસાડ.		17/5/21

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

4

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

This questionnaire should be filled for each of the villages in the selected Gram Panchayat[1]

I. Basic Information

a. Village: Chichwada
b. Ward Number: valsad
c. Gram Panchayat: chichwada
d. Block: -
e. District: Valsad
f. State: Gujarat
g. Lok Sabha Constituency: Valsad parliament
h. Number of Habitations / Hamlets in the Gram Panchayat: 2
i. Names of Habitations / Hamlets:
Chichwada
Pameser - Paradi

Demographic Information

Number of Households 363 Total Population 1025 Male 537 Female 488

SC HHs 0 ST HHs 92 OBC HHs _____ Other HHs _____

II. Access to Infrastructure/Amenities etc.

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
a.	Nearest Primary School	Y	5 km
b.	Nearest Middle School	NO	
c.	Nearest Secondary School	N	7 km valsad
d.	Kisan Seva Kendra	N	7 km valsad
e.	Milk Cooperative /Collection Centre	N	
g.	Health Sub Centre	Y	
h.	Bank	N	7 km valsad
i.	ATM	N	7 km valsad
j.	Bus Stop	N	7 km valsad
k.	Railway Station	N	7 km valsad

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

1

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
l	Library	No	7 Km Valsad
m	Common Service Centre		
n	Veterinary Care Centre	NO	7 Km Valsad

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: All

iii. Drinking Water Facilities
a.Piped Water Supply Coverage to Habitations: All *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered: All

b.Hand Pump Coverage in Habitations: 1 *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered:

iv. Coverage of Habitations under Waste Management System
a. Coverage under Covered Drains: _____ *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered:

b. Coverage under Open Drains: _____ *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered:

c. Coverage under Doorstep Waste Collection: *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered:

v. Coverage of Habitations under Electrification
a. Coverage under Household Connections: *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered:

b.Coverage under Street Lighting: All *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered:

vi. Sports Facilities in the Village
a.Number of Play Grounds in the Village (minimum size 200 square meters): 0
b.Mini Stadium : NO Yes(Y) /No (N)

vii. Education, ICDS
a. Number of Anganwadi Centres: 1
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	142.02	d.	Pasture / Grazing Land		g.	Check Dam	
b.	Irrigated Land		e.	Forests/ Plnatations		h.	Wells/Bore Wells	1
c.	Un-irrigated Land		f.	Other Common Land		i	Tanks /Ponds	3

ix. Entitlement Related Parameters		
1	Number of active Job Card holders under MGNREGA	15
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	ANI
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)	NO
12	Number of Youth Clubs	–
13	Number of Bharat Nirman Volunteers	–

Name and Signature of Surveyor and Respondent'

B Hela	સરપંચ, પારડી–પારનેરા–ચીયાડા		17/5/21
Surveyor	PRI Respondent (Preferably a ward member from a ward that is fully or partially covered under the Village)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey

3

CHEPTER 20: TDO-DDO-Collector Email Soft Copy Attachment in the Report

Gmail HIREN BAGLE <hirenbagle7@gmail.com>

Development Scenario of Chichwda, Valsad

HIREN BAGLE <hirenbagle7@gmail.com> Fri, Jun 25, 2021 at 11:12 AM
To: collector-val@gujarat.gov.in, ddo-val@gujarat.gov.in, tdovalsad@gujarat.gov.in
Cc: rurban@gtu.edu.in, dtbarot@gecv.ac.in

Respected Sir/Madam

We are students of Government Engineering College, Valsad affiliated to Gujarat Technological University-GTU. GTU has been assigned to Vishwakarma Yojanaa-VY in which students survey various villages and Designs various amenities To Deliver it to them making them ideal for living a better life as per requirements & village problem statements.

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

Village: Chichwada		Population: 1025(As of Census 2011)
Key Issue	**Remark**	**Design Given**
Toilet	Almost 90% have not household toilet and Public Toilet, under SBA toilet was needed.	• Public Toilet
Identification	Village comes within the premises of other village but it was seen that village direction holdings were not proper which can cause difficulty in finding the village. And also no any bus stop for villagers.	• Village Gate • BUS Stop
Community Place	Grampanchayat faces difficulties in conducting gramsabha, village does not have any place for gatherings or for celebration.	• Community Hall
Health Care	Habitats has to travel minimum 4 km for any health care aids(Hariya village PHC), mobile van not comes any day.	• PHC Center
Education	Village Has School but not in working, School Need redesign of it.	• Primary School

	underground tanks. But do not have any water controller.	• Automatic Water Level Controller
Power Generation	Village has 363 houses with free roof places, we used this place for power generation by roof top solar system.	• Roof Top Solar Panel
Energy Saving	Street lights of Village on During Whole night and not this is not efficient use of energy so save street lights energy and used it for other use full work and also need Solar Penal Cleaning Machine For roof top solar system.	• Motion Activated Street Light • Solar Penal Cleaning Machine
Energy Strode	Some people of village have poetical to wealth and strode energy for their house.	• Off Grid Solar System
Smart Village	Village need Redesign of Primary School So this redesign school become smart with electrical equipment and wiring layout.	• Primary School Electrical Layout

SR NO	Design Name	Period (Month)	Amount Expenditure(RS)	Benefit
1	Public Toilet	4	1,77,368.67	Sanitation
2	Village Gate	1	15,618.33	Aesthetics And Heritage
3	Community Hall	5	2,25,472.12	To organize events
4	PHC Center	6	1,44,716.25	To Facilitate Good Health
5	BUS Stop	2	49,766.50	Better Travelling Facilities
6	Primary School	8	7,74,057.10	Good Education
7	Automatic Water Level Controller	1	700	Water Saving
8	Motion Activated Street Light	1	1000(per Street light)	Better Energy Saving System
9	Roof Top Solar Panel	1	1,10,000(For 3kw)	Own Power Generation and cell
10	Solar Penal Cleaning Machine	1	5,700	For Good Efficiency of solar penal
11	Off Grid Solar System	1	2,70,000(For 5kw)	Reduce Electricity Bill
12	Primary School Electrical Layout	2	1,10,131.00	Use of Electrical equipment in Schol

Please Find Herewith attached,

1. Detailed Project Report Of Chichwad Village

Best Regard,

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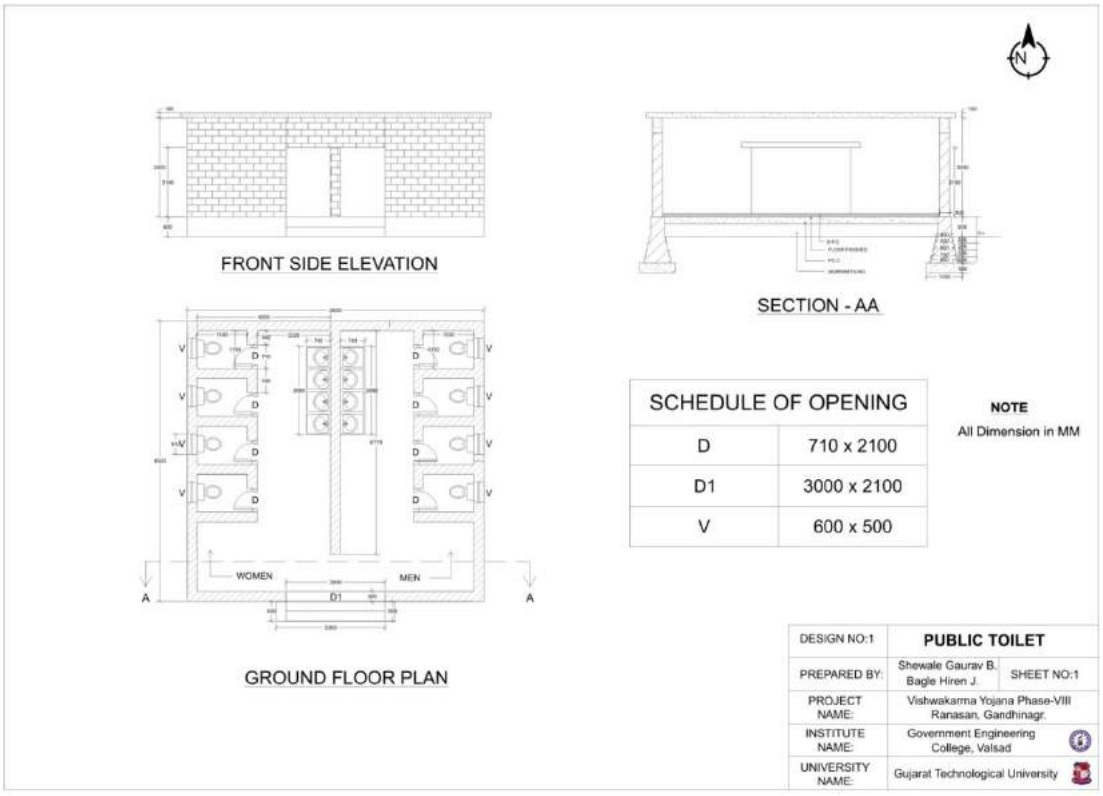
Chichwada_Vishwakarm_Yojana_Phase-VIII.Part-2.pdf
6591K

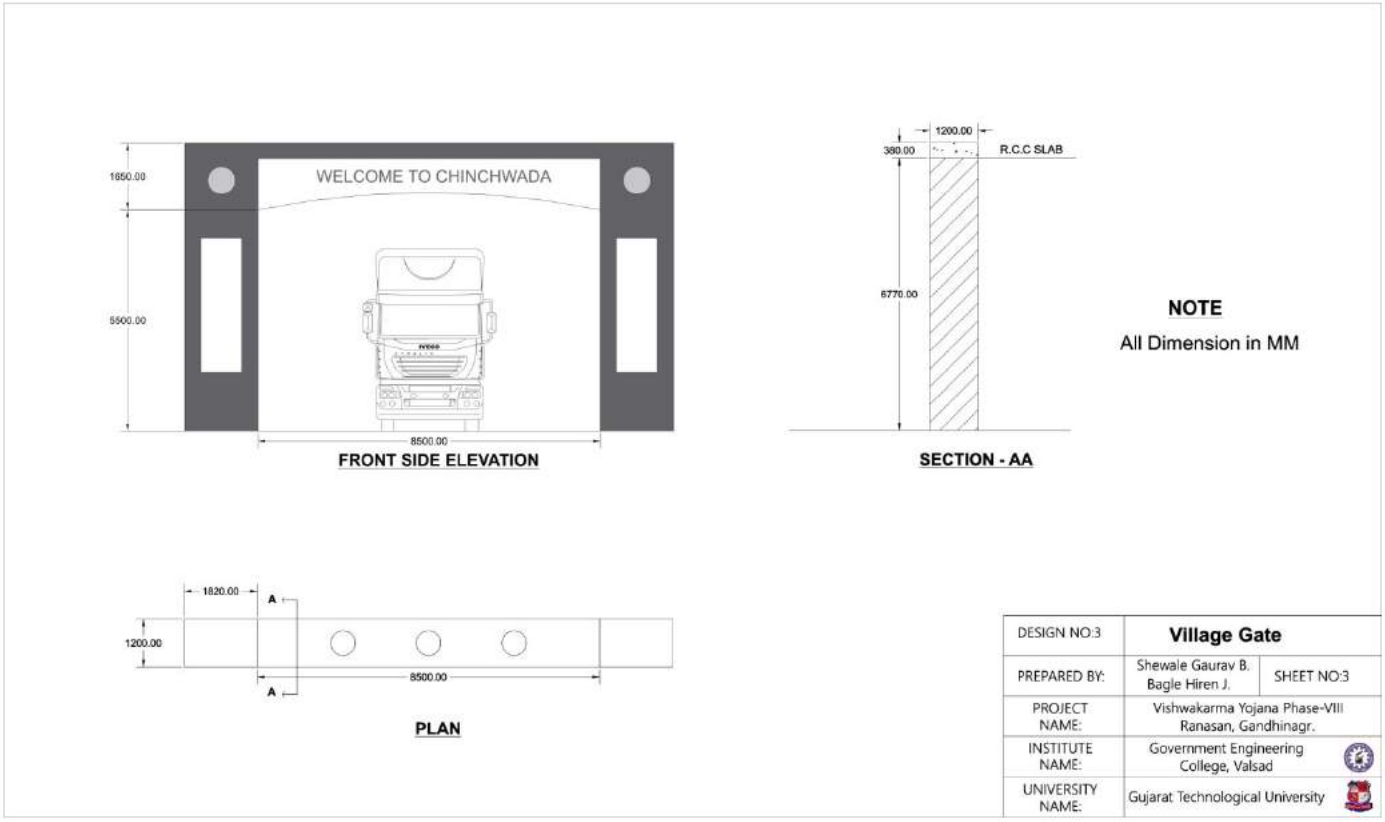
CHEPTER 21: Comprehensive Report for the Entire Village Civil Design

Civil Design

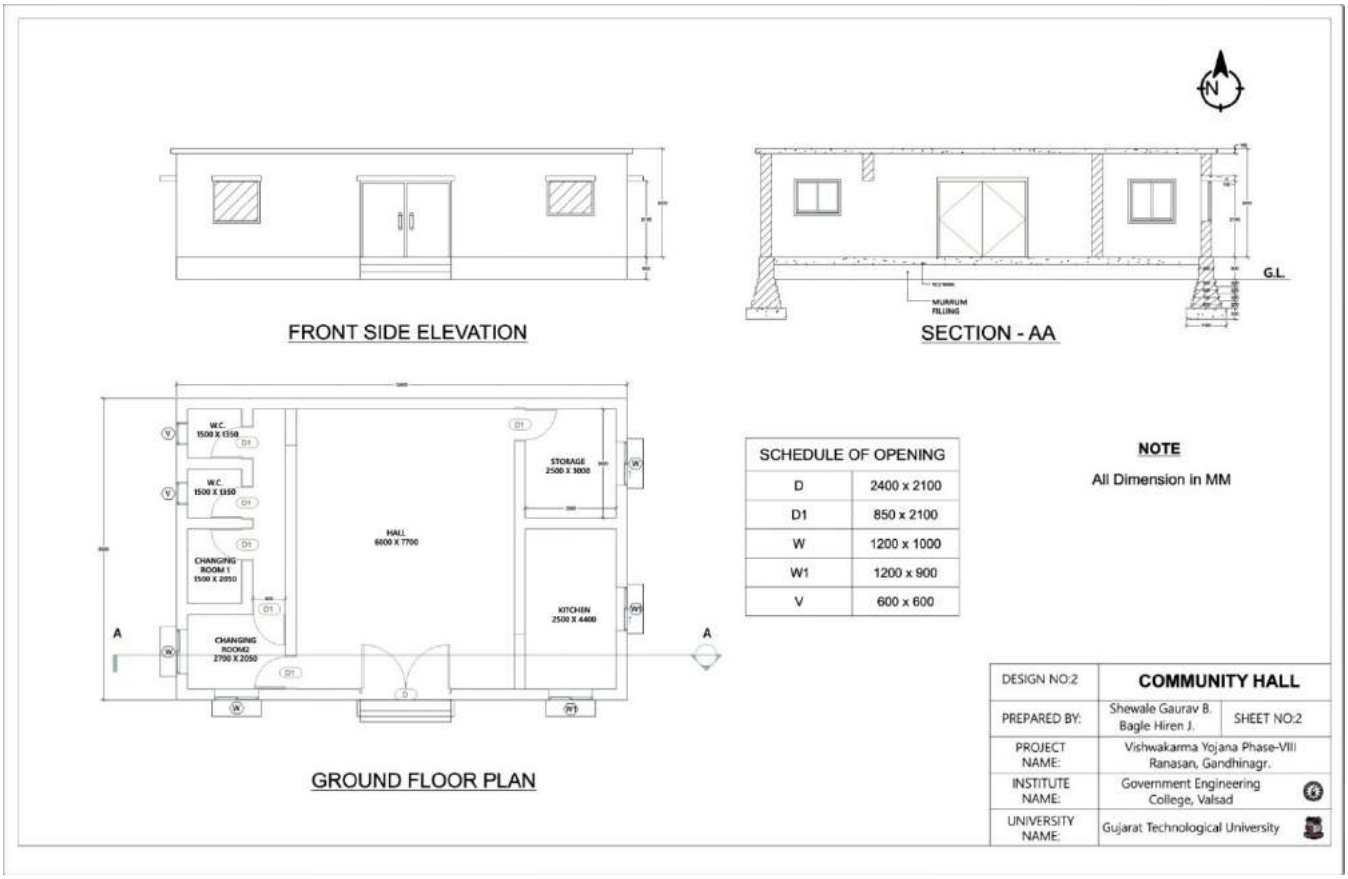
Design of Public Toilet



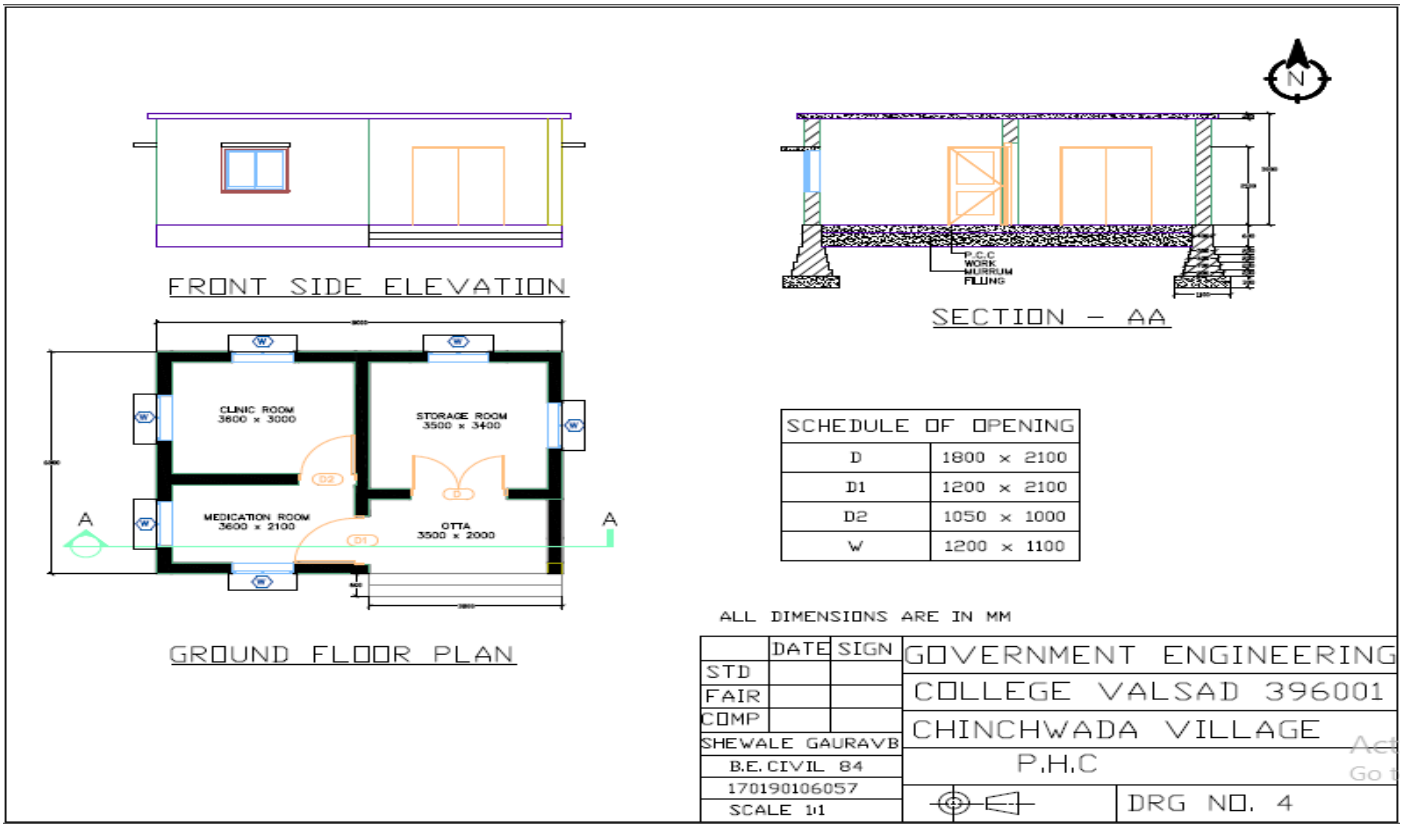
Design of Village Gate



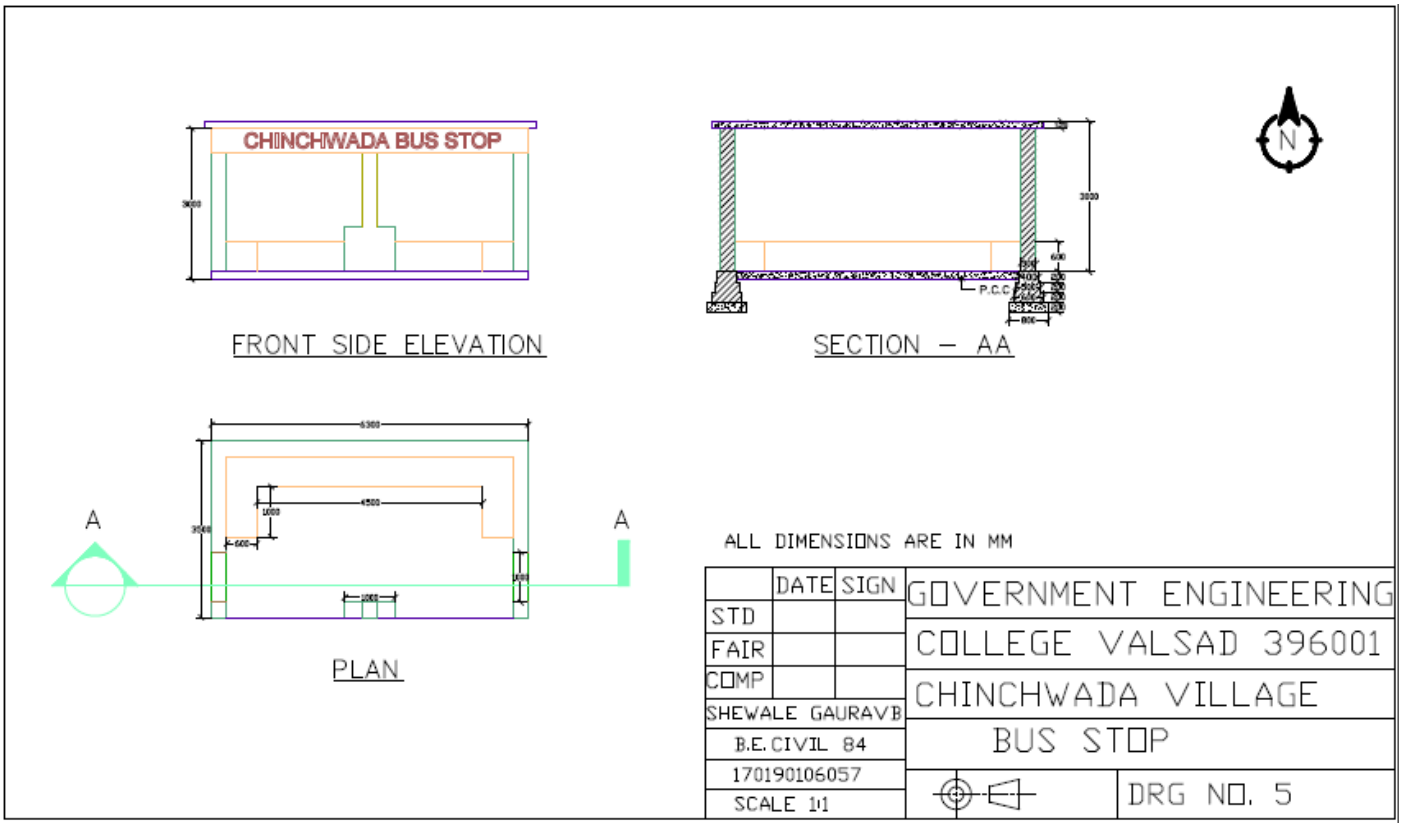
Design of Community Hall



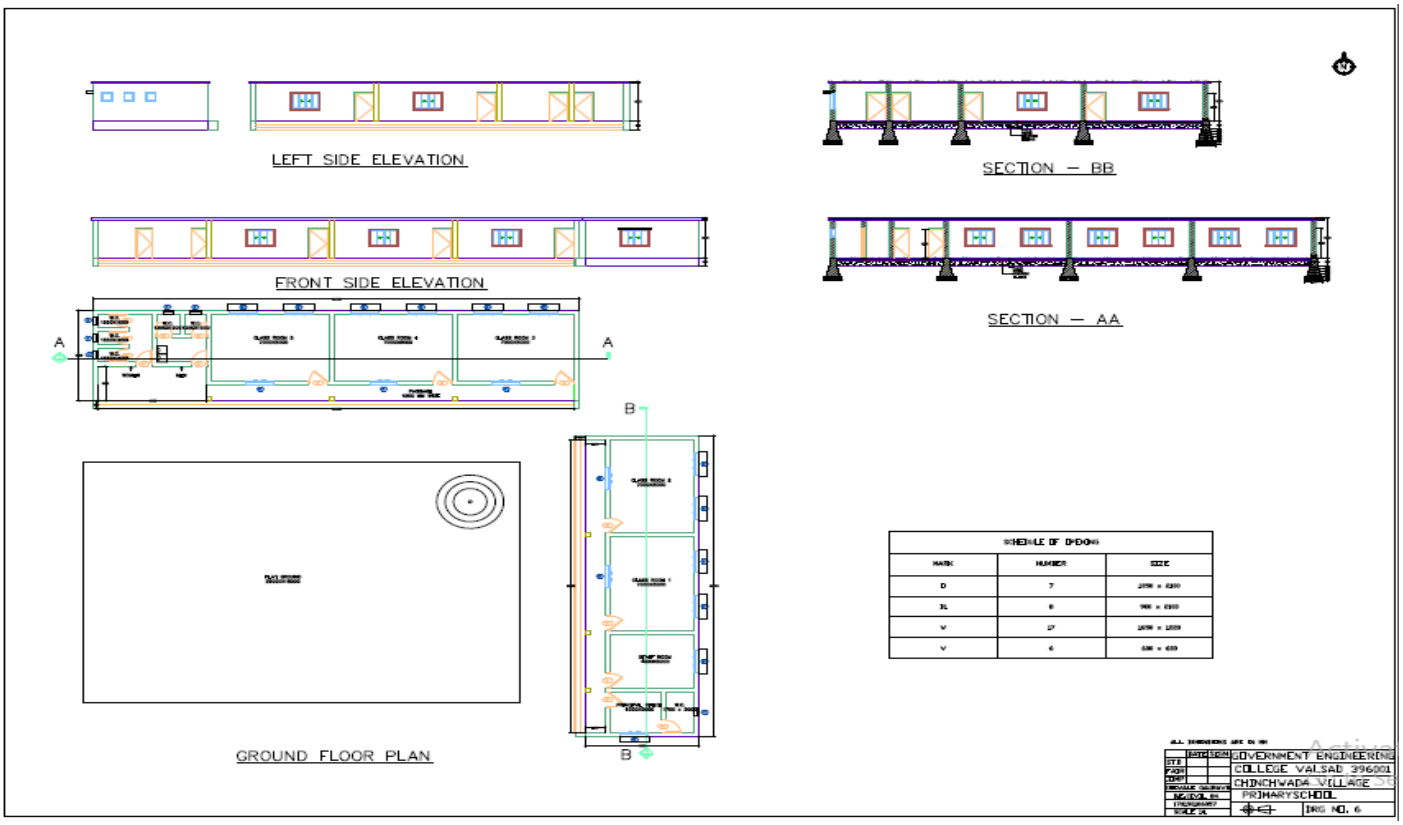
Design of PHC Center



Design of BUS Stop

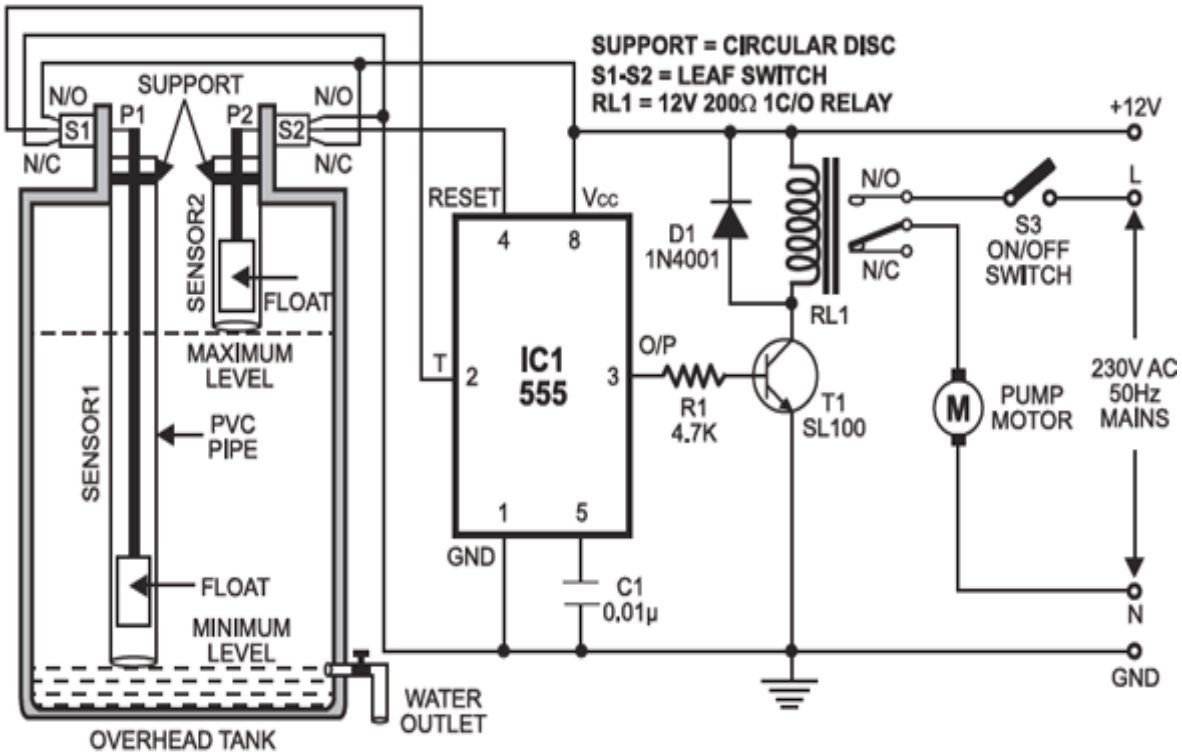


Design of Primary School

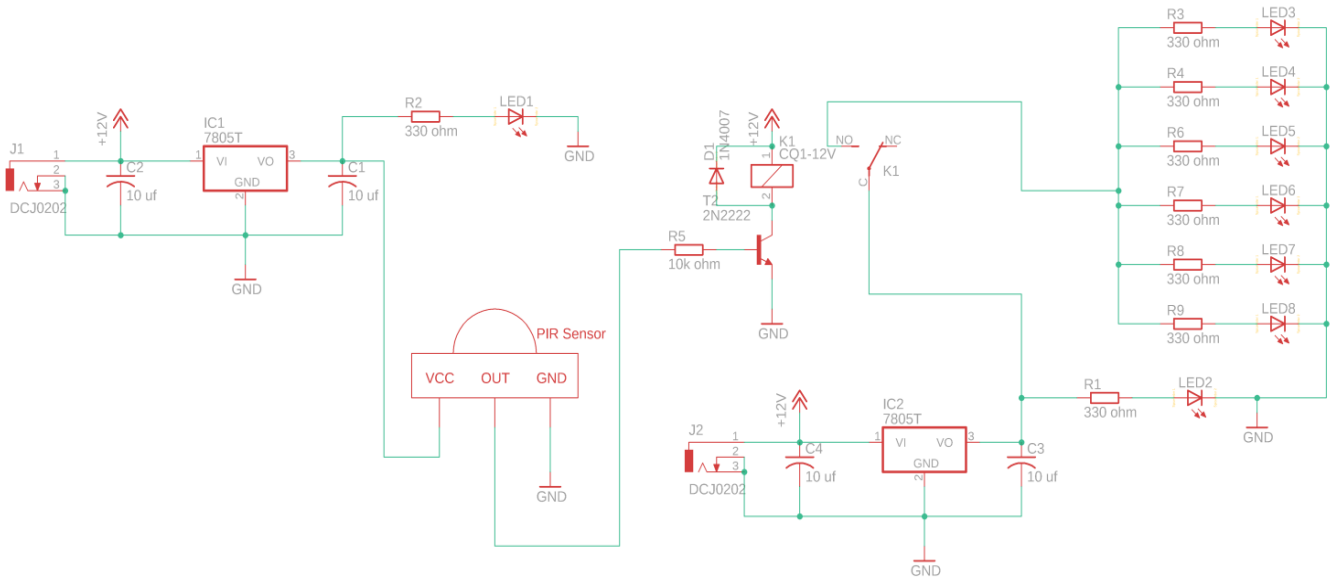


Electrical Design

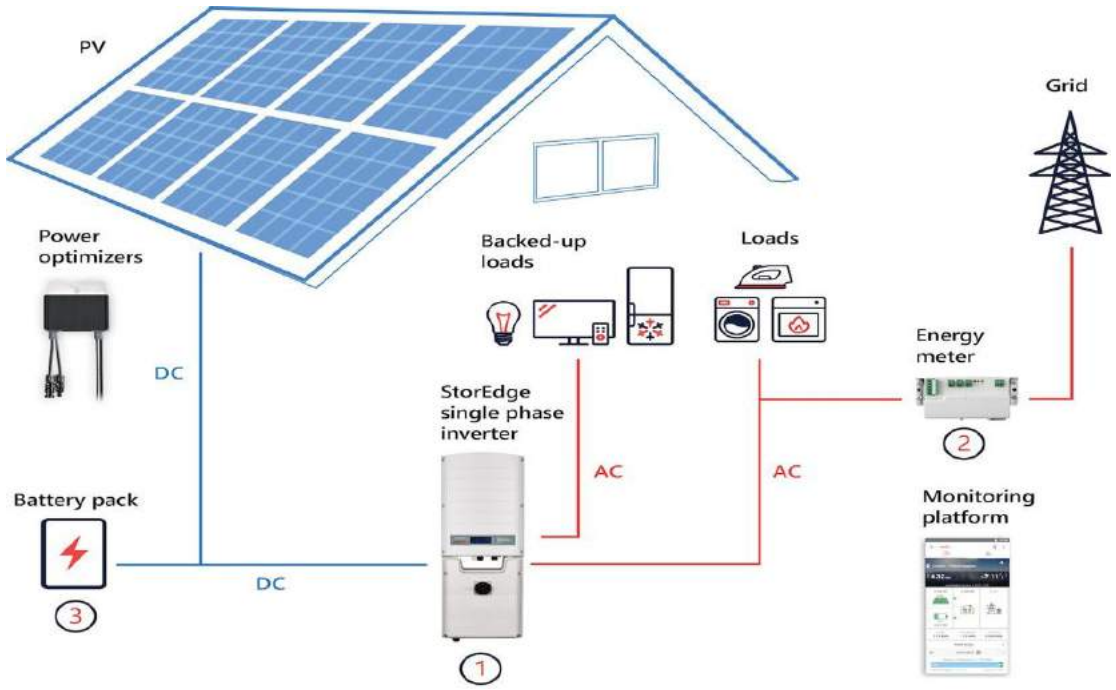
Automatic Water Level Controller



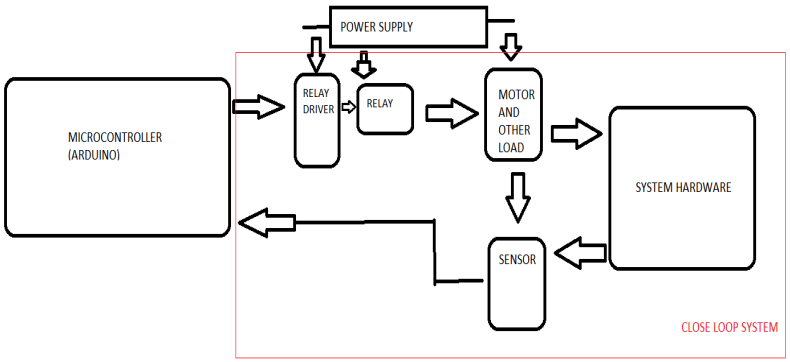
Design of Motion activated Street Light

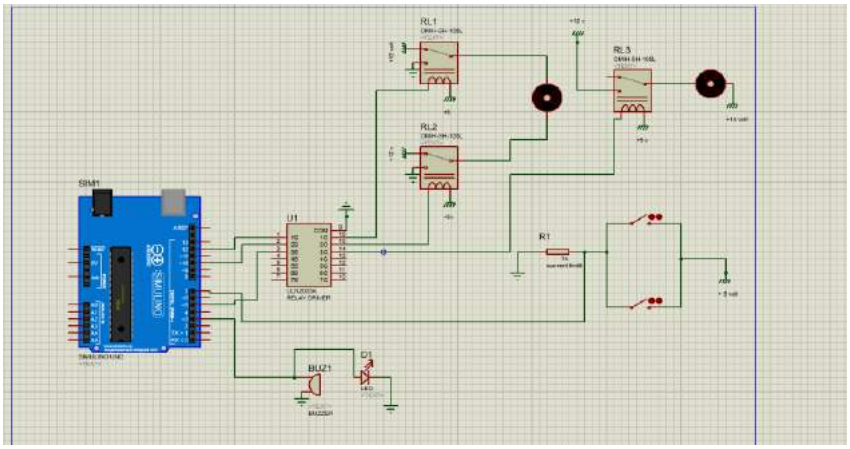


Design of Roof Top Solar Penal

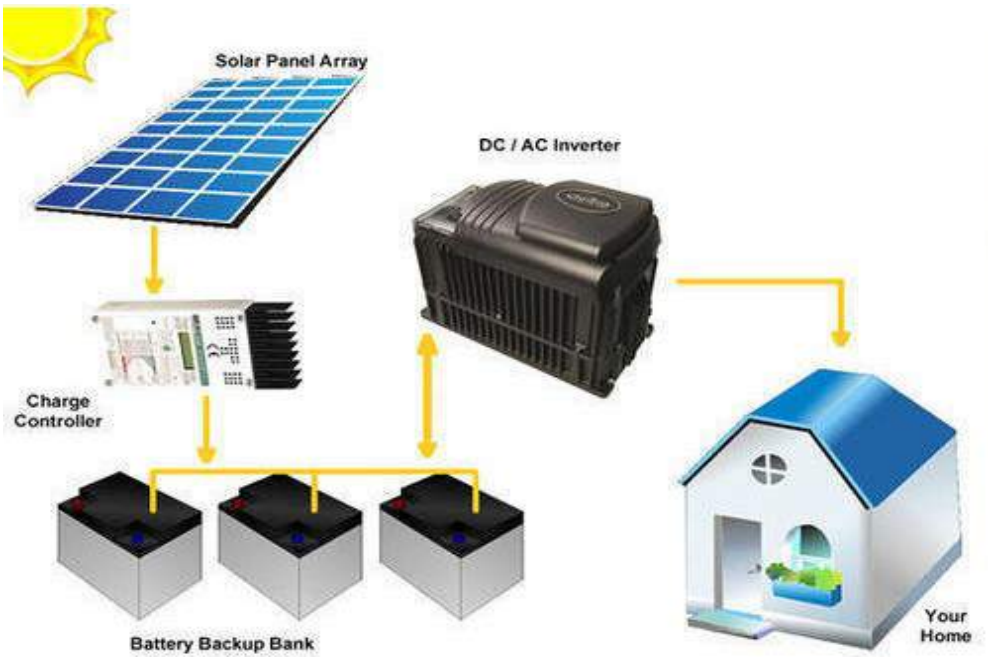


Design of Solar Penal Cleaning Machine





Design of off Grid Solar System



Design of Electrical Layout of Primary School