DETAIL PROJECT REPORT

VISHWAKARMA YOJNA: VIII
AN APPROACH TOWARDS RURBANISATION
SUREL Village

SURENDRANAGAR District

PREPARED BY

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COLLEGE LOGO

YEAR:2020-21

GUJARAT TECHNOLOGICAL UNIVERSITY
Chandkheda,Ahmedabad– 382424 Gujarat

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ON

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CERTIFICATE

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

Detail Project Report for ,

VILLAGE- Surel

DISTRICT- Surendranagar

Under

Vishwakarma Yojana: Phase-VIII

in partial fulfillment of the project offered by

GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA

during the academic year 2020-21.

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

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ABSTRACT

The Government of Gujarat has launched Vishwakarma Yojana (scheme) for development of villages by identifying the requirements of villages. Under this scheme, the villages are surveyed and this project was identified and selected for implementation. Rurbanization is to bring peace of mind to the villagers by providing them the basic amenities required and still keeping the village's oulintact. This project gives one new idea for Development of rural villages.

Also gives procedure how they fulfill requirement of the villages. Now a day people are moving from rural to urban are due to lack of basic amenities. With the help of this Yojana we can bring awareness about the thing which are not available at rural areas. So this help to provide better solution for the available problems in rural area like drinking water, Drainage facility, road network, etc.

The purpose of this paper is to define the role rural areas and country towns play in the persistence of, or often time regrettably, the dissolution of local character and place. The observations contained in this paper apply to most types of rural areas in many different locales. The central argument of this work is that wherever viable rural settlements exist, the government, professional planners, and inhabitants within must focus their energies on the immediate place-they must make the word "local" mean something if we are ever to be successful in the retention and sustenance of "local community."

A rural development doctrine must, if it is to be effective, give deeper and more concentrated thought to the role of local rural place as we seek to find solutions to the ongoing problems of population imbalance and the dissolution of the countryside.

For the development of the rural area of State considering social development, infrastructure development and socio-cultural development, Government of Gujarat started a rural development program "Vishwakarma Yojana" and it is allotted to the Gujarat Technological University in which team of Nodal officers and Students from civil and electrical engineering branch of diploma engineering and degree engineering colleges are designed the basic infrastructure and urban facilities to the allotted village which will help to minimize many current issues like urbanization, etc.

Basically, what we need is to empower the rural people by providing them education and proper health care. They need to have infrastructure like electricity and water, sanitation so that they are free from the
cycle of droughts and floods. We need to give them self-employment so that they want to stay in villages
instead of migrating in cities. There is a need to empower the villagers.

Rural development in India has witnessed several changes over the years in its emphasis, strategies and programmes. It has assumed a new dimension and perspectives as a consequence. Rural development can be richer and more meaningful only through the participation of clienteles of development.

Just as implementation is the touchstone for planning, people's participation is the centre-piece in rural development. People's participation is one of the foremost pre-requisites of development process both from procedural and philosophical perspectives. For the development planners and administrators it is important to solicit the participation of different groups of rural people, to make the plans participatory.

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.(Dr.) Navin Sheth**, **Hon'ble Vice Chancellor, Gujarat Technological University-Ahmedabad**, for his encouragement and giving us the wonderful project.

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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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1.1 Back ground & study area Location

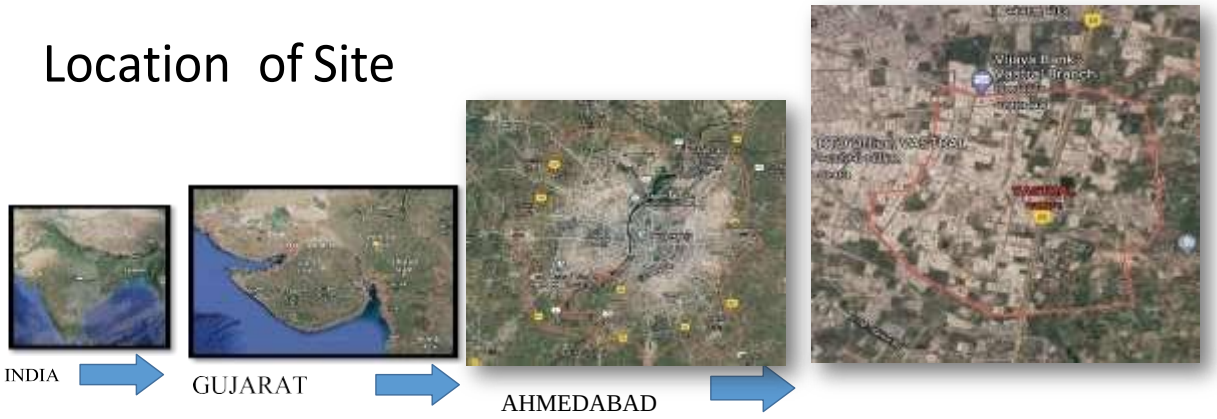


Figure 1 Location of site

- We have visited the vastral village located in Ahmedabad under Gujarat state.
- Vastral is a in Daskroi City in Gujarat State, India.Vastral Pin code is 380038 and postal head office is Memadpur , Amraiwadi , C.t.m , G I D C Industrial Area , Satyam Nagar are the nearby Localities to Vastral.
- Ahmedabad , Mehmedabad , Dehgam , Gandhinagar are the nearby Cities to Daskroi.
- Ideal village consist of good infrastructure for education , sanitation, electricity, Business etc.
- Ideal village consists of good transportation facilities and other recreational activities.
- It also consist Manufacturing Hub so that villagers could get employment.
- It have proper solid Waste management plant.
- It have Sub center or hospitals.
- There is strict followers of law.
- It's come under district of Ahmedabad.
- It is located 10 KM from District Ahmedabad.
- Vastral village Local Language is Gujarati. Vastral Village Total population is 150000. Female Population is 45%. Village literacy rate is 76.0% and the Female Literacy rate is 70.0%
- Water bodies in Ahmedabad district are as follows-
- Vastral Lake (Lake in same district)
- More then 10 schools are there in vastral
- Government as well as private hospitals are there in vastral

1.2 Concept: Vastral village , normal village

1.2.1 Objective

- Objective of the ideal village is to have urban facilities in the village.
- Major or basic amenities should be available, where now also some of the district of Gujarat is facing.
- To set a case study for other villages so they can also apply in there village.
- Objective is to village people may not migrate to other places to fulfill their daily needs.

1.2.2 Example / live case studies of Vastral village of India

- Hiware Bazar Village , Ahmadnagar district of Maharashtra where there is no single beggarin the whole village.
- This village people are millionaires.
- They Banned all addictive substances to minimize expenses and started investing in rain - water harvesting and cattle farming.
- It is noted for its irrigation system and water conservation program, with which it is noted for its irrigation system and water conservation program, which it has fought the drought and drinking water problems.

1.2.3 The idea of a model / Smart village.

- Smart village is a concept adopted by national, state and local governments of India, as an initiative focused on holistic rural development, derived from Mahatma Gandhi's vision of Adarsh Gram.
- The parliamentarian's model village scheme main goal is for each member of parliament and minister to adopt a rural village and develop it into a model by 2019 under the SAGY guidelines.

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

- As it is near Ahmedabad which is most developed city, this village always have influenced by newtechnology .
- Majority development started after 2005.
- As it is 10 km from Ahmedabad all roads are well constructed and well connected .
- Currently new metro station is constructed, that connect it to Ahmedabad city.

1.3 Detail of Study

Figure 2 Picture with vastral village talati

- As of 2001 India census Vastral had a population of 41,925.
- Males constitute 55% of the population and females 45%. Vastral has an average literacy rate of 76%, higher than the national average of 59.5%: male literacy is 81%, and female literacy is 70%.
- In Vastral, 13% of the population is under 6 years of age.

- It's come under district of Ahmedabad.
- It is located 10 KM from District Ahmedabad.
- Vastral village Local Language is Gujarati. Vastral Village Total population is 150000. Female Population is 45%. Village literacy rate is 76.0% and the Female Literacy rate is 70.0%
- Water bodies in Ahmedabad district are as follows-
- Vastral Lake (Lake in same district)
- More then 10 schools are there in vastral
- Government as well as private hospitals are there in vastral
- There is 24/7 Power supplies in the whole area.
- Treated Tap Water Supply all round the year and in summer also available.
- Community toilets are there.
- There is perfect system to Collect garbage on street.
- Village has a proper sanitation and underground through clean and well-maintained concrete roads.
- Streetlight are operational through solar power.
- Insufficiency of electricity has become a thing of the past as vastral has 24 hours power supply through 75 KV power sub-station located in the village itself.
- Smart Village refers to a concept developed in rural area that provides solutions to problems occurred and improves the quality of life.
- The main problems faced by rural areas are cover poverty, low level of education, and limited access to technology.
- Smart village concept emerged due to somedifferent characteristics between rural and urban areas.

Figure 3 Metro station in vastral gam

Figure 4 Farm in Vastral village

1.4 SWOT analysis of Vastral villages.

- **Strength**

1. Due to metro city near this village it get developed more faster then other village.
2. villages are the back bone of the country as most of the food crops grow there only.
3. In Village there is peaceful life as compared to cities.

- **Weakness**

1. Soil is not so fertile .
2. In Digital India , village are lagging due to less technology and literacy in village.
3. There was no such more weakness observe.

- **Opportunities**

There is a great opportunity in villages to go more green by establish solar and wind park.

1.Due to major develop city near the village the price of land has increased and stillit will increased more in coming future.
2.High chances of generation of employment due to development of industrial factories
3.we believe that integrated development of villages will be primarily achieved through implementation of existing scheme of central and state governments, in a convergent manner along with other funding support and community involvement.
4. India still has its most population settled in villages. Villages have their own set of infrastructure which is different from the urban areas. It is true that business requires a special set of infrastructures and has its own different needs. But this doesn't mean there are no business opportunities in rural areas.

- **Threat**

1. As Ahmedabad is just 10 km away , slowly and slowly this village is coming insidethe city as Ahmedabad city is expanding a lot.
2. Due to this village may loose its identity.

1.5 Future prospects of development of ideal village

- Tourism allows the creation of a replacement of income in the non-agricultural sector foe rural dwellers.
- Community will be empowered to take smart decisions using smart technologies and with support of smart manpower.
- Protecting local traditions and heritage of the village.
- The concept of smart village will provide the similar kind of facilities to the villages, so that the agrarian community does not migrate to the urban areas.

1.6 Benefits of the visit of ideal / smart villages.

- After the visit of smart village we understand the different community lifestyle, source of income, and other condition which can be implemented to other villages.
- Smart village encourages to give smart solutions to the tribal villages.
- It forms the bridge gap between rural and urban which solution to stop peoples to migrate to cities for better income and good lifestyle.
- By 2050, it is estimated that more than half of India will be living in urban area.
- Smart village visit gives idea to develop sustainable development of village.

1.7 civil aspects required in Vastral village.

- According to the electrical aspects maximum use of renewable energy which gives sustainable development.
- Minimum use of fossil fuels for the agriculture purpose can lead to the greater development of village.
- According to electrical aspect there should have small solar/wind park which generates and distribute the electricity to the village.
- Sufficient amount of energy should be available for agriculture so that farmers should not struggle for power requirement.
- According to the civil prospect firstly, road network must be strong to make faster progress.
- Proper Infrastructure like bank, school, hospitals, bus stand etc. should be available.
- Proper distribution of water to every home should be the most prior requirement of any smart village.

Electrical aspects required in vastral village

- According to the electrical aspects maximum use of renewable energy which gives sustainable development.
- Minimum use of fossil fuels for the agriculture purpose can lead to the greater development of village.
- According to electrical aspect there should have small solar/wind park which generates and distribute the electricity to the village.
- Sufficient amount of energy should be available for agriculture so that farmers should not struggle for power requirement.
- Irrigation system with solar panel should be implemented and solar street lights should be installed.Regular.
- maintenance of electrical equipment is required as one pole gets damaged than the supply of whole village can be disturbed.
- There is no universally accepted definition of a smart village. It means different things to different people. The conceptualization of Smart Village, therefore, varies from country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the village residents.
- A smart village would have a different connotation in India than, say, Europe. Even in India, there is no one way of defining a smart village. Smart village is an "Ideal Village With Technology".
- Ideal village deals with the proper availability of service to people to their means regardless of achieving their means while in smart village conceptualization it is needed to properly define
- Smart Village as a bundle of services like Smart Education, Smart Infrastructure, Smart Environment, Smart Agriculture, Smart Health , Smart Connectivity and Smart Security which are delivered to its residents and businesses in an effective and efficient manner.
- integrated planning with monitoring and execution of the activities using appropriate governance models. The smart village is a formation resulting from co-evolution of four distinct forces and innovations these four sectors. They include - Modular services and Modular service chains - Service delivery technologies such as logistics and IT and their mechanisms - Institutions that influence the governance and regulations - Resources and their management.
- The basic services offered to the rural residents are supply of purified water, affordable housing, primary education, vocational training, help in farming techniques, procurement of seeds and fertilizers, training and employment opportunities in SMEs like leather, crafts, food processing units, retail / kirana shops. The services delivery technologies and mechanisms like road transportation by bus/truck ; IT and mobile networks; procurement, warehousing and marketing for agricultural and SME produce; Food Courts; e-kiosks for bill payment; applications like Spoken web for commodity price broadcast, social networking, etc; post office based services like ticket booking, e-purchase, etc need to be developed.
- Existing infrastructures like post offices can be used as village information centers that provide all the information from market prices of various commodities, advice related to agricultural, animal husbandry or health related issues, educational information for students of class X and XII, employment opportunities, career guidance for young people, to online applications for pan card, driving licenses, tax and bill payments etc.

They can also have a call centre based regular monitoring and grievance system so that their complaints are attended to. This calls for a lot of awareness and training in the initial phases to educate and make people acquainted with the new systems. Vocational training has to be provided on a large scale to make them familiar with IT, maintenance of records, operation of the equipment and managing their finances.

Chapter 2. Vastral Village Literature review

2.1 Literature Review

- Smart villages is a new concept that can be instrumental for the development of rural areas.
- The population inhibit in the rural area needs the calibre and status of life as enjoyed by people living in suburban and urban areas.
- The government has already accepted this consequences and put solemn endeavor through diverse schemes for enhancing livelihood of rural masses.The idea of smart villages enhance the attention to multiple challenges like unplanned urbanization, under-development villages.

2.2 Importance of Rural development.

- Rural development means an action plan for the social and economical upliftment of rural areas.
- The main aim is to improve the quality of life.
- Traditionally rural development is centered aim to misuse of land use and intensive use of forest.
- Rural development is very important so that the gap between rural and urban areas can be minimized.
- It is a process to improve the qualitative and quantitative changes to improve condition in rural areas.
-

2.3 Ancient villages.

- India is a vast country with a majority of its total population living in the villages.
- The Indian society is predominantly divided into two divisions like the rural society and the urban society.
- Villages have always been an integral part of society in India. No specific timeframe can be mentioned about the conception of villages in India.
- However, the concept of village was not present there in the ancient period.
- The Indus valley civilizations is so far known to be the ancient civilizations in India and it mainly comprised two cities of Harappa and Mohen jo dro However, the concept of village seems to be absent during this era.
- The village communities are little republics, having nearly everything that they want within themselves and almost independent of any foreign relations.
- They seem to last where nothing lasts. Dynasty after dynasty tumbles down; revolution succeeds to revolution, Hindu, pathan,Maratha, Sikh, English, are all masters in turn; but the village communities remain the same.
- Such a description of the village community in India was idyllic and superficial.
- Although villages had their distinct identity and were ruled by the local heads, they could not be called republics.
- They were the part of the great tradition of India, having various links with the people living in.

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%.

2.5 Scenario : rural / urban village of Gujarat as per census 2011 and latest

- As per details from Census 2011, Gujarat has population of 6.04 Crores, an increase from figure of 5.07 Crore in 2001 census.
- Total population of Gujarat as per 2011 census is 60,439,692 of which male and female are 31,491,260 and 28,948,432 respectively.
- In 2001, total population was 50,671,017 in which males were 26,385,577 while females were 24,285,440.
- The total population growth in this decade was 19.28 percent while in previous decade it was 22.48 percent. The population of Gujarat forms 4.99 percent of India in 2011. In 2001, thefigure was 4.93 percent.

2.6 Rural development issues – concerns- measures

- Poverty is largely a rural problem, More than 75 percent of the world's poor live in rural areas and a majority of the poor will continue to live in rural areas well into the 21st century.
- Agriculture employs more than half of the total labour force in developing countries and almost three quarters in lower-income developing countries.
- Most of the world's extreme poor depend on agriculture for their livelihoods.
- Most developing countries are at an early stage of agricultural technology and still have the considerable potential to increase productivity and diversify production.
- Most developing countries also lack the financial and administrative capacity to implement measures covered by the green box, such as income safety-net programme, and therefore may need recourse to price-based supports.

2.7 Various infrastructure guidelines with the norms for villages for the provision of different infrastructure in India.

- Availability between one village to other village in whole district to develop the better infrastructure .
- Various necessary public buildings like hospital , recreational building, parks, etc. should be available.
- Various technologies should be used for agricultural process

Figure 5 Vastral area Mall

- India's population growth and economic development requires improved transport infrastructure, including through investments in roads, railways, and aviation, shipping and inland waterways.
- by 2030, transport is expected to attract over 60 per cent of infrastructure investment in India.
- At present, wastes from households are mostly disposed in city outskirts by municipalities. There is an urgent need to set up recycling facilities as a lot of times the waste often ends up in rivers polluting

- The India Infrastructure Project Development Fund IIPDF's primary objective would be to fund potential PPP projects' project development expenses including costs of engaging consultants and Transaction Advisor, thus increasing the quality and quantity of successful PPPs and allowing informed decision making by the Government based on good quality feasibility reports.

Figure 6 Good quality of roads.

- Infrastructure is a key driver of the overall development of Indian economy.
- Infrastructure sector focuses on major infrastructure sectors such as power, roads and bridges, dams and urban infrastructure. India's population growth and economic development requires improved transport infrastructure.
- The government has electrified over 7,000 villages in 2015-16 which stands 37 per cent higher than the previous three years. But this may not necessarily mean that all houses in the villages have access to electricity.

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

2.8.1 Energy Audit

2.8.1.1 What is an Energy Audit?

Effective energy management program designed to improve the energy efficiency and reduce the energy operating costs of a facility.

Detailed examination of

A. How a facility uses energy?
B. What the facility pays for that energy?

It is a recommended program for changes in operating practices or energy consuming equipment that will cost effectively save money on energy bills. Collection of data about a facility's operation and about its past record of utility bills. Analysed Data to find out the facility uses, wastes energy, reduce energy costs.

2.8.2 Energy Audit and its importance

2.8.2.1 Walk-Through Audit (WTA)

Includes:
Walk-through inspection of a facility to identify maintenance, operational or deficient equipment issues and also to identify areas that need further evaluation.

Results of a Walk-Through Audit include,

A. An identification of energy saving opportunities
B. A qualitative analysis of the implementation of energy saving measures an estimation of its potential energy saving.

2.8.2.2 Energy Diagnosis

Includes:

A. Performing economic calculations.
B. Devices to identify actual energy consumption and Losses using some metering devices.

The results of an Energy Diagnosis include,

A. An energy balance (energy uses breakdown)
B. List of energy efficiency measures derived from performance or building facility.
C. Financial analysis for each of the identified measures.

2.8.2.3 Investment Grade Audit (IGA)

Includes:
Detailed account of energy use,
Quantitative study of the implementation with detailed investments and operational and maintenance costs. An analysis of the investment model. The results of an Investment Grade Audit include the real energy demand and an energy balance. Audit suggests a number of energy saving measures, including the Calculation of energy savings and the investment needed to carry them out. This audit proposes bundled measures, with a financing plan as well as implementation and savings verification plans.

2.8.4 Different Techniques to save energy in rural areas:

A. Sealing and insulating windows, doors and cracks is a big step.
B. Checking air filters, unblocking A/C vents.
C. Replacing incandescent light bulbs with CFLs.
D. Upgrading to Energy Star appliances, and turning everything off when it's not in use.

2.8.4.1 Cooking

A. When cooking Using electric equipment use pots and pans that are properly sized to "fit" the burners. Using a small pan on a large burner wastes energy and can be a safety hazard. Always cook with lids on your pans, as this keeps the heat inside and speeds up cooking time.
B. A microwave oven is an energy efficient alternative to a conventional oven. It cooks food more quickly and uses 70-80% less electricity than a conventional oven.
C. Use a toaster oven, electric skillet, popcorn popper or slow cooker for specialised jobs, rather than the electric range top, since these small appliances use less energy.
D. Use cold water when operating your food/waste disposal. Cold water saves energy and solidifies grease so that it will move through the drainpipes easier.

2.8.4.2 Home Cooling

E. Whole-house fans can be installed in the attic or ceiling to pull fresh air through the house – usually at night when it's cooler. It can minimise air conditioning use.
F. The location of an air conditioner has a lot to do with how efficient it will be. If you have a choice, locate your unit on the north, east or the best-shaded side of your home. If the unit is exposed to direct sunlight, it has to work much harder and use more energy to cool your home.
G. Keep shrubbery away for the air conditioner since it blocks vents and reduces the unit's ability to exhaust air.

2.8.4.3 Home Heating

H. Keep draperies and shades on south-facing windows open during the heating season to allow sunlight to enter your home. Close them at night to reduce the chill you may feel from cold windows.
I. Keep fireplace dampers closed when they aren't needed will rise up the chimney and escape when the fireplace is not being used.
J. Fireplaces with glass doors are most efficient.
K. Set your thermostat to the lowest comfortable setting.
L. Keep the temperature fairly constant, as frequent changes will use more energy.

2.8.4.4 Lighting

M. Lights add a lot of heat to the room 99% of a light's energy use is converted to heat, 1% to light. Use only as much light as you need.
N. Take advantage of reflected light by placing portable fixtures near light colour walls or other surfaces.
O. Replace incandescent light bulbs in high use areas with compact fluorescent light bulbs.
P. Compact fluorescent bulbs are more expensive, but use up to 70% less energy and last
Q. up to 10 times longer.
R. Consider using lighting directed at a specific area instead of overhead or general
S. lighting, which may light unused areas of the room.
T. Limiting lighting only to areas where it is needed, savings in the cost of bulbs and energy can be made

Chapter 3. Smart village concept idea and its visit

3.1 Introduction: concepts, definitions and practices

- Smart cities concepts includes smart solutions for every challenges.
- Use of latest technologies and instrument includes smart solutions.
- Villagers should be educated for better lifestyle and smart solutions.
- Use of maximum renewable energy like biogas plant for solid waste management.
- Cleanliness can solve the problem of diseases.
- Availability of water problems can be solved by rain water harvesting.

3.2 vision-Goals, standards and performance measurement indicators

- Visions are to improve the quality life of poor people.
- The available facilities should be used sufficiently.
- Goals are to make available faculties like cc camera, libraries, collages.
- Vishwakarma is also the aim toward the rurbanisation.

3.3 Technological options

- Agriculture is the prime source of income in every village so maximum increase in technology of agriculture leads to progress of village.
- Mobile networks / wifi coverage should be made available for online Yojana of government.
- Solar street light must be used to minimize the consumption of fossil fuels.
- Water treatment plants should be available to minimize water problems.
- Rain water harvesting should be adopted to have water whole year.

3.4 Issues &Challenges

- According to present conditions of villages education is main challenge.
- Source of income is mainly dependent on agricultural, dairy products etc.
- Water availability in all 12 months.
- Waste management is also major issue in major villages
- Electricity problems in farming.3.5 Smart infrastructure – intelligent traffic management.
- Smart infrastructure includes availability of smart toilet in every house where Indian government is encouraging under scheme called “Nirmal bharat abhiyan”.
- All kind of basic material should be available in village so minimum material must be outsourced.
- Under scheme of “Pradhan mantri gram sadak Yojana” to built roads in all villages.
- Smart technologies must be adopted for rain water storage and purification.

3.6 Smart initiatives by district municipal development.

- District municipal plays a major role in development of villages because they are been notified by state and central government schemes.
- Municipal can educate people by encouraging various schemes and technologies.
- Pond should be maintained properly for proper water storage.
- Quality education , solar , wind power must be developed.
- PM Narendra modi has launched swaraj & swaraj yojana, two web portals for accelerating the pace of development in india's village

Figure 7 Magistrate office in vastral

- Making a city smart encapsulates learnings from the smart cities mission to outline the WHAT, WHY and how a smart city.
- The book illustrates how smart city is a city that works for tis people.
- It is not the highest end state of a city and it does not sit at the top of a city's pyramid needs-from basic up to creative.

- It is a workbook with tasks in each section to help cities chart out their own smart city journeys.
- The book illustrates how a smart city is a city that works for its people
- Being smart makes a city more able and agible to move from one level to the next, guided by principles of making most from limited resources, taking everyone along quickly adapting to changes, being resilient in the face of stresses or shocks at each stage, and using technology mindfully at every step of the way to reach scale and speed.

The main features obtained by upgrading the nation towards smarts leads to:

- Adequate and certain Electricity supply
- Digitalized Education
- Advanced Health Technologies
- Essential Water Supply
- Robust IT Connectivity and Digitalization
- Constant and Green Environment
- The objective is to promote sustainable and inclusive cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions.

3.7 Cyber security.

- Securing smart cities is a not-for-profit global initiative which aims at solving the existing and future cyber security problems of smart cities through collaboration between companies, government,media outlets and individuals across the world.
- Over the past few years, Technology has begun to play an important role in our daily lives. Internet enabled gadgets have changed the way in which we work or do our daily chores. Digitization has an impact on personal lives, education, health, government and national security. Due to increase in complexity of smart city systems and globally connected social, economic, political systems, etc. has increased vulnerability of security of a city. The cyber threats have amplified due to infinite supply of data. Smart surveillance technology or analytics to manage the crowd, traffic, cyber security, data privacy, building codes to manage natural/man-made disasters, etc. are some parameters that would make a city safe. Different challenges to our security and expectations of privacy have arrived due to innovations in IT. Humans are already interconnected via gadgets. Standards are evolved for all thesepotentially connected systems. This will lead to improve in quality in life.
- Smart Transportation will also provide an access to a web of connected data from GPS location. Integrated systems and cyber security will aid public safety. We examine two important challenges :Security and Privacy.

3.8 Retrofitting-Redevelopment -Greenfield Development District Cooling

Retrofitting

- The main elements of the strengthening approach are ferrocement horizontal belts and vertical straps, ferrocement patches, vertical reinforcement, cast in situ bond elements (through hooks), shear connectors, and in the case of pitched roofs, guy lines and bracing
- Despite numerous studies on retrofitting techniques for low-rise, masonry and adobe dwellings in developing country settings, continued research is needed to confirm the effectiveness of existing methods and identify lower cost means of strengthening damaged or vulnerable houses. The research should focus on locally available materials that require minimum skill to implement.
- The prescribed retrofitting guidelines rely heavily on steel, welded wire mesh, and cement. Material banks were set up in the reconstruction program, but such banks were not included in the capacity building program. In other words, even if a homeowner had in mind to retrofit after the demonstration program, materials were not easily available.
- Further research is required to illustrate the potential for and impact of differential settlement under static and seismic conditions for the foundation approach using cobbles flooded with loose sand. This foundation practice is prevalent throughout India, and a low-cost alternative should be identified and tested, such as manually crushed, angular hardcore.

Redevelopment

- The phenomenon of urban villages in the Indian context can be viewed from two different perspectives. The first suggests that under the influence of rapid urbanisation and economic development, many urban areas in Indian cities and towns have doubled or tripled in terms of land cover and population. As a result, a large number of traditional rural villages, located in the peripheral areas of cities, have became part of the city's built up areas.
- They have been turned into the so-called 'urban villages' and examples can be seen across the country – from small towns like Bhiwadi in the National Capital Region, to cities like Hyderabad and Bangalore.
- The second is the case of existing urban villages within city limits and includes examples such as Delhi, Mumbai and Navi Mumbai. In the case of Delhi, these urban villages also identified as lal dora, are exempted from municipal and building codes. In Navi Mumbai, these urban villages, locally known as gaothans were initially not included in the land acquisition process during the formation of the Navi Mumbai New Town Development Authority Notified Area.
- Increase in FSI would have a direct bearing on the urban form. The assessment of the urban renewal schemes needs to be undertaken for the size and structure of the buildings and dwelling units that are likely to emerge in various gaothans.
- While multiple urban forms might arise, depending on the actual shape, size of land holdings and willingness of residents to participate in the scheme, the study includes an analysis that evaluates the building form and consequent economic viability for two options – plot sizes of 4000 sq.metres and 2000 sq. metres. The following are the urban form options suggested as a part of the study.
- Based on the estimated population after redevelopment of gaothans and assuming per capita generation of a 500 grams of waste per day, a significant increase in Municipal Solid Waste (MSW) generation is expected.
- With the increase in the quantum of MSW, the collection and transportation system would need to be augmented proportionally. The current system adopted uses garbage collection vehicles that transport garbage to dumping yards. With the estimated increase in volume, there will be a need to augment manpower, and vehicular resources to meet the new volumes.
- With business-as-usual practices, there will be an impact on the processing and disposal facilities. NMMC would need to encourage decentralised treatment options, coupled with segregation practices to handle the increased volumes. Given the spread of gaothans, it may not be possible to configure waste to energy plants only for MSW generated from these villages.
- The feasibility would need to be studied from the perspective of waste generation at the node level. This would have an impact on the sanitary landfill site with the active life being reduced. NMMC might need to explore alternate waste management processing and disposal facilities, to address the reduced life of the facilities.
- Redevelopment of gaothans is dependent on the economic viability of the scheme, and based on the population trends in the Navi Mumbai and Mumbai region. Achieving a terminal population, as estimated for an FSI of 4, would require a time period of between 20 and 25 years. Accordingly, it is assumed that each development is spread out over a five year period.

Greenfield Development District Cooling

- Over 10% of global electricity consumption today is used for cooling, and demand for cooling continues to increase. District cooling (centralized cooling) is a modern approach that uses increased efficiency, local sources and multi-generation to deliver more cooling capacity while reducing electricity consumption, peak load and environmental impacts. A district cooling business is easy to start and delivers multiple benefits to the customer.
- Global warming poses a massive challenge to cooling. More cooling is needed than ever before, but at the same time, energy consumption and greenhouse gas emissions due to cooling must be drastically reduced.
- District cooling has emerged as a solution that answers to both needs. By maximizing efficiency and harnessing natural sources of cold water and waste heat, district cooling can achieve five to ten times better primary energy factors than cooling systems based on conventional chillers.
- The result is a high cooling capacity with significantly reduced emissions. District cooling also improves the security of electricity supply and reduces the need for investments in peak capacity.
- The fundamental idea behind modern district cooling is the use of local energy sources: heat, cold and fuel sources that under normal circumstances would be lost or remain unused. Cooling is produced centrally and the cooling media – cold water – is distributed to customers via a closed pipe network.
- A heat exchange process inside a substation located in the customer's premises transfers heat from the customer's internal cooling circuits into the network. This surplus heat can later be used in heating.
- Sources of free cooling that can be harnessed include rivers, lakes, sea and ground water. Heat energy can also be converted into cooling through an absorption process. Depending on local circumstances, free or inexpensive heat sources can include biofuels, solar panels and surplus heat from electricity co-generation (CHP).
- In addition to sources of free cooling and absorption, district cooling can also make use of heat pumps that produce heat and cold energy simultaneously in the same process. Large-scale industrial chillers used in district cooling often consume less than half the electricity need of individual chillers.
- Besides the use of local energy sources, another major advantage of district cooling is the ability to store cooling energy over time. One way to do this is to store cold water in tanks. Storage makes it possible to cut peak load and significantly optimize production.
- Cooling is needed in many kinds of buildings, including office buildings, shopping centers, hospitals, hotels, data centers, manufacturing plants and homes. Even though peak consumption occurs during hot weather, cooling is often needed throughout the year. Over 40% of commercial and institutional buildings in Europe already have cooling systems, and this figure is set to grow to 60% by 2020.
- A district cooling business is easy to start in a new building area, especially in a dense city center filled with commercial buildings. New buildings are easily designed to be suited for district cooling.
- Comfort cooling is also becoming more common in residential buildings. Rising standards of living mean that people are willing to pay for more comfortable living conditions.

3.9 Strategic Options for Fast Development

- Preserving and developing open spaces - parks, playgrounds, and recreational spaces in order to enhance the quality of life of citizens, reduce the urban heat effects in Areas and generally promote eco-balance;
- Promoting a variety of transport options - Transit Oriented Development (TOD), public transport and last mile para-transport connectivity;
- Making governance citizen-friendly and cost effective - increasingly rely on online servicesto bring about accountability and transparency, especially using mobiles to reduce cost of services and providing services without having to go to municipal offices. Forming e- groups to listen to people and obtain feedback and use online monitoring of programs and activities with the aid of cyber tour of worksites;
- Giving an identity to the city - based on its main economic activity, such as local cuisine, health, education, arts and craft, culture, sports goods, furniture, hosiery, textile, dairy, etc.
- Applying Smart Solutions to infrastructure and services in area-based development in orderto make them better. For example, making Areas less vulnerable to disasters, using fewer resources, and providing cheaper services.

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

- The water supply and sanitation in India has increased greatly from 1980 to present. Still, many people lack access to clean water, toilets, and sewage infrastructure.
- Various government programs at national, state, and community level have brought rapid improvements in sanitation and the drinking water supply.
- These various programs are ongoing. In 1980 rural sanitation coverage wasestimated at 1% and reached 95% in 2018.
- Also, the share of Indians with access to improved sources of water has increased significantly from 72% in 1990 to 88% in 2008.
- At the same time, local government institutions in charge of operating and maintaining the infrastructure are seen as weak andlack the financial resources to carry out their functions.
- In addition, only two Indian cities have continuous water supply and according to an estimate from 2018 about 8% of Indians still lack accessto improved sanitation facilities.
- The Municipal bodies are constituted of persons chosen by direct election from the territorial constituencies in the municipal area.
- However, the Legislature of a State may, by law, provide for the representation in a municipal body of persons having special knowledge or experience of municipal administration, the members of Rajya Sabha, Lok Sabha and the members of Legislative Council and Legislative Assembly of the State, representing constituencies, which comprise wholly or partly the Municipal area and the Chairpersons of Wards Committees.

3.11 Electrical concept

A. 24/7 electricity availability:-

The village will have 24/7 electricity availability in future compared to current scenario. It will improve the quality of power supplied also like uninterrupted power supply, no power cut offs, etc.

2) Electricity generation through solar power:-

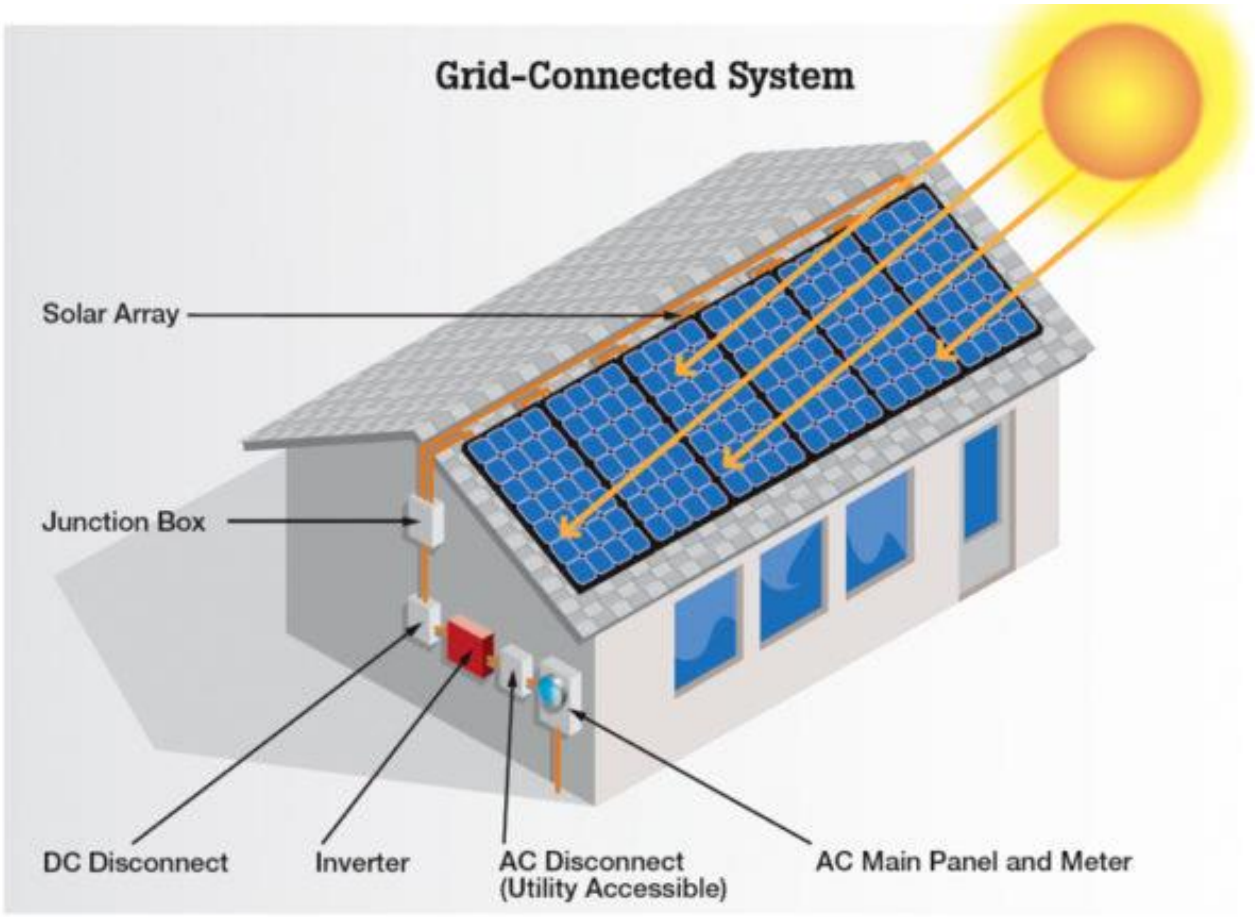


Figure 2Electrical concept

The solar power is renewable energy source & it is available for free of cost. This solar energy can be converted into electrical energy through solar PV cells. This generated energy can be used as back power supply in agriculture & industrial sector where if power supply gets stopped due to any reason then power generated through solar can be used as backup. This solar power can be used in homes as primary source as the power requirement of home/houses is less compared to agriculture & industrial sector.

3) The step-down transformers placed in village should be properly covered to prevent from atmospherically as well as human accidents and happening of short-circuits.

4) The conductors on the electric poles should be properly isolated and connected.

5) Safety from electricity theft.

3.11 Initiatives in village development by local self-government

- In our towns and cities, we have local government institutions that are called Municipalities and Municipal Corporations. An urban area is usually a compact and densely populated area. Municipal administration is necessary to provide basic civic facilities like water supply, drainage, garbage disposal, public health, primary education, construction and maintenance of roads and sanitation. As local level democratic government, the municipal institutions Structure of Government that are elected by the local people, raise taxes and collect fees and fines from the public. They regulate city life by laying down regulations regarding buildings, road network and garbage disposal. There are many developmental activities undertaken by them like women and child development, slums improvement etc. Municipal government has made possible participative urban development and local management of civic facilities.
- Some of the voluntary provisions which are not binding, but are expected to be observed by the States are:

(i) Giving voting rights to members of the Union and State Legislatures in these bodies;
(ii) Providing reservation for backward classes;
(iii) Giving financial powers in relation to taxes, duties, tolls and fees, etc;
(iv) Making the municipal bodies autonomous and devolution of powers to these bodies to perform some or all of the functions enumerated in the Twelfth Schedule added to the Constitution through this Act and/or to prepare plans for economic development.

In accordance with the 74thAmendment, municipal corporations and municipalities (municipal boards or municipal committees) are now regulated in a fairly uniform manner in all the States. However you must remember that local self-government continues to be a subject in the State List. Thus, the 73rd and 74th amendments provide framework for the States in respect of local government. Thus, each State has its own Election Commission which conducts elections to all local bodies after regular intervals of five years. Each State has its Finance Commission to regulate finances of the local bodies. Seates are reserved in the corporations and municipalities for Scheduled Castes and Tribes. One-third seats are reserved for women in all local bodies – urban and rural.

The Municipal bodies are constituted of persons chosen by direct election from the territorial constituencies in the municipal area. However, the Legislature of a State may, by law, provide for the representation in a municipal body of persons having special knowledge or experience of municipal administration, the members of Rajya Sabha, Lok Sabha and the members of Legislative Council and Legislative Assembly of the State, representing constituencies, which comprise wholly or partly the Municipal area and the Chairpersons of Wards Committees. Empowerment of weaker sections of society and women by reserving seats for such groups is one of the important constitutional provisions of the Constitutional Amendment. The offices of chairperson are also be reserved for SC/ST and women. Thus at least one year, out of five year duration of Municipal Corporation of Delhi, the office of Mayor is reserved for a women, and one year is reserved for a Councillor of Scheduled Caste. It gives a term of five years to the municipalities and if any of them is to be dissolved, it must be given an opportunity of being heard. To be able to understand the composition of urban local bodies, we give below a very brief account of Municipal Corporation of Delhi. This Corporation covers entire area of Delhi, except small portion of New Delhi where seat of Union Government is situated. The Corporation has 134 elected members (Councillors). They are directly elected from single-member wards on the basis of universal adult franchise. Several seats are reserved for women and for Scheduled Castes.

3.12 Smart Initiatives by District Municipal Corporation

- Smart city is an urban renewal and reach to 15 programme by Ministry of housing and urban affairs it was launched by the government of India on 25 June 2015.
- The mission targets over hundred city's and promote makes land use in area-based development, housing and inclusiveness, creating walkable localities, promote in a variety of transport options, make in governance citizen friendly and cost effective, applying smart solutions to infrastructure and services in area-based development in order to make them better and overall given identity to the city.
- The objective is to promote sustainable and inclusive cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of smart solutions.

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

Here are some key initiatives which form a part of Digital India week

1. Digi Locker
2. MyGov.in
3. eSign Framework
4. Swach Bharat Mission mobile app
5. National Scholarship Portal
6. eHospital
7. Digitize India Platform
8. Bharat Net
9. Wi-fi Hotspots
10. Next Generation Network
11. Electronics Development Fund

Figure 8 NGO

Chapter 4 About Surel Village

4.1 Introduction

4.1.1 Introduction about Surel Village

- Surel village is located under Dasada taluka in surendranagar district of Gujarat state.
- It is located 98 KM toward north towards district head quarters surendranagar.34 KM from Dasada 127 KM from state capital Gandhinagar.
- Surel pin-code is 382780 and postal head office is Adariyana.
- Surel local language is Gujarati.
- Surel Village Total population is 2647 and number of houses are 528. Female Population is 46.6%. Village literacy rate is 47.0% and the Female Literacy rate is 17.4%.

Table 1 census data

Census Parameter	Census Data
Total Population	2647
Total No of Houses	528
Female Population %	46.6 % (1234)
Total Literacy rate %	47.0 % (1243)
Female Literacy rate	17.4 % (460)
Scheduled Tribes Population %	0.0 % (0)
Scheduled Caste Population %	8.6 % (228)
Working Population %	39.6 %
Child(0 -6) Population by 2011	408
Girl Child(0 -6) Population % by 2011	48.0 % (196)

- Surel is surrounded by Mandal Taluka towards East , Viramgam Taluka towards East , Detroj Rampura Taluka towards East , Sami Taluka towards North.
- This Place is in the border of the Surendranagar District and Ahmadabad District.
- Ahmadabad District Mandal is East towards this place.
- Gujarati is the Local Language here.
- Pond should be maintained properly for proper water storage.
- Quality education , solar , wind power must be developed.
- Out of total poplation total 1243 people in Surel Village are literate, among them 783 are male and 460 are female in the village. Total literacy rate of of Surel is 55.52%, for male literacy is 65.2% and for female literacy rate is 44.32%.
- Total working population of Surel is 1049 which are either main or marginal workers. Total workers in the village are 1049 out of which 794 are male and 255 are female. Total main workers are 998 out of which female main workers are 767 and male main workers are 231. Total marginal workers of village are 51

4.1.2 Justification / need of the study

- As the aim of Vishwakarma yojana is one of the initiative towards the rurbanisation by Gujarat government.
- There is a need of study required for the urban amenities in rural areas.

4.1.3 Study area (Broadly define)

- Our study area is to identify the problems and to make or suggest the solutions for the respective problems which are been faced by the villagers.
- Also to identify the problems which are not always existing but which occurs in a specific period of time.
- To make the survey in the village for the literacy, disease, Income etc.
- Also to know about which type of crops are growing which can be grown and also for improving the farming by the technology.
- We have identified that different types of crops are not possible to grow as land is not fertile.
- There is an existing solar power plant of 25MW outside the village area.

4.1.4Objectives of study

- Objective of study is to identify the problems faced by the villagers and what kind of improvement can be done.
- Also to identify if there is a large change could happen by some changes in the existing condition.
- By the study we can make some changes in the facilities.
- The main objective of village studies has been to know as much as possible about the village life.
- Our main objective is to provide a healthy, safe and, satisfactory life and by doing so we need to provide a good education, good sanitation, good facilities.
- Development of sanitation by developing the toilet condition by the means of repair and rehabilitation.
- Generating more renewable energy sources.
- To make the survey in the village for the literacy, disease, Income etc.
- Also to know about which type of crops are growing which can be grown and also for improving the farming by the technology.
- We should produce all the other necessities in the village itself. Then we should also find out what other industries we can set up here. We ought to press oil and make shoes locally. Similarly we can think of other industries also.
- Due to which surrounding area and village itself could be developed.
- Transportation facilities plays prime role in development of village.

4.1.5 Scope of study

- There is a great scope of study due to which we can get different types of data which is useful in identifying problems.
- By changing some of the condition there is a great scope of generating renewable energy.
- Also, by establishing renewable energy plant employment increases and environment also remains in safe condition.
- Literacy rate could be increased of the village and other surrounding villages.

4.1.6 Methodology framework for development of your village

- We, have found out several problems from the village after village visit.
- By giving knowledge to the villagers we can make development.
- Also, under the SWACHH BHARAT ABHIYAN village is been benefitted which is been initiated by respected prime minister of our India shri NARENDRA MODI.
- Transportation facility could increase the development of village.
- Also, electricity problems could solve several problems of farmers.

4.1.7 Available methodology for development of related to civil/electrical.

- As per the civil point of view infrastructure should be strong to make the development of any village.
- Proper planning of village with maintenance can solve the problems.
- From, electrical point of view farmer can work in any time of the day if electricity must not be the issue.
- For, the villages which are near to the desert and not sufficiently fertile there solar or wind park could be established.
- Allot house locations to rural families who are starved of them and develop packages
- for building support also.
- Also by pursuing enthusiastically programmes of social, afforestation, to implement of
- bio-gas plant, farm forestry and other substitute energy sources.
- Due to which surrounding area and village itself could be developed.
- Transportation facilities plays prime role in development of village.
- Because in many district roads facilities are not good due to which development could stop.
- The government announced Rs. 18,998 crore (US$ 2.61 billion) for metro projects.
- Mega Investment Textiles Parks (MITRA) scheme was launched to establish world-class infrastructure in the textile sector and establish seven textile parks over three years.
- The government announced Rs. 305,984 crore (US$ 42 billion) over the next five years for a revamped, reforms-based and result-linked new power distribution sector scheme.
- infrastructure sector is a key driver for the Indian economy.
- The sector is highly responsible for propelling India’s overall development and enjoys intense focus from Government for initiating policies that would ensure time-bound creation of world class infrastructure in the country.

4.2 Surel village study area profile.

4.2.1 Study area location with brief history land use details.

- Surel village is located under dasada taluka in surendranagar district.
- According to the metrological department survey the period of march to may is one of continuous increase in temperature, may being the hottest month.
- Total geological area of surel village is 49 KM^2 and it is the 5^{th} biggest village by area in the sub district.
- Population density of the village is 54 persons per km^2.
- Patdi is the subdistrict headquarter and it's distance is 50 KM.
- 1..86 square kilometer of the total village's area is covered by forest.

4.2.2 Base location map , land map, gram tal map.

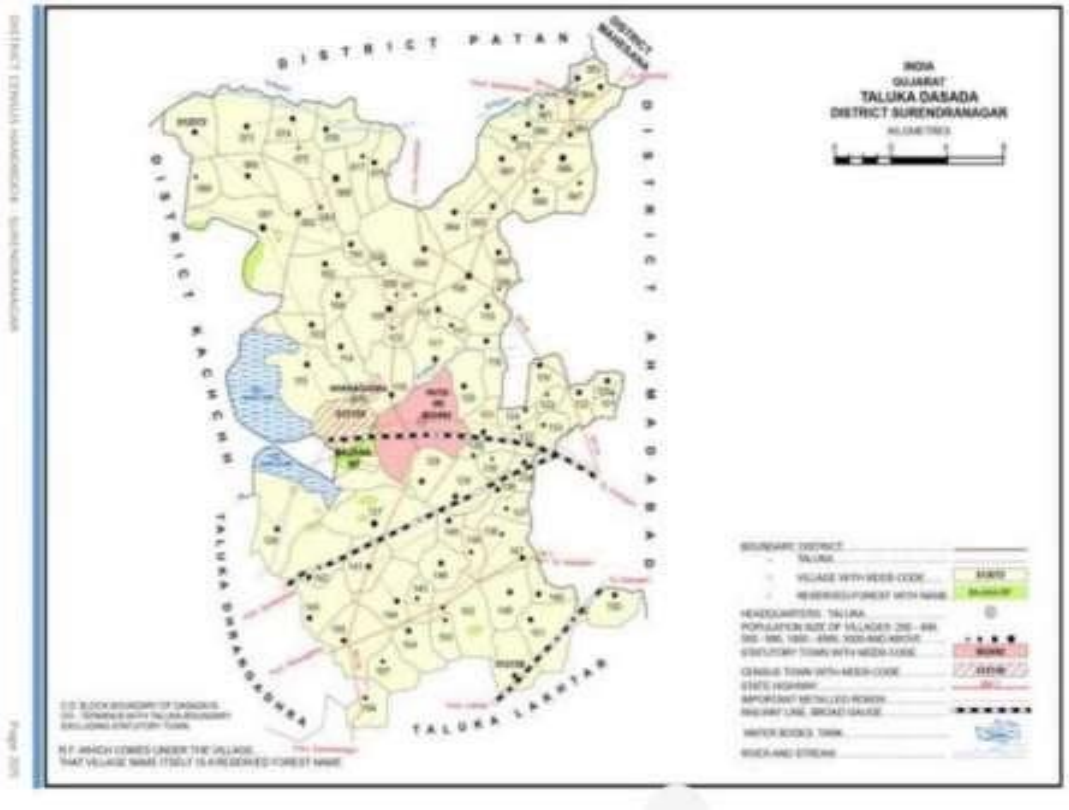


Figure 9 District map

4.2.3 Physical & Demographical Growth.

- Physical growth of the surel village is engaged in main or marginal works.
- 56% male and 21% female female population is working.
- The village is home to 3500 people, among them 1800(53%) are male and 1700 (47%) are female.
- 91% of the whole population are from scheduled caste 9% are from general and other category.
- There are 540 households in the village and average 5 persons live in the family.
- Population of the village has decreased by -2.4% in last 10 years. In 2001 census of total population was 3800.

4.2.4 Economic generation profile/ banks

- There is no availability of bank in surrounding 5 villages.
- Village called Adariyana has the availability of bank called SAURASHTRA GRAMIN BANK which is approximately 12-16 KM from surel village.
- As the land is not much fertile so income from land is not high.
- There is no other source of income except farming.
- Desert is very near to surel village almost 20-25 KM

4.2.5 Actual problem faced by the villagers and smart solutions.

- There are several problems we have identified after village visit which are as follows:-

1. Village consist of only primary school secondary school facilities are not available.

Solution:- Secondary school must be made possible due to which students must not migrate to another village and some student might not remain illiterate due to financial problem.

2. Overhead tank condition.

Solution:- Overhead tank condition is not good it must be demolished first in near future so it not create problem to mankind or any other living organism.

3. Solid waste management

Solution:- Villagers must be educated by giving knowledge to manage the solid waste and if possible biogas plant must be established.

- Towns and villages are no strangers to the digital revolution that is taking place in the world, or at least they should not be because their survival depends on it.
- Innovative solutions, from Big Data to the Internet of Things (IoT), have reached rural areas to help develop and improve their social, economic and environmental conditions.

4.2.6 social scenario- preservation of tradition, festivals ,cuisines

- Social scenario is been maintained even today by the villagers.
- Preservation of several important tradition are also celebrated every year.
- General festivals trend is maintained by the villagers.

4.2.7 Migration Reasons/ Trends

- Migration is mostly done by students for the higher standards studies which is not available in village.
- Economic purpose is also the main reason for migration as there is no other source of income except farming and dairy.
- Almost 2-3 % Population migrates per year.

4.3 Data collection of allocated village (photographs/chart/table)

4.3.1 Describe Methods for data collection.

There are several methods for data collection which are as follows:

- Home-to-home survey.
- Contact with talati or gram panchayat/
- Google maps.
- Online data.
- Various articles, magazine
- Etc.

4.3.2 Primary details of survey.

Primary details of surveys are follows:

- No. of population.
- Literacy rate.
- Average life of villager.
- Financial condition.
- Land area.
- Type of crop grown.
- Roads.

4.3.3 Average size of the house-geo-tagging of house

- Average size of house is 5 person per home.

4.3.4 No of Human Being in one House

- In the village average 6 to 7 people lives in a house

4.3.5 Material available locally in the village and material out sourced by the villagers.

Material available in the village

- For the construction sand, stones, lime stone.
- Dairy products.
- Other crops
- Other product supplied by dealers of the company products.

Material outsourced in the village

- Cement, concrete etc.
- Farming Machinery.
- Clothes, spices, etc.

4.3.6 Geographical detail

- 56% male and 21% female female population is working.
- The village is home to 3500 people, among them 1800(53%) are male and 1700 (47%) are female.
- 91% of the whole population are from scheduled caste 9% are from general and other category.
- A village is a small settlement usually found in a rural setting. It is generally larger than a "hamlet" but smaller than a "town". Some geographers specifically define a village as having between 500 and 2,500 inhabitants.
- There are 540 households in the village and average 5 persons live in the family.
- Population of the village has decreased by -2.4% in last 10 years. In 2001 census of total population was 3800.
- In many cultures, towns and cities were few, with only a small proportion of the population living in them.
- The Industrial Revolution attracted people in larger numbers to work in mills and factories; the concentration of people caused many villages to grow into towns and cities. This also enabled specialization of labor and crafts, and development of many trades.
- The trend of urbanization continues, though not always in connection with industrialization.
- Historically homes were situated together for sociability and defense, and land surrounding the living quarters was farmed.
- Traditional fishing villages were based on artisan fishing and located adjacent to fishing

4.3.8 Occupation detail- occupation wise details / Majority business

- The major occupation in the village is farming there is no industry or other major source of income available in the village.
- Other Way of income is dairy employment and local shops run by the investment of villagers.
- Majority business is agriculture.

4.3.9 Agriculture Details / Organic farming / Fishery

- Agriculture is the science, art and practice of cultivating plants and livestock. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities.
- The history of agriculture began thousands of years ago. After gathering wild grains beginning at least 105,000 years ago, nascent farmers began to plant them around 11,500 years ago. Pigs, sheep, and cattle were domesticated over 10,000 years ago.
- Plants were independently cultivated in at least 11 regions of the world. Industrial agriculture based on large-scale monoculture in the twentieth century came to dominate agricultural output, though about 2 billion people still depended on subsistence agriculture.
- The major agricultural products can be broadly grouped into foods, fibers, fuels and raw materials (such as rubber). Food classes include cereals (grains), vegetables, fruits, oils, meat, milk, fungi.
- Over one-third of the world's workers are employed in agriculture, second only to the service sector, although in recent decades, the global trend of a decreasing number of agricultural workers continues, especially in developing countries where smallholding is being overtaken by industrial agriculture and mechanization.
- Creating global sustainable food systems which provides food security with sustainable agriculture practices is an international policy priority articulated in Sustainable Development Goal 2: "Zero hunger", adopted by the United Nations in 2015.

- Following crops are been grown by the villagers.
- Cotton.
- Sugarcane.
- Bajra.
- Castor seed.
- Wheat.
- Sesame.
- Ground nut.
- Barley.

Figure 10 Agriculture Technologies

4.3.10 Physical Infrastructure Facilities- Manufacturing HUB / Ware Houses.

- Physical available infrastructure is a existence of 25 MW solar power plant.
- Availability of Sub center.
- Availability of gram panchayat.
- Also, dairy processing is available outside the village.
- There is no manufacturing HUB / Warehouses are available.

4.3.11 Tourism development available in the village for attracting the tourists.

- There is no tourism development available in the village for attracting the tourists.
- As village is near to desert some development like white desert of Kutch can be developed.

4.4 Infrastructure Details (With Surel village photograph)

4.4.1 Drinking Water / Water management facilities.

- While piped water is used as a drinking water source by most people in villages, the water supply is not continuous and varies between half to two hours daily or every second day.
- The villagers have to withdraw water when available and store it until the next supply phase, increasing chances of contamination.

Figure 11 Drinking Water Facility

- Village is having good drinking water facility also design is good available at the village.
- 24 Hours drinking water is available in village.
- The gram panchayat and the sarpanch are responsible for the management of water supply, treatment and day-to-day maintenance.
- The actual implementation is done by the “waterman”, who is from the same village and is paid by the gram panchayat.
- The waterman has received training to do his duties, including chlorination practices, from the health department at the block level. The health department is in charge of taking monthly water samples and monitoring the water quality.

4.4.2 Drainage Network / sanitation networks

- One of the challenges that people have to face in rural areas is access to good roads.
- The poor drainage system and stagnant water have become a breeding site for various illnesses.

Figure 12 Sanitation

- Drainage Network facilities is not good in the village also dry waste is dumped in open outside thevillage area
- No, sewage line is available inside the village.
- Also, diseases are spread in the village.

4.4.3 Transportation and Road networks.

- Transportation refers to any vehicle or activity that moves people and goods from one place to another.
- In the United States, key modes of transportation for people and goods include buses, trains, trucks, cars, airplanes, and other forms of motorized vehicles.

Figure 13 Road Network and condition

- Road network is very poor inside the village also with other connecting village road network is notfound good.
- As there is no bank available in the village, villagers had to travel to near by village for theircommercial work by their own facilities.
- No, public transport facilities are available during day time.

4.4.4 Housing Condition.

Figure 14 Housing condition

- Kutcha houses are found in the village.
- Village is having 502 total houses.
- Also, Some houses are not having facilities of electricity.

- The Pradhan Mantri Awas Yojana Gramin (PMAY-G) was earlier known as the Indira Awas Yojana. It was renamed in March 2016 with a motive to improve the convenience and affordability of housing for rural India.
- The world's largest housing scheme PMAY-G was launched by Prime Minister Narendra Modi on 20th November 2016 from Agra (UP). The new scheme replaced and restructured the Indira Awas Yojana (IAY),

4.4.5 Social infrastructure facilities , Health, Education , Community hall Library

Figure 15 Gram panchayat

- Gram Panchayat is a basic village governing institute in Indian villages.
- It is a democratic structure at the grass-roots level in India. It is a political institute, acting as cabinet of the village.
- The Gram Sabha work as the general body of the Gram Panchayat. The members of the Gram Panchayat are elected by the Gram Sabha.

- Public building like gram panchayat is available in the village but that also not fund in good condition.
- Primary school is available in the village also school requires renovation for better facilities to the students.
- Secondary school or colleges are not available in the village due to which students had to migrate to other villages.
- Public building like banks, Bus station, medical shops are not available in the village.
- Urban health center is available in the village.
- Public toilets, Aayush center, private dispensary are not found the village.
- Gardens, Libraries, PHC like facilities should be made available.

4.4.6 Existing condition of public building & Maintenance of existing publicinfrastructures.

- A School in Every Village shifts our attention away from the city, the presumed locus of modernizing movements, to show how the countryside also played .
- An important role, thereby illustrating the variety of possible paths to modernization.

Figure 16 Primary School

- Various building of ground floor level are their in the school premises. But condition of schoolpremises are very poor.
- Renovation is been required for the school.

4.4.7 Technology Mobile / WIFI / Internet Usage details.

- There is availability of mobile technology / WIFI and other cellular networks.

4.4.8 Sports activity as gram panchayat

- Once a week there is arrangement of sports like horse racing , cricket, volleyball and other games by the gram panchayat.
- Sports and cultural activities are been done in the village.

4.4.9 Socio-cultural Facilities , public Garden / Park/ Playground /Pond /Otherrecreational facilities.

- Cultural activities are arranged according to the festivals in the village ground.
- Public garden, park facilities are not available for the children's.

4.4.10 Other facilities (e.g. like foot path development-smart toilets-coin operatedentry, self-cleansing, public building)

- General category of roads are available but not in good condition.
- Public building like school, gram panchayat , sub center , post-office are available.
- Public toilets should be made available in the village.

4.5 Electrical concept

4.5.1 Renewable energy source planning particularly for villages.

- Renewable like solar street light are been used in whole village which saves electricity and nature.
- Biogas plants must be established to manage solid waste.
- Villages like surel must be developed by government of Gujarat by developing in Solar and wind park also by establishing any manufacturing HUB.

4.5.2Irrigation Facilities.

- Irrigation facilities can be improved by providing sufficient power for ground water collection.
- Sprinklers or drip irrigation might be developed.
- New technologies must be added for faster and easier work.
- Maximum use of renewable energy must be developed.

4.5 .3 Existing Institution like- Village Administration – Detail profile

4.5.6 Bachat Mandali

- There is a bachat mandali in the village which is maintained by the panchayat.

4.5.7 Dudh Mandali

- It is offering fresh dairy products in to the villages.

4.5.8 Mahila forum

- Mahila forum is been maintained by the senior female appointed by the panchayat for the welfare of the female.

4.5.9 Plantation for the air pollution

- Every several plants are been grown by the villagers to reduce the air pollution.
- Special campaign are also run by the government to encourage people to grow more and more plants.

4.5.10Rain water harvesting- Waste Water Recycling.

- Rain water harvesting is advisable in this kind of villages where problems of water is mainly faced in summer season.
- Rain water is to be collected rather to ran off which can be stored for the future purpose.
- Dew and fog can also be collected by other nets.
- As rain water is usually free from harmful chemicals, however it is not viable for portable purpose

Chapter 5. Technical options with case studies (FOR ANY ONE TOPIC, TAKE A NEWCONCEPT DESIGN, PROTOTYPE MODEL WITH ACTUAL COSTING)

5.1 Concept (civil)

5.1.1 Advance sustainable construction techniques.

- Sustainable construction is the practice of creating a healthy environment that's based on ecological principles. According to Professor Charles J. Kibert, sustainable construction focuses on six principles: "conserve, reuse, recycle/renew, protect nature, create non-toxic and high quality."
- The goal is to reduce the industry's impact on the environment by utilizing sustainable development practices, employing energy efficiency, and taking advantage of green technology.
- Although many different business sectors are doing what they can to be more sustainable, theconstruction sector is unique because it has the chance to significantly affect the way these practices are applied. This is because of the large amounts of materials and energy that the industry uses.

Figure 17 Sustainable Development

- How companies in which we invest contribute positively to the SDGs is mainly through the products and services they provide. However, we have also identified a number of SDGs that can be met through companies managing their operations better with these goals in mind.
- Which environmental, social or governance challenges are most material varies depending on the industry in question. For example, this can include quality of work through working conditions, fair pay, working conditions in supply chains as well as equality and diversity in the workforce and on the board.

5.1.2 Soil Liquefaction

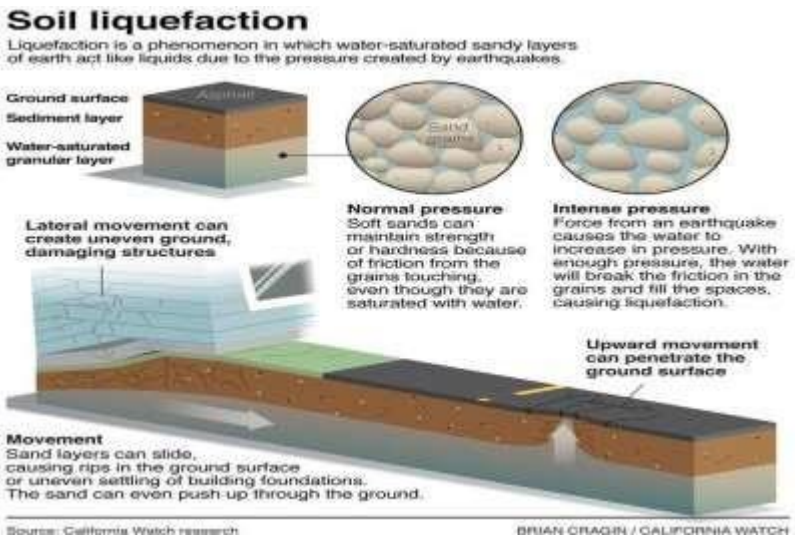


Figure 18 Soil liquefaction

- If the pressure of the water in the pores is great enough to carry all the load, it will have the effect of holding the particles apart and of producing a condition that is practically equivalent to that of quicksand the initial movement of some part of the material might result in accumulating pressure, first on one point, and then on another, successively, as the early points of concentration were liquefied.

- A 'flow failure' may initiate if the strength of the soil is reduced below the stresses required to maintain the equilibrium of a slope or footing of a structure. This can occur due to monotonic loading or cyclic loading, and can be sudden and catastrophic.

- A historical example is the Aberfan disaster. Casagrande referred to this type of phenomena as 'flow liquefaction' although a state of zero effective stress is not required for this to occur.

- The phenomenon is most often observed in saturated, loose (low density or uncompacted), sandy soils.

- This is because a loose sand has a tendency to compress when a load is applied. Dense sands, by contrast, tend to expand in volume or 'dilate'.

- If the soil is saturated by water, a condition that often exists when the soil is below the water table or sea level, then water fills the gaps between soil grains ('pore spaces'). In response to soil compressing, the pore water pressure increases and the water attempts to flow out from the soil to zones of low pressure (usually upward towards the ground surface).

5.1.3 Sustainable sanitation

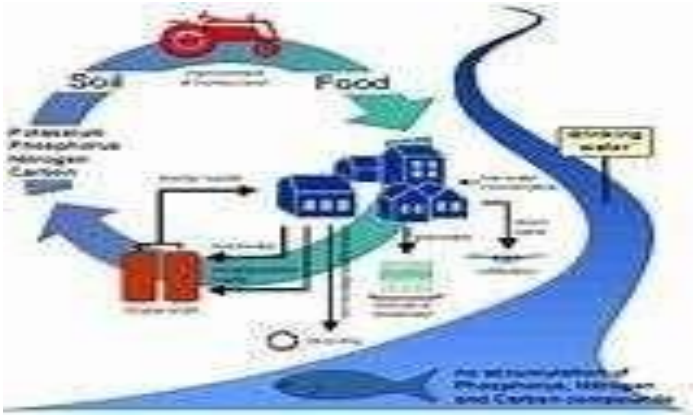


Figure 19 Sustainable sanitation

- Sustainable sanitation is a sanitation system designed to meet certain criteria and to work well over the long-term.
- Sustainable sanitation systems consider the entire "sanitation value chain", from the experience of the user, except and waste water collection methods, transportation or conveyance of waste, treatment, and reuse or disposal.
- It includes five features (or criteria) in its definition of "sustainable sanitation": Systems need to be economically and socially acceptable, technically and institutionally appropriate and protect the environment and natural resources.
- The purpose of sustainable sanitation is the same as sanitation in general: to protect human health. However, "sustainable sanitation" attends to all processes of the system: This includes methods of collecting, transporting, treating and the disposal (or reuse) of waste.

5.1.4 Transport Infrastructure

Figure 20 Transport Infrastructure

- Roads are the dominant mode of transportation in India today.
- They carry almost 85 percent of the country’s passenger traffic and more than 60 percent of its freight. The density of India’s highway network -- at 0.66 km of roads per square kilometer of land – is similar to that of the United States (0.65) and much greater than China's (0.16) or Brazil's (0.20).

- Infrastructure is the fixed installations that allow a vehicle to operate.
- It consists of a roadway, a terminal, and facilities for parking and maintenance. For rail, pipeline, road and cable transport, the entire way the vehicle travels must be constructed.
- Air and watercraft are able to avoid this, since the airway and seaway do not need to be constructed. However, they require fixed infrastructure at terminals.
- Terminals such as airports, ports, and stations, are locations where passengers and freight canbe transferred from one vehicle or mode to another.
- For passenger transport, terminals are integrating different modes to allow riders, who are interchanging between modes, to take advantage of each mode's benefits.
- For instance, link connect airports to the city centres and suburbs. The terminals for automobiles are parking lot, while buses and coaches can operate from simple stops.[15] For freight, terminals act as trans shipment points, though some cargo is transported directly fromthe point of production to the point of use.

5.1.5 Vertical Farming

- 30% of the Indian Farmers, i.e more than 30 million farmers, will have no access to irrigation and arable land by 2030 & India's growing need to feed the population through a healthy diet ensuring sustenance is Indian agriculture's biggest challenge. India today is eating a low nutrient, high calorie diet.
- Indians eat more fruits and vegetables per person and yet is only half of what's a recommended healthy diet. Not to mention, up to 45% of the nutritional value of this produce erodes between harvest to landing on store shelves.
- Vertical farming is the practice of growing crops in vertically stacked layers. It often incorporates controlled-environment agriculture, which aims to optimize plant growth, and soilless farming techniques such as hydroponics, aquaponics, and aeroponics. Some common choices of structures to house vertical farming systems include buildings, shipping containers, tunnels, and abandoned mine shafts. As of 2020, there is the equivalent of about 30 ha (74 acres) of operational vertical farmland in the world. The modern concept of vertical farming was proposed in 1999 by Dickson Despommier, professor of Public and Environmental Health at Columbia University. Despommier and his students came up with a design of a skyscraper farm that could feed 50,000 people. Although the design has not yet been built, it successfully popularized the idea of vertical farming. Current applications of vertical farmings coupled with other state-of-the-art technologies, such as specialized LED lights, have resulted in over 10 times the crop yield than would receive through traditional farming methods
- The main advantage of utilizing vertical farming technologies is the increased crop yield that comes with a smaller unit area of land requirement. The increased ability to cultivate a larger variety of crops at once because crops do not share the same plots of land while growing is another sought-after advantage. Additionally, crops are resistant to weather disruptions because of their placement indoors, meaning fewer crops lost to extreme or unexpected weather occurrences. Because of its limited land usage, vertical farming is less disruptive to the native plants and animals, leading to further conservation of the local flora and fauna.
- Vertical farming technologies face economic challenges with large start-up costs compared to traditional farms. In Victoria, Australia, a "hypothetical 10 level vertical farm" would cost over 850 times more per square meter of arable land than a traditional farm in rural Victoria. Vertical farms also face large energy demands due to the use of supplementary light like LEDs. Moreover, if non-renewable energy is used to meet these energy demands, vertical farms could produce more pollution than traditional farms or greenhouses.

5.1.6 Sewage treatment plant

- Sewage treatment is the process of removing contaminants from domestic and municipal wastewater, containing mainly household sewage plus some industrial wastewater. Physical, chemical, and biological processes are used to remove contaminants and produce treated wastewater (or treated effluent) that is safe enough for release into the environment. A by-product of sewage treatment is a semi-solid waste or slurry, called sewage sludge. The sludge has to undergo further treatment before being suitable for disposal or application to land.
- Sewage treatment may also be referred to as wastewater treatment. However, the latter is a broader term that can also refer to industrial wastewater. For most cities, the sewer system will also carry a proportion of industrial effluent to the sewage treatment plant that has usually received pre-treatment at the factories to reduce the pollutant load. If the sewer system is a combined sewer, then it will also carry urban runoff (stormwater) to the sewage treatment plant. Sewage is conveyed in sewerage which comprises the drains, pipework and pumps to convey the sewage to the treatment works inlet.
- Sewage is generated by residential, institutional, commercial and industrial establishments. It includes household waste liquid from toilets, baths, showers, kitchens, and sinks draining into sewers. In many areas, sewage also includes liquid waste from industry and commerce. The separation and draining of household waste into greywater and blackwater is becoming more common in the developed world, with treated greywater being permitted for use for watering plants or recycled for flushing toilets.
- Sewage may include stormwater runoff or urban runoff. Sewerage systems capable of handling storm water are known as combined sewer systems. This design was common when urban sewerage systems were first developed, in the late 19th and early 20th centuries. Combined sewers require much larger and more expensive treatment facilities than sanitary sewers. Heavy volumes of storm runoff may overwhelm the sewage treatment system, causing a spill or overflow. Sanitary sewers are typically much smaller than combined sewers, and they are not designed to transport stormwater. Backups of raw sewage can occur if excessive infiltration/inflow (dilution by stormwater and/or groundwater) is allowed into a sanitary sewer system. Communities that have urbanized in the mid-20th century or later generally have built separate systems for sewage (sanitary sewers) and stormwater, because precipitation causes widely varying flows, reducing sewage treatment plant efficiency.[4]
- As rainfall travels over roofs and the ground, it may pick up various contaminants including soil particles and other sediment, heavy metals, organic compounds, animal waste, and oil and grease. Some jurisdictions require stormwater to receive some level of treatment before being discharged directly into waterways. Examples of treatment processes used for stormwater include retention basins, wetlands, buried vaults with various kinds of media filters, and vortex separators
- In highly regulated developed countries, industrial effluent usually receives at least pretreatment if not full treatment at the factories themselves to reduce the pollutant load, before discharge to the sewer. This process is called industrial wastewater treatment or pretreatment. The same does not apply to many developing countries where industrial effluent is more likely to enter the sewer if it exists, or even the receiving water body, without pretreatment.
- Industrial wastewater may contain pollutants which cannot be removed by conventional sewage treatment. Also, variable flow of industrial waste associated with production cycles may upset the population dynamics of biological treatment units, such as the activated sludge process.

5.1.7 Technical case study on : Atal Tunnel, Rohtang

Narendra Modi
Prime Minister of India

MESSAGE

Prime Minister of India

It is heartening to learn that Border Roads Organisation (BRO) is publishing a Compendium on Atal Tunnel.

Atal Tunnel is an exceptional infrastructure project that symbolizes the intent and conviction of the youthful nation. As a top quality technological feat of the resolute and hardworking personnel of BRO, every single inch of the Tunnel echoes the Organisation's *motto- Shramena Sarvam Sadhyam.*

An engineering marvel built at a height of 10,000 feet, the Tunnel fulfils the dreams of Atal Ji. The iconic Tunnel in Rohtang with state-of-the-art structure and several salient features is ensuring all-weather connectivity and furthering Ease of Living for local people.

Atal Tunnel has scaled up development processes and given boost to tourism and other socio-economic activities. It is also a project of great strategic importance.

The longest highway tunnel in the world at this height is a testimony to the indomitable spirit and indefatigable efforts of the engineers, technicians and workers that have been part of its designing and construction.

I am sure that the Compendium will successfully document the entire journey of its construction including the challenges faced and the innovative approach adopted to overcome them. It will serve as a guide for the experts in the field and as an inspiration for everyone.

Heartiest congratulations and best wishes to all associated with this project.

I wish the publication of the Compendium all success.

(Narendra Modi)

New Delhi
पौष 25, शक संवत् 1942
January 15, 2021

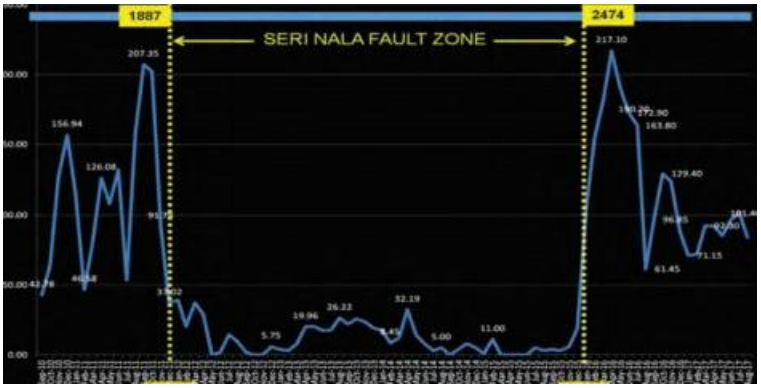
- Rohtang Pass is a high mountain pass (13,058 ft) on the Eastern Pir Panjal Range of the Himalayas around 51 km from Manali on the Leh – Manali highway in Himachal Pradesh. The Himalayas run West-Northwest to East-Southeast. The Himalayan range is bordered on the Northwest by the Karakoram and the Hindu Kush ranges. To the North, the chain is separated from the Tibetan Plateau by a 50–60 km wide tectonic valley called the Indus-Tsangpo Suture

Necessity of Tunnel.

- The area witnesses heavy snowfall during winter and remains closed for more than six months every year. Statistics from 1990 till 2011 shows that Rohtang Pass witnesses an average of 24 feet snowfall (Over 50 Feet in 2011) every year.
- The crossing of the Rohtang Pass on foot and by mules and horses has been a traditional practice before to the construction of the road network. The pass has a reputation for unpredictable snowstorms and blizzards leading to a number of casualties, specially in winters. Very often, rescue operations have to be launched to evacuate stranded tourists and locals.

Construction of Tunnel.

- The first blast took place at the Southern end of the tunnel on 29 August 2010. This marked the commencement of construction of the main tunnel. For the commencement of works on the Northern end of the tunnel, the first blast took place on 04 October 2010.
- The most challenging task was to continue the excavation during heavy snowfall in winter. Excavation for tunnelling was done from both ends. However, as Rohtang Pass closes during winter, the North Portal was not accessible and the excavation was done only from the South Portal in winters. Only about one-fourth of the entire tunnel was excavated from the North end and three-fourth was excavated from the South end.



- After commencement of excavation from South Portal side, Seri Nala Fault Zone was encountered wherein at a given time, 8000 litres of water gushed into the tunnel along with muck. This retarded the progress from 120 metres per month to 20 metres per month.
- Seri Nala was a unique challenge and had to be tackled in many ways. A considerable amount of time and effort had to be put in to overcome it, the main one being partial excavation under a heavy pipe roof umbrella. On 03 January 2016, after months of concerted efforts, Seri Nala was tackled.
- Many other challenges to the progress of the tunnel involving difficulties in disposing of more than 800,000 m^3 of excavated rock and soil, heavy ingress of water (as much as 3 million litres per day in June 2012)

Tunnel Support System.

RITES Ltd report firmed in on having one single tube with two lanes based on rock conditions and cost analysis. It also concluded that the Horseshoe cross-section was the best keeping in view the optimum balance between space requirements and the stress conditions which govern the stability. The support system being one of the most essential aspects of tunnelling was planned based on anticipated rock conditions and the depth of the overburden. The preliminary design used empirical methods based on qualitative parameters measured in the drills and then extrapolated. Subsequently, numerical modelling was undertaken and thereafter the support system and detailed designs were made. Primarily Shotcrete and rock bolts were planned as the principal primary support elements and concrete lining in conjunction with Shotcrete and systematic rock bolting as the permanent support system. This was planned for all possible rock conditions in all segments.

Ventilation System – Fresh Air Requirement.

The ventilation system contributes significantly to the initial capital cost and is the key factor for power supply and operational cost. Hence the system was required to be the most cost efficient. Keeping that in mind, perspective planning for the Ventilation System was undertaken. The conceptual design of the ventilation system was developed during the Phase-I study wherein a semi-transverse ventilation system was found to be most suitable and the same was used in Phase-II report. Formulation of the ventilation system was done using design factors, like vehicular traffic, vehicular emissions inside the tunnel, limits of CO concentrations, and limits of turbidity (Soot Particles). Based on that, fresh air demand was planned. The key issue of provision of partition slab for providing the air duct was deliberated at length. The same was decided to be done away with. It was proposed to plan ventilation fans on the ceiling of the tunnel at regular intervals throwing fresh air to create a longitudinal air stream. RITES Ltd conducted a detailed cost analysis, prepared the drawing of the same and then proposed the tunnel with fresh parameters and costs.

Construction of Tunnel

Construction of Atal Tunnel, Rohtang was essential since Manali-Sarchu-Leh road remains closed for six months in a year due to the closure of Rohtang Pass. The single tube, two lanes, bi-directional 9.02 km long horseshoe shaped tunnel, has provided all-year connectivity between the Manali valley in the South to the Lahaul & Spiti valley in the North on the National Highway connecting to the Leh region. The South Portal of the tunnel is located at an altitude of 3060 m above sea level which is 25 km North of Manali, on the left bank of Seri Nala, which is a tributary of Beas-Kund River. The North Portal is located across the Rohtang Pass on the South West bank of Chandra River at an altitude of 3071 m above sea level, at an approximate distance of 79 km from Manali on the Manali-Sarchu road (NH 21) via Rohtang Pass. The tunnel has been excavated using the Drill and Blast technique with the application of the New Austrian Tunnelling Methodology (NATM) philosophy. It is the longest road tunnel in the world at an altitude above 3000 m.

The design of the Tunnel is unique because the Emergency Egress Tunnel is not parallel but is a part of the main tunnel, below the carriageway adding to the overall cross-sectional area (137 sq. m) of the tunnel. The tunnel consists of 4 m wide carriageways and 1 m wide foot paths on both sides and a 0.5 m median in the middle. The thickness of the final concrete lining is 500 ± 50 mm and 0.5% gradient from both portals for effective drainage. The tunnel is a 10.5 m wide single tube bi-lane tunnel having an overhead clearance of 5.525 m. It has a 3.6 x 2.25 m fireproof emergency Egress tunnel built into the main tunnel itself. This tunnel is designed to cater for traffic density of 3000 petrol cars per day and 1500 diesel trucks per day with a maximum speed of 80 km/hr. It has been designed with a state of the art electromechanical system including Semi transverse Ventilation system and Supervisory Controlled and Data Acquisition (SCADA) controlled firefighting, illumination, and monitoring system.

5.2.1Programmable Load Shedding

- It is an elementary case of „power economics", electric load demand versus generation supply. As we know , when a power system is stable at normal frequency the total mechanical power input from the prime movers to the generators is equal to the sum of all running load and all real power losses in the power system.
- The frequency conditions of the overall power system will directly depend on the amount of active power that the generator could deliver to the system. Also, the prime mover"s stored energy plays an important role on the system behavior.
- This stored energy varies drastically from thermal, to hydro units. For gradual increases in electric load, or sudden but mild overloads, unit governors will sense speed change and therefore increase power input to the generator.
- Extra load is handled by the unused capacity of all accessible generators functioning and synchronized to the system. If all generators are operating at their maximum capacities and the spinning reserve is zero, then the governors may be powerless to relieve overloads.
- So it is necessary to shed the load of a particular geographical region. Load shedding is an intentionallyengineered electrical power outage where electricity supply is stopped for non-overlapping periods of time over a particular zone. For manually maintaining Load shedding times, some man power may be employed or by using computer it can be controlled efficiently.
- Detaching of power is done to minimize the consumer load provided through several substations, Which are connected to the main power station. And the main station instructs the sub-stations to cut some of the feeders for a certain period of time & thus the shedding procedure continues.
- The main purpose of electric power system is to accord the power structure to consumer's loads.
- An electric power system consists three parts:
- 1. Power generation
- 2 .Transmission system
- 3. Distribution system
- Electric power is generated at 11kV, 50Hz in a power generating station.
- For transmitting over long distances, it is stepped-up to 400kV, 220 kV as it is necessary to reduce power losses while transmitting power.
- Power is carried through a high voltage lines of transmission network. Usually, these voltage lines run into hundreds of kilometers and it deliver to grid.
- These load centers (cities) are connected to grid through a sub-transmission network of ordinarily 33kV (or sometimes 66kV) lines.
- These lines dismiss into a 33kV (or 66kV) at substation, where the voltage is to be stepped-down to 11kV for power distribution to load points over a distribution network of lines at 11kV and lower.
- This LCD has two registers, namely, Command and Data. The command register rations the command directives given to the LCD. A command is an instruction given to LCD to do a predefined job like initializing it, clearing its screen, setting the cursor position, regulatory display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

1. Manual load shedding technique In manual load shedding technique the power supply is cut by electrician engaged at substation for certain period of time to control shortage of electrical energy used by locality .In this way the load shedding done by manually at substation to cut of the power.
2. Programmable load shedding According to the data from the different chronological demand curves (fig 2) the demand of electricity is regularly varies throughout a day. It is very difficult to match generating capacity to such a peaky demand. So when demand exceed the supply we need an effective load shedding technique for power system.

A. AT89S52 Microcontroller

The AT89S52 is an 8 bit low-power, high performance microcontroller with 8K bytes of programmable flash memory. This device is manufactured using high-thickness nonvolatile memory machinery of Atmel and is compatible with the industry-standard 80C51 instruction set and pin-out. The on-chip flash permits the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a adaptable 8-bit CPU with in-system programmable flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller because of its high flexibility and cost-effective solutions to many embedded control applications.

B. Relay Driver ULN2003

Relay Driver ULN2003 is a high voltage, high current Darlington transistor array comprising seven open collector Darlington pairs with common emitters. It comprises of seven NPN Darlington pairs that feature high voltage outputs with communal cathode Clamp diodes for switching inductive loads. The collector current rating of a single Darlington pair is 510 mA. For higher current competences, the pairs can be paralleled. ULN2003 is used to edge relays with the microcontroller since the maximum output of the microcontroller is 5V with too little current distribution and is not practicable to operate a relay with that voltage.

C. Electromagnetic Relay Relay

Is an electromagnetic device which is castoff to isolate two circuits electrically and link them magnetically. For example, a relay can make a 9V DC battery circuit to switch a 230V AC mains circuit. Thus a small sensor circuit can drive, say, a small fan or an electric bulb. A relay switch can be distributed into two parts: input and output. Operating voltages like 5V, 9V, 10V, 24V etc. Input part - 2 Coil Pins: These pin are the controller switch which is connected to electromagnet through which we can govern the operation of relay. Here low voltage is applied to generate magnetism. Output part - Normally Open Contact (NO) – NO contact is also called a make contact. It ends the circuit when the relay is started. It detaches the circuit when the relay is not active. Normally Closed Contact (NC) – NC contact is also known as break contact. This is opposed to the NO contact. When the relay is activated, the circuit disengages.

D. LCD

Liquid Crystal Display (LCD) comprises of rod shaped tiny molecules sandwiched between a flat piece of glass and a dense substrate. These rod-shaped molecules in between the plates bring into line two different physical positions based on the electric charge applied to them. When electric charge is applied they align to block the light incoming through them, whereas when no charge is applied they become crystal clear. Light passing through it makes the desired images appear.

E. REAL TIME CLOCK (RTC)

A real-time clock (RTC) is a processer clock (most of ten in the form of an integrated circuit) that keeps track of the current time. A real time clock (RTC) is a timepiece module having an independent battery for operation and has a backup RAM always provided with electric power from the battery. Many data processing circuits utilize real-time clocks to deliver a real-time clock value representing, for example, the current day, date and time. Typically, when the data dealing out the circuit is first activated, the correct day, date and time may need to be set. When the data handling circuit is shut down, power is sustained to the real-time clock by a battery, so that the real-time clock may continue to operate. A Real-Time-Clock (RTC) is, as the name suggests, a clock which keeps track of time in a "real mode." While there are a numeral of 8051-compatible microcontrollers that have built-in, precise real-time clocks (especially from Dallas Semiconductor), some humble applications may benefit from a software RTC solution that uses the built-in capabilities of an 8051 microcontroller

OBSERVATION & CONCLUSION

So according to our observations real time clocks (RTC) work more accurate than other time-keeping alternatives, it allow the main system to perform important tasks, and they do not consume much power. Functionality of Electronic devices can even increase by using real-time clocks (RTC). Certain electronic devices can rely on real time clocks when comparing the times of previous functions. If the functions have taken place within a selected period of time, device functions can be reduced drastically. Hence real time clocks interfaced with AT89S52 microcontrollers could be used extensively in load shedding time management system by utility departments.

ADVANCEMNENT & FUTURE SCOPE

This project can be advanced in which the distribution point monitored by one central location. The relays are used to cut off supply of concerned geographical region through circuit breaker. In this system user can send commands to concerned DP to read the remote electrical parameters. This system can repeatedly send the real time electrical parameter data like active power, reactive power, voltage, current, frequency etc., periodically in the form of SMS to the user. It can be designed to send SMS alerts when relay trips. In this power system microcontroller are being used to effectively communicate with the sensors. The microcontroller has internal memory to hold the assembly code. .This internal memory is used to dump some set of assembly instructions into the controller. The operation of the micro-controller is completely dependent on these assembly instructions. The proposed system will overcome manual efforts for controlling the load shedding time break in a systematic way by sending SMS. Central unit can cut off power supply of specific zone by just sending an SMS to the concerned Distribution Point. These relay gets activated whenever the electrical parameters overdo the predefined values. The proposed system is designed to Load Monitoring.

5.2.2Railway security system using IOT

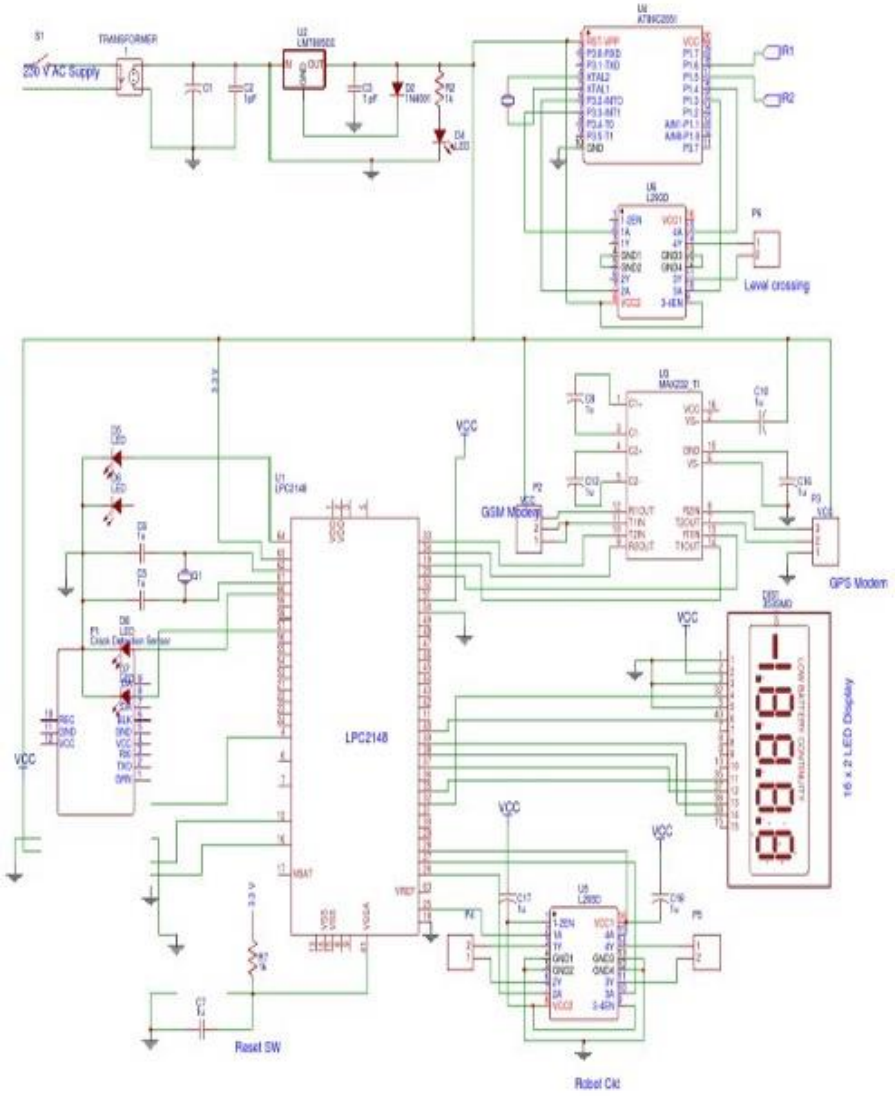


Figure 21 Circuit diagram of propose system

- Indian railways is an Indian state-owned enterprise, owned and operated by the government of India through the ministry of railways. india possesses fourth largest network in the world exceeded only by those of the united states, russia and china.
- The indian railway network stretches across the globe with a length of 115,000 kilometers (71,000 mi) over a route of 65,000 kilometers (40,000 mi) covering 7,500 stations. the network traverses every nook and cranny of the nation carries over 25 million passengers and 2.8 million tons of freight daily. despite boasting of such impressive statistics, the indian rail network is still on the growth trajectory trying to fuel the economic needs of our nation. in terms of the reliability and safety parameters, we have not yet reached truly global standards.

- Though rail transport in india growing at a rapid pace, the associated safety infrastructure facilities have not kept up with the aforementioned proliferation. our facilities are inadequate compared to the international standards and as a result, there have been frequent derailments that have resulted in severe loss of valuable human lives and property as well.
- The principal problem has been the lack of cheap and efficient technology to detect problems in the rail tracks and of course, the lack of proper maintenance of rails which have resulted in the formation of cracks in the rail sand other similar problems caused by anti-social elements which jeopardize the security of operation of rail transport. Indian railway is one of those modes of transport that faces a lot of challenges due to human errors such as level cross accidents, collisions due to broken track etc.
- A level cross, an intersection of a road and a railway line, requires human coordination, the lack of which leads to accidents; also the main problem about railway analysis is detection of the crack in the location. If these problems are not controlled at early stages they might lead to a number of derailments resulting in heavy loss of life and property.
- In traditional system level crossings are managed by the gatekeeper and the gatekeeper is instructed by the means of telephone at most of the level cross from the control room. But the rate of manual error that could occur at these level crosses is high because they are unsafe to perform without actual knowledge about the train time table.
- Delay in the opening and closing of the gate could lead to railway accidents. In order to avoid the human errors that could occur during the operation of gates and derailment due to crack , the proposed paper introduces the concept of railway gate automation and crack detection system has been modified by using IR sensors and IOT (Internet of Things) technology which performs automatic gate operation and helps in detecting of the faulty track.
- The IOT represents the coordination of multiple vendors 'machines, devices and appliances connected to the Internet through multiple networks.
- To find the location of the faulty track, we have designed IOT website using Xammp server. We have also used GPS and GSM modem. GPS is used to read the current latitude and longitude data.

5.2.3 Home automation concept

Research background

- Home automation system is getting popular and widely used in a lot of houses worldwide. It has tons of advantages to users even more to the handicapped and/or elderly users in which it will make it easier for them to control their home appliances.
- Home automation systems can be labeled to two medium in which how it is connected and they are either wired or wirelessly connected.
- The main difference between these two kinds is that home appliances are linked wirelessly a central controller if it a wireless home automation system. On the other hand, the appliances are connected to a central controller if the medium use wired communication method
- Wireless system had been introduced in order to dispose of wired communication among home appliances. Arduino based, Bluetooth based home automation will be applied.
- Nowadays, everyone cannot be separated from their smartphones. a number of five thousands individuals from USA, UK, South Korea, India, China, South Africa, Indonesia and Brazil took a survey regarding which was done by Time magazine

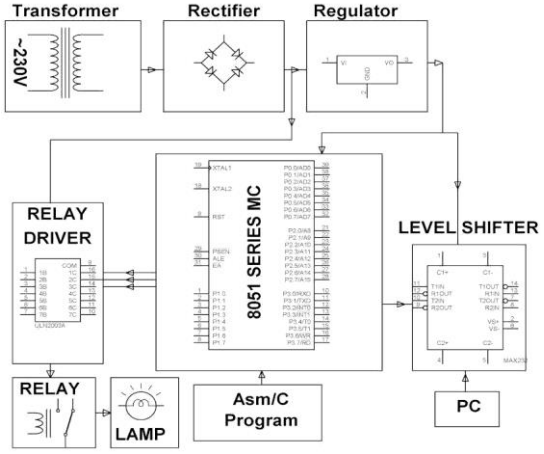
- The result proved most of them is inseparable from their smartphones, eighty four percent allegedly claimed that survive without their smartphones.
- On the other hand, the appliances are connected to a central controller if the medium use wired communication method.
- Our smart lighting solutions are instant mood setters. Want to turn your living room into a discotheque, or want to create a romantic setup in your bedroom? Setting mood and changing colour is now as easy as pressing a button on your smartphone.

Needs of automations

- Home automation is computerization of the home, housework or household action. Home automation may incorporate a control unit for controlling of lighting, HVAC (warming, ventilation and aerating andcooling), machines, and different frameworks, to give enhanced accommodation, solace, better energy saving ,productivity and security.
- The idea of home Automation has been around for quite a while and items have been available for a considerable number of years, however nobody's arrangement has gotten through to the standard yet.
- Home computerization for the elderly and debilitated can give expanded personal satisfaction to persons who may generally need parental figures or institutional consideration.
- It can likewise give a remote interface to home apparatuses or the automation system itself, through phone line, remote transmission or the web, to give control and observe and monitor by means of an smart phones or a web explorer program.
- Home automation is connecting all the *functional* elements of your home to a network (Internet) and putting it to work for you. From lighting to air-conditioning, from television to door-locks, you can now control, monitor and track your home from anywhere in the world, using your smartphone, computer or tablet device.

Figure 22 Home Automation

5.2.4 Pc based Electrical load control



- 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.
- This system is integrated with the electrical loads and also connected to the PC where centralized control takes place.

Figure 31 Circuit diagram of pc based electrical load control system

- It uses an RS-232 protocol from the microcontroller to communicate with the PC. To turn on/off the appliances, we use Hyper Terminal on PC. Once the connection is established with the PC, then the system starts working. The microcontroller used in this project belongs to 8051 family.
- This project can be further enhanced by implementing a GUI based control panel on the PC with appropriate embedded software. The intensity control can also be incorporated using power electronics devices. Note: The project works only on operating systems having hyper terminal (E.g. Windows XP). The computer must have a RS232 serial port.
- Electrical appliances can be controlled through a PC interfaced to a microcontroller. This interface is done through a level shifter IC. The loads are then controlled through the relays duly interfaced to the relay driver which in turn is connected to the microcontroller.

5.2.5 Electrical parameters Measurements.

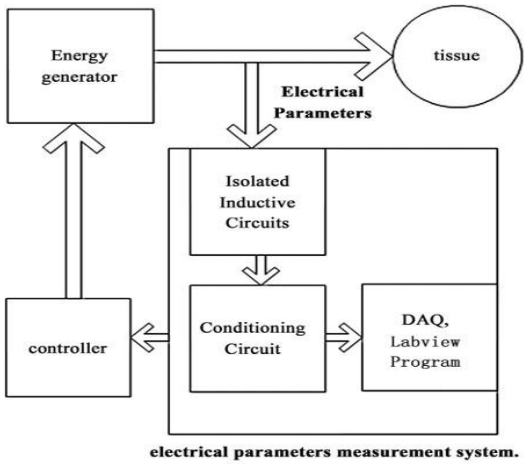


Figure 21 Electrical parameters

- The whole system is depicted in above figure , incorporating a high-frequency energy generator and an electrical parameters measurement system. The former is to generate on biological tissues a high-frequency energy of 450 kHz with the biggest power as high as 150 w. corresponding to the real voltage and current effective values. Also it provides the controller with feedback, and the controller does a fitting and adjusting of the feedback information for the real values and on this basis realizes the control of constant power and real-time judgment of biological impedance. To determine a super fitting strategy for the controller, the detected values are acquired by DAQ delivered.

5.2.6 Practical implementation of Home automation using IoT

- A complete home automation solution will involve multiple smart technologies functioning simultaneously & in tandem with each other so that there exists an easy flow. How are the different ways the entire house can be automated and the cost they will entail:-

Sr. No	Product	Nos.	Cost
1	Smart plugs	1	₹1000-2000/-
2	Universal remote	1	₹2490/-
3	Indoor camera	1	>₹10,000/-
4	Water controller	1	₹6490/-
5	Automatic hand sanitiser dispenser	1	₹2950-9490/-
6	Google Alexa	1	₹8,999/-
	Total		₹40,000-60,000/-

Figure 23 Home Automation

Chapter 6 Swatch Bharat Abhiyan (Clean India)

6.1 Swatchta needed in allocated village – Existing Situation with photographs




Figure 24 Solid waste.

7.1 Village conditions in covid-19

- Villagers have followed strict guidelines given by the government also they have followed lockdown situation.
- Also people were wearing mask and following social-distancing guidelines.
- During lockdown period people also were restricted to move outside their houses.
- Home department were strictly informed to follow lockdown guidelines to the villagers.
- Masks were been distributed from gran panchayat during the lockdown condition.
- Villagers were given awareness regarding corona guidelines and its steps to remain protect.
- No positive case were found in the village as gram panchayat and health centre weregiving awareness to the villagers. In this village cleanliness is not given high importance by the villagers.
- We have explained the importance of cleanliness and also given knowledge about the same.
- As from the above condition various kinds of waste is dumped in open area, due to which diseases spread in village.
- Biogas plant can be established to get solution of this kind of waste handling.
- Public toilets are also not available in to the village due to which cleanliness is not maintained.
- Reduction in waste can only be achieved by performing strict activities.
- Also, public awareness is major problem solution .
- Villagers were given knowledge for the covid-19 precautionary and safety measures.

7.2 Steps taken by students / villagers.

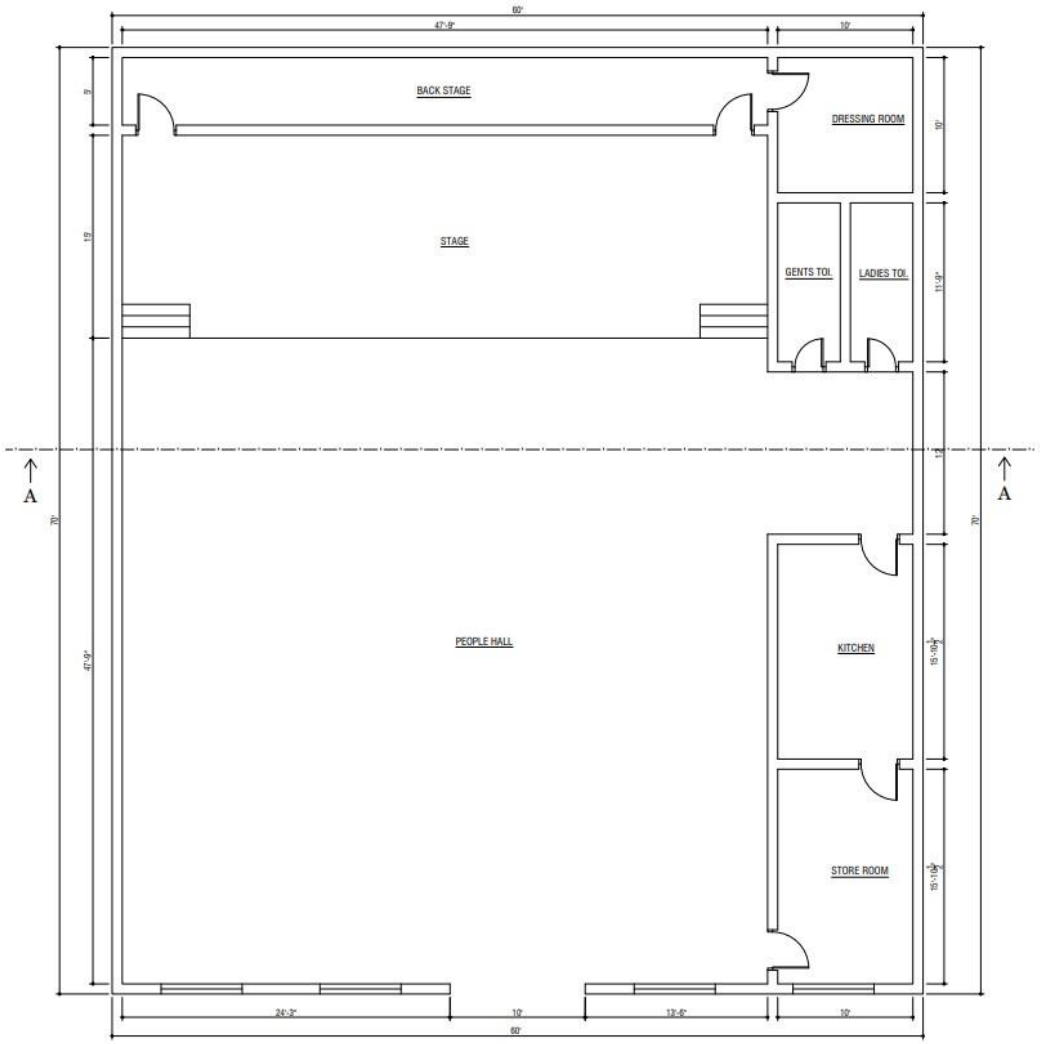
- During the village visit we acknowledge to the panchayat to take care by them if any positive case is found.
- Also, we suggested in health centre to test the villagers after regular interval.
- To, some villagers who where not using mask, we explained them importance of mask in this covid situation.

- In that awareness camp we have distributed some face masks to the villagers for the protection against covid 19 and aware them about covid 19 situation in India and told them to take precautionary measures like wear a mask perfectly, wash hands regularly, maintain social distancing in public and avoid crowdy area & firstly make yourself home quarantined if you fill any COVID-19 symptom in your body.

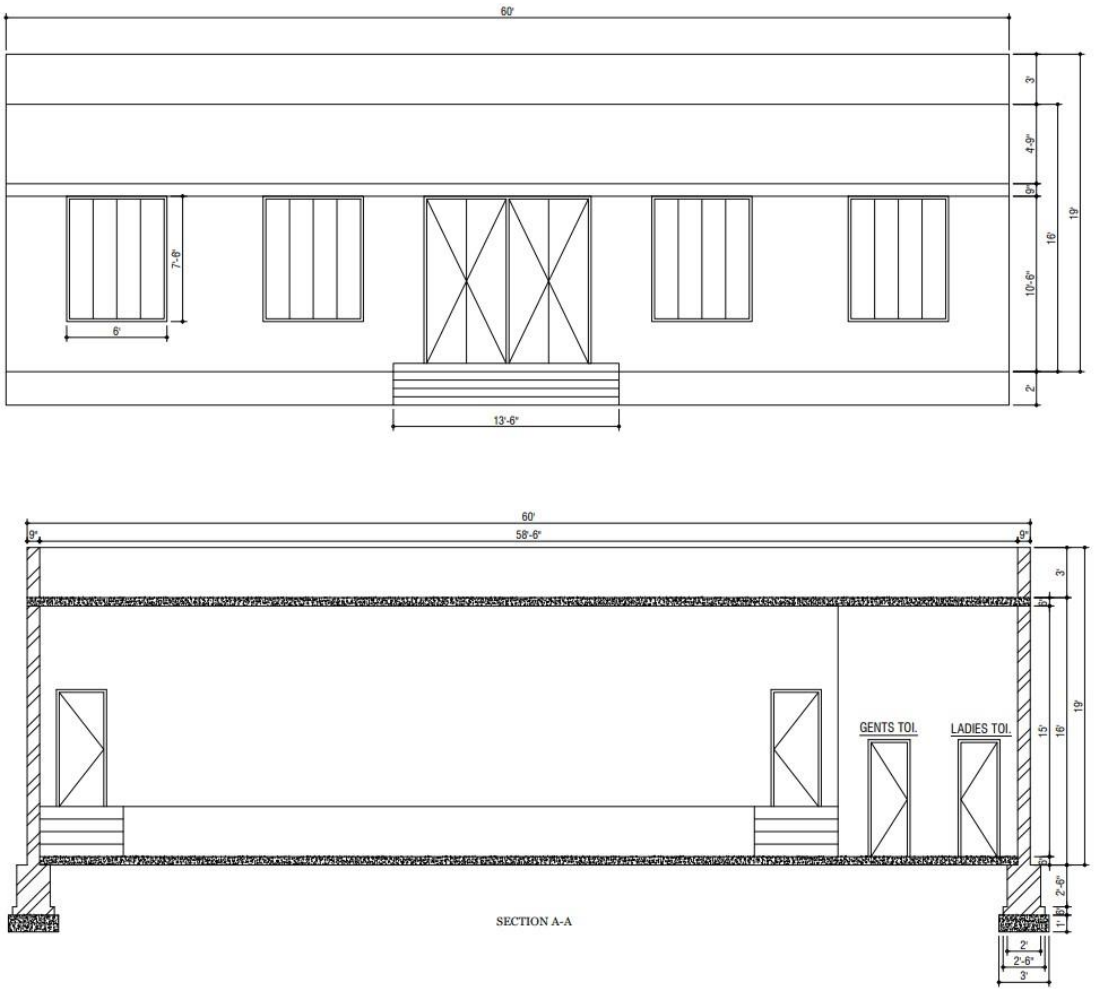
Chapter 8. Sustainable Design planning proposal (prototype design)

8.1 proposed design 1 at location (civil)

8.1.1 Community Hall



Plan for community hall



Elevation and section for community hall

- community hall means a building which is used for meetings, lectures, social and cultural functions and other non-commercial assembly purposes, in which there does not take place any activity involving the betting of money or valuables on a game or activity that has an uncertain outcome, nor any game requiring payment to play except on not more than four (4) days in any calendar year and where directly ancillary to a permitted assembly use other than a hall use.

Benefits of Community hall:

- Community centers are incredibly important for a healthy, vibrant community. These community or wellness centers provide opportunities for residents to be active and to interact with other residents.

- They are common ground areas that are focused on inclusivity, while fostering a culture of health and wellbeing in the communities they serve.

- Moreover, they should aim to be a beacon of social responsibility for the residents; leading the way in educating about health, nutrition and general wellbeing.

1. **Community centres strengthen family bonds**

   When you take part in a family activity at your community centre, it brings a sense of accomplishment and joy, and that's important because family time brings a stronger sense of connection within the family. Sometimes families can get so busy and caught up with household tasks that there's no free time left to just a family. When families participate in a family activity, it's healthy for everyone involved. As an example. I recently had the opportunity to photograph a family pottery class at Parkgate Community Centre, and the smiles and laughter on the faces of all participants illustrated pure, uninhibited joy. That's a powerful thing, and community centres offer these kinds of experiences at an affordable cost.

2. **Community Centres offer valuable community info**

   Community Centres are excellent resources for providing families with easy access to events, programs, courses, and general information about the community. Culture has guides, brochures, and online newsletters to keep families in the know. I can't even count the number of events and programs my family and I wouldn't have known about if not for. we think it's important to stay connected to what's happening in your community, and community centres are an excellent option for keeping informed.

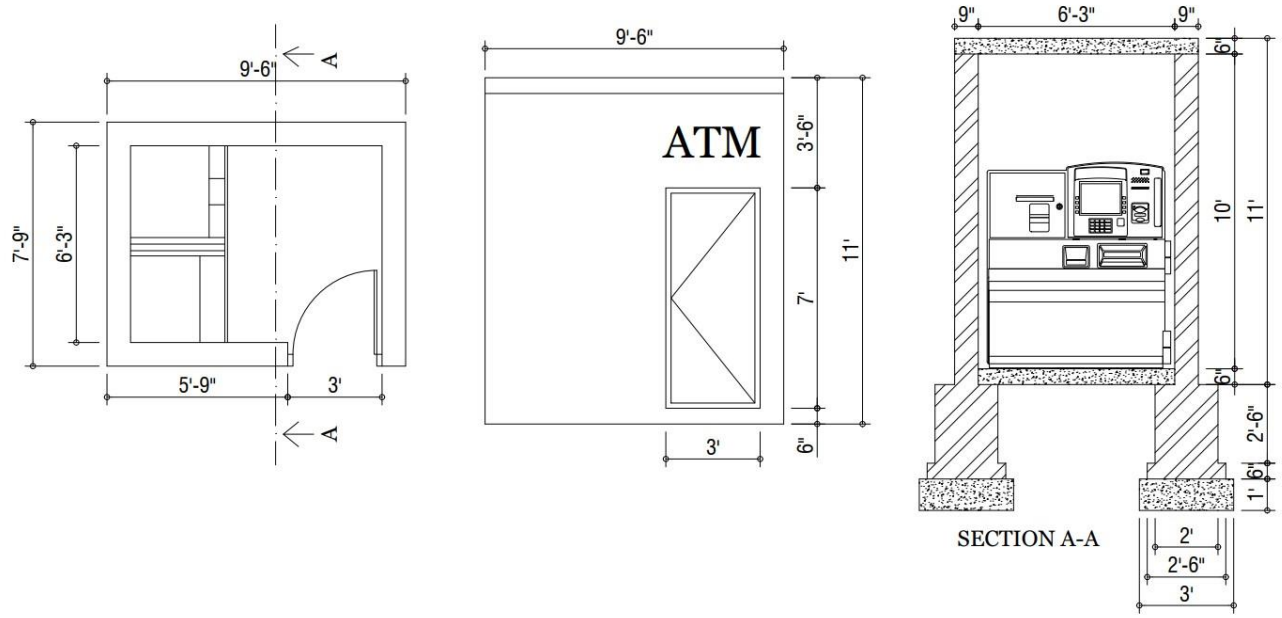
Community hall Details:

Length-18.28 M, Depth -21.33 M, height- 5.79 M

SR. NO.	Description	Length (m)	Width (m)	Height (m)	Count (Nos.)	Total Quantity (m^3)
1	BASIC WALL: 9": 4	32.045	0.278	3	1	**26.58**
2	BASIC WALL: 9" PL: 4	32.045	0.278	3	1	**4.5**
3	BASIC WALL: GENERIC - 6": 5	13.53	0.154	1	1	**3.6**
4	BASIC WALL: GENERIC - 6" 2: 4	35.789	0.154	0.8	1	**2.7**
5	WINDOW-CASEMENT-DOUBLE: 48" X 60"	1.32		0.8	4	-
6	WINDOW-LOUVERS: 16" X 24": 2	0.7		1.6	2	-
7	BASIC ROOF: GENERIC -6"			0.152	1	20.58
8	FLOOR: GENERIC - 10"			0.58	1	
9	DOOR-INTERIOR-DOUBLE-SLIDING-2_PANEL-WOOD: 72" X 84"		1.9325	1'-0''	2	-
10	SINGLE-FLUSH: 30" X 80" 2	0.6		2.13	2	-
11	PCC	36.78	1.4	2.15	1	**8.5**
12	BASIC WALL: 00.30	36.78	1.4	0.4	1	**6.55**
13	BASIC WALL: 0.40	36.78	1.8	0.4	1	**6.87**
14	BASIC WALL: GENERIC -0.50	36.78	1.8	0.4	1	**6.78**
15	EXCAVATION	45	1.3	1.8	4	**69.54**

SR NO.	Description	Quantity(m^3)	rate	per	Amount
1	BASIC WALL: 9": 4	26.58	130	Ft^2	**154554**
2	BASIC WALL: 9" PL: 4	4.5	90	Ft^2	**45550**
3	BASIC WALL: GENERIC - 6": 5	3.6	90	Ft^2	**30124**
4	BASIC WALL: GENERIC - 6" 2: 4	2.7	90	Ft^2	**2415.3**
5	WINDOW-CASEMENT- DOUBLE: 48" X 60": 6	18ft	220	-	**3960**
6	WINDOW-LOUVERS: 16" X 24": 2	390inch	75	-	**29250**
7	BASIC ROOF: GENERIC -6"	20.58	3500	M^3	**72030**
8	FLOOR: GENERIC - 10"	20.57	3500	M^3	**71995**
9	DOOR-INTERIOR-DOUBLE-SLIDING-2_PANEL-WOOD: 72" X 84"	-	-	-	**9200**
10	SINGLE-FLUSH: 30" X 80" 2	-	-	-	**4500**
11	EXCAVATION	8.5	350	M^3	**2975**
12	PCC	6.55	3500	M^3	**22925**
13	BASIC WALL: 00.30	6.87	90	Ft^2	**6018.3**
14	BASIC WALL: 0.40	6.78	90	Ft^2	**6101.2**
15	BASIC WALL: GENERIC - 0.50	69.54	90	Ft^2	**62258.6**
				GRAND TOTAL	**524698**

8.1.2 ATM



Plan, Elevation and section for ATM

- We are seeing rural demand growing despite the pandemic. One of the reasons is that the rural economy has not been as severely impacted as the urban one with the lockdown," says K Srinivas, CEO, BTI Payments, a white-label ATM operator.
- The government's assistance to BPL workers during the pandemic is also held to have helped in part the industry take a quantum leap from 9.5% in September 2019 to 12% in September 2020.India's ATM industry has grown 3% to 2.5 lakh ATMs, while white-label ATMs grew 14% to 24,195 as of September 2020.
- The higher growth percentage of white-label ATM (WLA) operators is an indication of rural growth but its not limited to that — banks have also been expanding in rural regions. However, the ATM industry numbers (3% growth) do not reflect that as the expansion was offset by the 10-PSU-bank merger plan, which led to closure of ATMs in urban areas.
- Rural banking has come a long way from the days when bankers had their first brush with rural culture. Bankers are now financial anthropologists, and many of them are playing a missionary role in transforming rural societies. However, challenges persist. When rural banking took its baby steps, villagers were shy of loans because they always related them with moneylenders and carried bitter memories of those who had suffered at their hands. The situation today is quite the opposite. People have a savage appetite for loans, but unlike their forebears, they have lost that pristine morality which equated default of loans with the guilt of shame

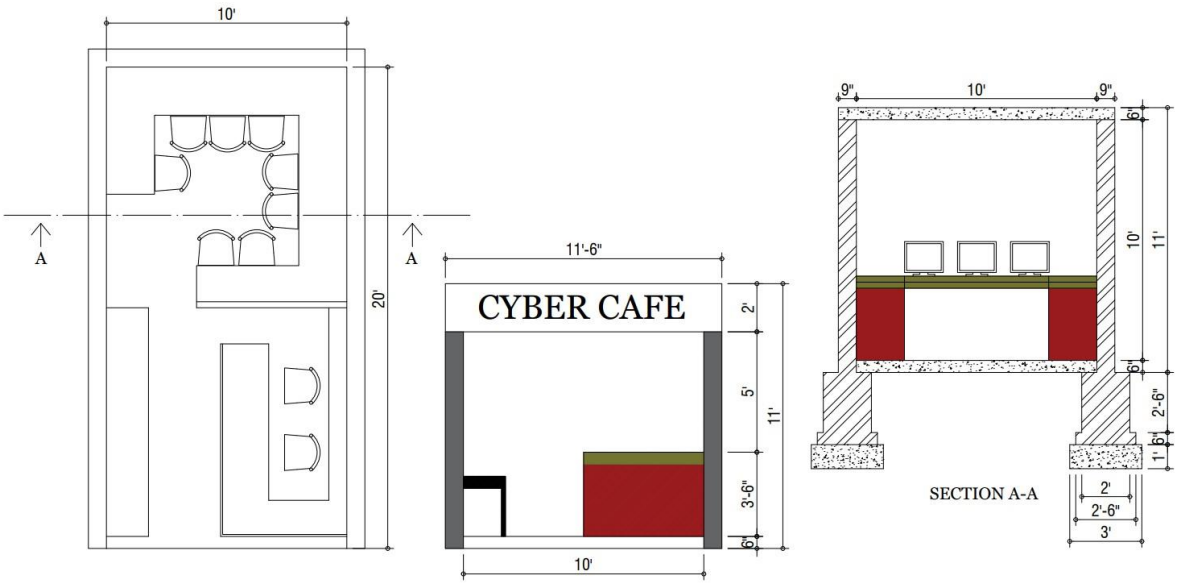
- In surrounding 35 KM village only village called Adariyana is having bank facilities which is 12 KM from surel village.
- As bank facilities are basic needs for everyone In daily needs.
- Every farmer in village requires bank facilities, so it is also the basic necessities.

Length- 3M,width-2.5M,height- 3.4M

SR. NO	Description	Length (m)	Width (m)	Height (m)	Count (Nos.)	Total Quantity (m^3)
1	GLASS DOOR WITH ALUMINUM FRAME	3	0.2286	2.35	1	**5.795**
2	BASIC ROOF: GENERIC	5.9	0.2563	6.321	1	**2.35**
3	FLOOR: 10"	3.2	2.548	0.365	1	**4.6**
4	BASIC WALL: 9" EXTERIOR	38.55	0.2561	0.762	3	**0.236**
5	BASIC WALL: 9" EXTERIOR	63.98	0.256	0.1628	1	**0.236**
6	CAST-IN-PLACE STAIR:	21.56	1.524	.1524	1	**0.36**
7	PCC IN FOOTING	0.35	0.4	0.6	1	**1**
8	BASIC WALL: 0.40	0.20	0.40	0.4	1	**0.4**
9	BASIC WALL: 00.30	0.20	0.38	0.4	1	**0.4**
10	BASIC WALL: GENERIC – 0.50	**0.25**	**0.38**	0.4	**1**	**0.6**
11	EXCAVATION	**0.50**	0.40	1.5	1	**90**

SR NO.	Description	Quantity(m^3)	Rate	Per	Amount
1	BASIC WALL: 9" EXTERIOR 1	0.4	130	M^3	**9580**
2	BASIC WALL: 9" EXTERIOR 2	0.6	130	M^3	**9580**
3	GLASS DOOR WITH ALUMINUMFRAME:	5.795	90	Ft^2	**9000**
4	BASIC ROOF: GENERIC - 12"	2.35	120	M^3	**9579**
5	FLOOR: 10"	4.6	150	Ft^2	**6500**
6	CAST-IN-PLACE STAIR:	0.36	180	Ft^2	**36000**
7	EXCAVATION	90	350	Ft^2	**5040**
8	PCC	1	3500	Ft^2	**32620**
9	BASIC WALL: 00.30	0.4	90	M^3	**9580**
10	BASIC WALL: 0.40	0.40	90	M^3	**5000**
11	BASIC WALL: GENERIC -0.50	0.6	90	M^3	**15000**
				GRAND TOTAL	**147479**

8.1.3 Cyber Cafe



Plan, Elevation and section for Cyber cafe

- There is no any cyber cafe existing in the village. From the feedbacks which were given by the villagers we have decided to design a cyber café.
- It will make village smart as internet availability at any time for any person in the village.
- It will help people to stay updated and connected.
- They can organise small courses to develop the skills.

Benefits of cyber café :-

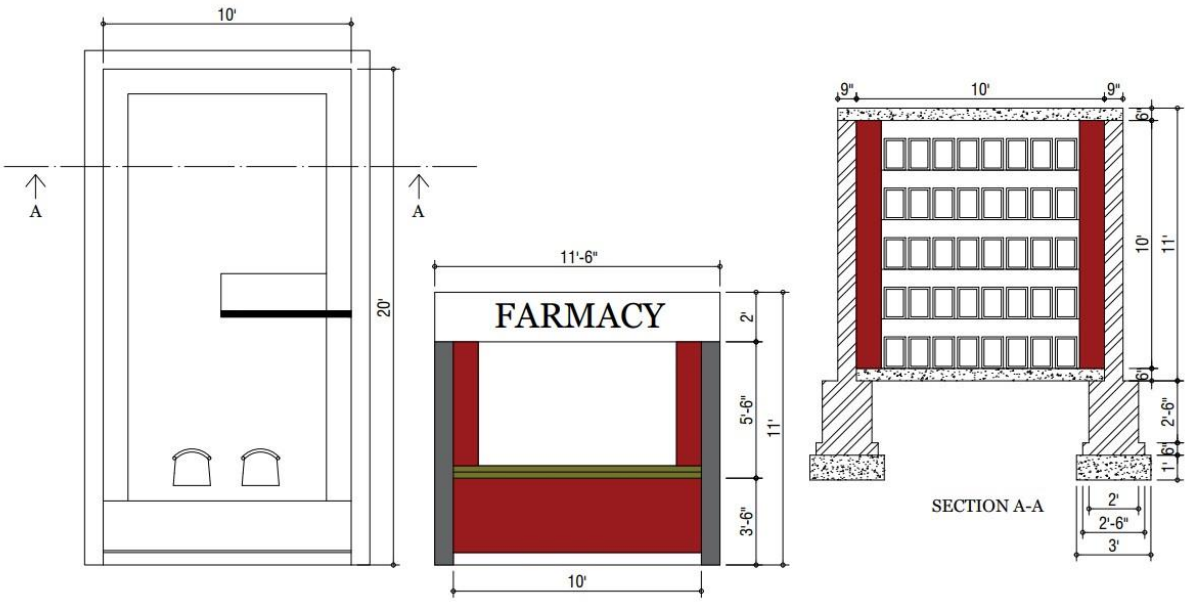
- It will empower everyone in the village and they will stay updated .
- They can learn different software and improve there skills that can help them in future.
- It can also be use for entertainment like playing video games etc.
- Students will take maximum advantage for there studies and project.

Length -8.4M, depth -3.5M, height -3.M

SR. NO	Description	Length (m)	Width (m)	Height(m)	Count (Nos.)	Total Quantity(m^3)
1	BASIC WALL: GENERIC - 9" 2	8.45	0.2286	3	1	**5.795**
2	BASIC WALL: GENERIC - 9" 2	5.7	0.2286	0.762	1	**1**
3	CURTAIN WALL: CURTAIN WALL 1	1.902	0.0254	3.048	1	**2**
4	DOOR-EXTERIOR-DOUBLE-TWO LITE: 72" X 80"	1.02	0.0508	2.0574	1	**2**
5	1452181752750-CURTAIN WALL DOOR: AUS SGL GLASS FRAMED W D-PULL	0.8382	0.0127	2.1082	3	**2**
6	WINDOW-CASEMENT- DOUBLE: 49" X 60"	1.2192	0.101	1.524	3	**6**
7	BASIC ROOF: GENERIC - 1	8.43	5.7	0.1524	1	**7.22**
8	FLOOR: GENERIC -1	8.43	5.7	0.1524	1	**7.22**
9	PCC	7.5	0.90	0.4	1	**5.02**
10	BASIC WALL: 00.30	38.55	1.2	0.4	1	**18.50**
11	BASIC WALL: 0.40	38.55	1.6	0.4	1	**24.67**
12	BASIC WALL: GENERIC - 0.50	38.55	2	0.4	1	**30.84**
13	EXCAVATION	50	1.2	1.5	4	**90**

SR NO.	Description	Quantity(m^3)	rate	per	Amount
1	BASIC WALL: GENERIC - 9" 2	4.75	130	Ft^2	**34051**
2	BASIC WALL: GENERIC - 9" 2	1	90	Ft^2	**5852**
3	DOOR-EXTERIOR-DOUBLE-TWO LITE: 72" X 80"	2	460	Ft^2	**7667**
4	1452181752750-CURTAIN WALL DOOR: AUS GLASS FRAMED W D-PULL	2	822	Ft^2	**16842**
5	WINDOW- CASEMENT-DOUBLE: 49" X 60"	6	415	Ft^2	**6980**
6	CAST-IN-PLACE STAIR: MONOLITHIC STAIR	1	800	Ft^2	**10600**
7	BASIC ROOF: GENERIC - 12" 2	3.61	3500	M^3	**12635**
8	FLOOR: GENERIC - 12"	3.61	3500	M^3	**12635**
9	EXCAVATION	3.6	350	M^3	**5040**
10	PCC	9.32	3500	M^3	**32620**
11	BASIC WALL: 00.30	18.5	90	Ft^2	**9580**
12	BASIC WALL: 0.40	24.67	90	Ft^2	**9580**
13	BASIC WALL: GENERIC - 0.50	30.84	90	Ft^2	**9580**
				GRAND TOTAL	**212397**

8.2.1 Pharmacy



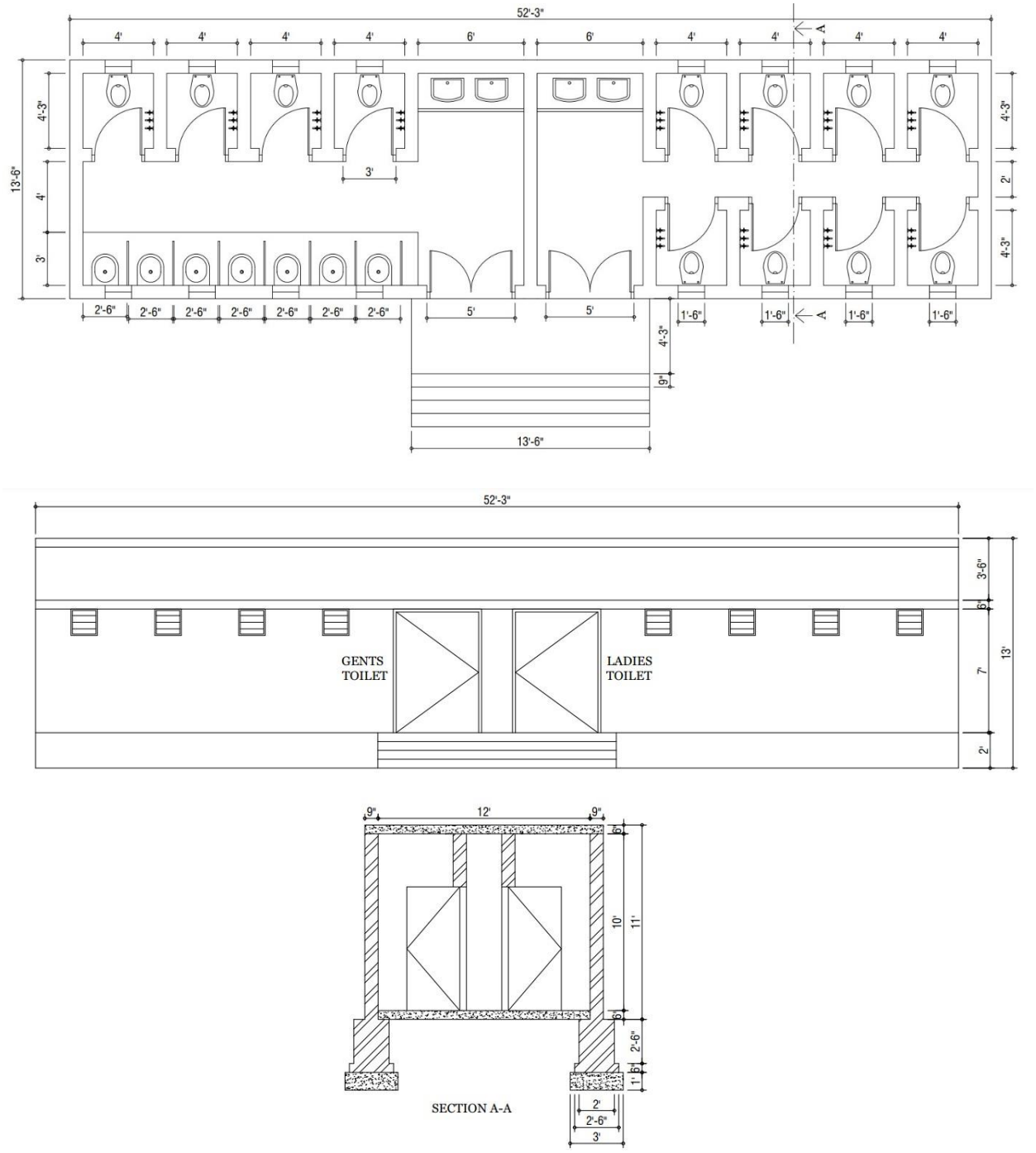
Plan, Elevation and section for Pharmacy

- In the village there is no pharmacy shop so pharmacy shop is a major necessity in current situation.
- Villagers need to depend on nearby cities for the medicines.
- In current situation major need of medicine is required so, if there is a proper medial shop it could help the patient.
- When a pharmacy is not available nearby, timely access to pharmaceutical services can be compromised due to lack of transportation options, extreme weather conditions, or the patient being too sick to travel the long distance to the nearest pharmacy.
- Pharmaceutical care is an important aspect of the spectrum of healthcare. Pharmacists are part of the healthcare team and provide counseling to patients and advice to medical staff and case managers. They have an essential role in helping prevent medication errors and in identifying drug interactions.

SR. NO	Description	Length(m)	Width (m)	Height(m)	Count (Nos.)	Total Quantity(m^3)
1	TOP ROOF	8.3	6.52	3	1	**1**
2	WALL 9"	6.3	9.36	0.762	2	**5.79**
3	PLINTH WALL WITH STAIRS	5.9	5.8	0.258	1	**1**
4	FLOOR	5.98	1.67	2.68	1	**1**
5	PCC	7.5	0.40	0.90	1	**9.32**
6	BASIC WALL: 00.30	38.55	1.2	0.4	1	**18.5**
7	BASIC WALL: 0.40	38.55	1.6	0.4	2	**24.67**
8	BASIC WALL: GENERIC - 0.50	38.55	2	0.4	2	**30.98**
9	EXCAVATION	50	1.2	1.5	1	**4.72**

	Description	Quantity (m^3)	rate	per	Amount
1	BASIC WALL: 9" EXTERIOR 1	4.75	130	Ft^2	**34051**
2	TOP ROOF	1	130	Ft^2	**20000**
3	FLOOR	1	150	Ft^2	**35000**
4	PLINTH WALL WITH STAIRS	1	500	Ft^2	**69801**
5	EXCAVATION	3.7	350	M^3	**5040**
6	PCC	9.32	3500	M^3	**36260**
7	BASIC WALL: 00.30	18.5	90	Ft^2	**9580**
8	BASIC WALL: 0.40	24.67	90	Ft^2	**9580**
9	BASIC WALL: GENERIC - 0.50	30.84	90	Ft^2	**9580**
				GRAND TOTAL	**228892**

8.2.2 Toilet



Plan, Elevation and section for TOILET

- Village toilet condition is very bad.
- There is no different toilet for women and disable .
- Due to open defecation, so many disease are cause.
- It will give good experience to the visitor as toilet is the first thing people observe.
- It will help in Swachh Bharat Mission.
- It will save lives**.** Every year, 200,000 infants die in India alone because of open defecation.
- It will improve women's safety and literacy.
- It will help village to get more hygiene as People can also wash their hands there.
- Using toilets prevents germs from getting into the environment, and protects the health of the whole community. Health is not the only reason to build and use toilets.

Length -16M, depth – 4M, height- 3.4M

SR. NO	Description	Length (m)	Width (m)	Height (m)	Count (Nos.)	Total Quantity (m^3)
1	GLASS DOOR WITH ALUMINUM FRAME	1.5	3.2	3	1	**3.65**
2	BASIC ROOF: GENERIC	0.28	2.6	3.4	1	**2.79**
3	FLOOR: 10"	0.30	3.6	.012	1	**2.7**
4	BASIC WALL: 9" EXTERIOR	0.90	4	4	1	**3.85**
5	BASIC WALL: 9" EXTERIOR	0.90	4	16	1	**3.85**
6	CAST-IN-PLACE STAIR:	1.2	2.7	4.5	1	**4.5**
7	PCC IN FOOTING	0.90	6	0.65	1	**6.3**
8	BASIC WALL: 0.40	0.40	0.25	0.56	1	**6.3**
9	BASIC WALL: 00.30	0.40	0.25	8.9	1	**7.2**
10	BASIC WALL: GENERIC – 0.50	**0.50**	**0.30**	8.3	**1**	**7.2**
11	EXCAVATION	90	0.50	0.90	1	**0.30**

SR NO.	Description	Quantity(m^3)	Rate	Per	Amount
1	BASIC WALL: 9" EXTERIOR 1	3.85	120	Ft^2	**35000**
2	BASIC WALL: 9" EXTERIOR 2	3.85	120	Ft^2	**35000**
3	GLASS DOOR WITH ALUMINUMFRAME:	3.65	300	Ft^2	**9000**
4	BASIC ROOF: GENERIC - 12"	6.3	180	Ft^2	**12600**
5	FLOOR: 10"	2.7	390	Ft^2	**25000**
6	CAST-IN-PLACE STAIR:	4.5	450	Ft^2	**30000**
7	EXCAVATION	0.30	350	M^3	**25000**
8	PCC	6.3	250	M^3	**9585**
9	BASIC WALL: 00.30	7.2	200	Ft^2	**9585**
10	BASIC WALL: 0.40	7.2	200	Ft^2	**9500**
11	BASIC WALL: GENERIC -0.50	7.2	350	Ft^2	**9000**
				GRAND TOTAL	**434685**

8.2.3 Residential Building

Plan, Elevation and section for RESIDENTIAL BUILDING

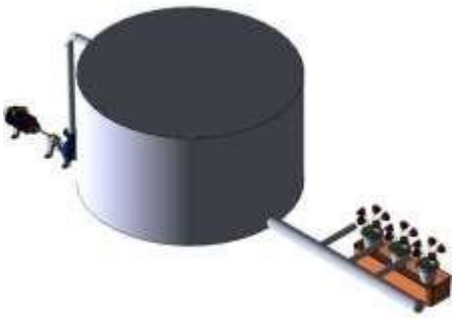
- In village every year due to storm or flood destructions happens to mud houses so instead of mud houses good concrete house could give better facilities and protection.
- Every year many money is been used for restoration of mud houses due to storm or flood.
- There could be permanent solution for safety and facility.
- Residential building provides better life instead of temporary houses.
- During survey we found it could be a better for villagers if we design a good residential building.
- Rural areas offer greater privacy from your neighbors, room to breathe and an expansive property to do as you please, from setting up an outdoor gym to building your own greenhouse or garden.
- More space means bigger homes too. Your kids won't have to share a bedroom and there's room for a home office or space for all of your family's hobbies.
- Real estate prices will fluctuate depending on where you live, but as a rule of thumb, you'll get more bang for your buck in rural and suburban America compared to major city centers, where housing and living costs come at a premium. Not only are you gaining access to more space, but you're also securing this space for less

Length -2.5M, depth2.8M -, height-3M

SR. NO.	Description	Length (m)	Width (m)	Height (m)	Count (Nos.)	Total Quantity (m^3)
1	BASIC WALL: 9": 4	32.07	0.235	3	1	**24.03**
2	BASIC WALL: 9" PL: 4	31.58	0.235	3	1	**3.56**
3	BASIC WALL: GENERIC - 6": 5	10.89	0.18	0.8	1	**2.01**
4	BASIC WALL: GENERIC - 6" 2: 4	25.84	0.18	0.8	1	
5	WINDOW-CASEMENT-DOUBLE: 48" X 60"	32.54		1.52	4	-
6	WINDOW-LOUVERS: 16" X 24": 2	1.2912		0.6	1	-
7	BASIC ROOF: GENERIC -6"	0.351		0.152	1	20.57
8	FLOOR: GENERIC - 10"			1	1	
9	DOOR-INTERIOR-DOUBLE-SLIDING-2_PANEL-WOOD: 72" X 84"		1.258	2.1336	1	-
10	SINGLE-FLUSH: 30" X 80" 2	0.852		2.032	2	-
11	PCC	33.968	1.2	0.4	1	**9.31**
12	BASIC WALL: 00.30	33.96	1.2	0.4	1	**4.05**
13	BASIC WALL: 0.40	33.96	1.6	0.4	1	**5.66**
14	BASIC WALL: GENERIC -0.50	33.96	1.6	0.4	1	**6.78**
15	EXCAVATION	37.58	1.3	1.5	4	**67.64**

SR NO.	Description	Quantity(m^3)	rate	per	Amount
1	BASIC WALL: 9": 4	24.06	130	Ft^2	**146250**
2	BASIC WALL: 9" PL: 4	3.64	90	Ft^2	**12574.5**
3	BASIC WALL: GENERIC - 6": 5	3.62	90	Ft^2	**22010.3**
4	BASIC WALL: GENERIC - 6" 2: 4	2.32	90	Ft^2	**12782.5**
5	WINDOW-CASEMENT- DOUBLE: 48" X 60": 6	25ft	220	-	**23400**
6	WINDOW-LOUVERS: 16" X 24": 2	390	75	-	**25250**
7	BASIC ROOF: GENERIC -6"	11.09	3500	M^3	**38815**
8	FLOOR: GENERIC - 10"	20.80	3500	M^3	**56000**
9	DOOR-INTERIOR-DOUBLE-SLIDING-2_PANEL-WOOD: 72" X 84"	-	-	-	**6000**
10	SINGLE-FLUSH: 30" X 80" 2	-	-	-	**4200**
11	EXCAVATION	1.31	350	M^3	**1702**
12	PCC	10.35	3500	M^3	**20000**
13	BASIC WALL: 00.30	5.02	90	Ft^2	**13520**
14	BASIC WALL: 0.40	5.44	90	Ft^2	**13515**
15	BASIC WALL: GENERIC - 0.50	6.78	90	Ft^2	**15410**
				GRAND TOTAL	**411429**

8.3.1.Agriculture automatic Water plant system



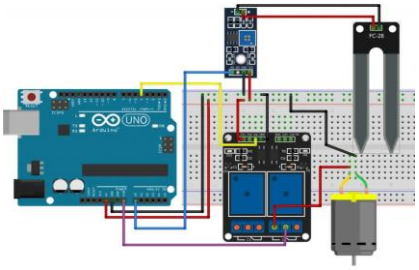


Figure 25 Agriculture Automatic water plant

This system provides water to plants, farms, gardens etc.

- In present days, in the field of agriculture farmers are facing major problems in watering their crops. It's because they don't have proper idea about the availability of the power.

- Even if it is available, they need to pump water and wait until the field is properly watered, which compels them to stop doing other activities – which are also important for them, and thus they loss their precious time and efforts. But, there is a solution – " An Automatic Plant Irrigation System " not only helps farmers but also others for watering their gardens as well.

- This automatic irrigation system senses the moisture content of the soil and automatically switches the pump when the power is on. A proper usage of irrigation system is very important because the main reason is the shortage of land reserved water due to lack of rain, unplanned use of water as a result large amounts of water goes waste. For this reason, we use this automatic plant watering system, and this system is very useful in all climatic conditions.

Advantages:-

1. very comfortable. Save time and effort in watering
2. Extends the life of plants. Prevent them from dying and save on new plants.
3. Saving water. Adjust the optimal watering for plants.
4. Add nutrients to the irrigation water to feed the plants while watering them.
5. Keeps the humidity level of the substrate constant.

Estimated cost:-

₹598/piece

[Including 1. Main supply line pipe- 15mtrs (16mm)
2. Feeder line pipe- 15mtrs (4mm)
3. Dripemitters- 30 pcs4. Feeder to main supply line connectors- 30 pcs5. Emitter stakes- 30 pcs
6.Dummy -10 pcs
7. Elbow connector- 5 pcs
8. T connector- 5 pcs
9. Straight connector with tap- 5pcs
10. Straight connector- 5 pcs
11. Universal water tap adapter-1 pc
12. End cap- 5 pcs
13. Drip hole \"s\" punch-1 pc
14. Teflon tape-1 pc15]

8.3.2.Device Monitoring and Control Using GSM

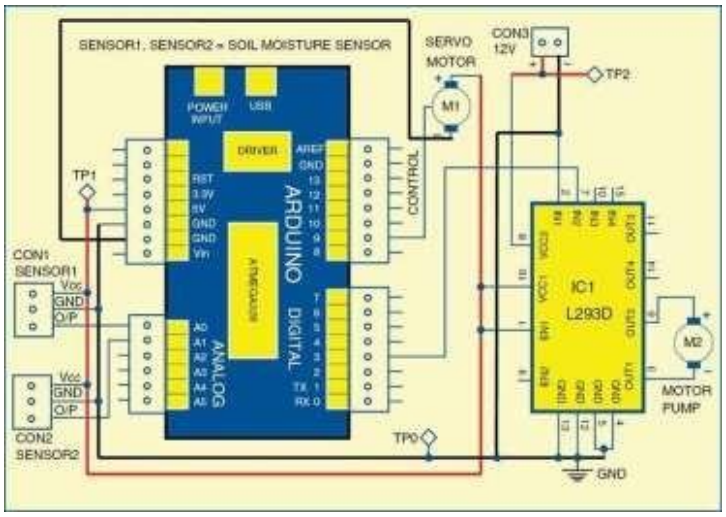


Figure 26 Device monitoring

- The purpose of this project is to monitor and control power grid (Analog and Digital) remotely using GSM modem. The GSM modem provides the communication mechanism between the user and microcontroller system by means of SMS messages.
- User can control multiple electrical devices in power rid by sending suitably formatted SMS messages to the microcontroller system and are validated.
- If the SMS command received is valid then it takes the necessary action to control the said devices.
- This system also continuously monitors the status of any critical devices changes from ON to OFF or vice versa, then microcontroller based system automatically sends SMS alerts back to users.
- After completion of the command implementation this system sends the confirmation message back to the calling user.

System Architecture:-

- There are five modules in this system: GSM Module, SMS Messaging Module, DTMF Module, Database Module, and detailed working mechanism.

GSM Module:-

- GSM (global system for mobile communication) is the popular standard for the mobile telephony. This is the technology used for the mobile communication. They have their own frequency bands to communicate with the respective groups for the medium without interference. In this paper more emphasis is given to understand the details of the existing GSM Technology, need and the benefits of monitoring existing systems remotely using GSM Technology.

SMS Messaging Module:-

- SMS stands for Short Message Service [6]. It is a technology that enables the sending and receiving of messages between mobile phones. As suggested by the name "Short Message Service", the data that can be held by an SMS message is very limited. One SMS message can contain at most 140 bytes (1120 bits) of data, so one SMS message can contain up to 160 characters. One major advantage of SMS is that it is supported by 100% GSM mobile phones. Almost all subscription plans provided by wireless carriers include inexpensive SMS messaging service. The System can inform the security agencies immediately as the incident is going to happen and the incident could be monitored on the Mobile phones and even could be recorded.

- DTMF Module:-
  Another module is the DTMF [7] Module that has been implemented to monitor electrical devices and even can be managed using DTMF immediately.

AT Commands Module:-

- AT commands [8], [9] are instructions used to control a modem. AT is the abbreviation of Attention. Every command line starts with "AT" or "at". That's why modem commands are called AT commands. There are two types of AT commands. Basic commands are AT commands that do not start with "+". For example, D (Dial), A (Answer), H (Hook control) and O (Return to online data state) are basic commands. Extended commands are AT commands that start with "+". All GSM AT commands are extended commands. For example, +CMGS (Send SMS message), +CMGL (List SMS messages) and +CMGR (Read SMS messages) are extended commands. Below are the SMS AT commands that may output the final result code +CMS ERROR:
  +CRES (command name in text: Restore Settings) +CMGL (command name in text: List +CMGS (command name in text: Sending Message)

- The status of various devices can be monitored & controlled from anywhere

1.The operation of system is very simple & can be used by anyone with basic knowledge ofoperating mobile phones.
2 Easy to upgrade as per the user requirements.

Application:-

1. Home automation
2. Office automation
3. Industrial automation
4. To control water pump sets in agricultural fields
5. The security system can be employed in household or any organisation

Estimated Cost:-
₹8900/-

8.3.3.Energy Meter Reading with Load Control Using GSM

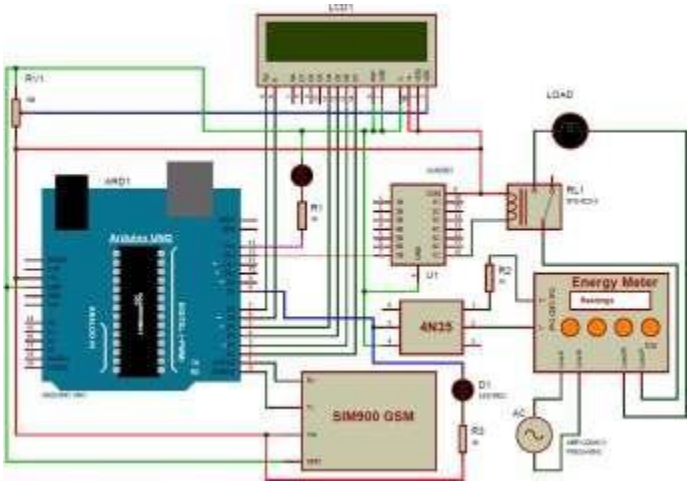


Figure 27 Energy meter reading

- The present traditional billing system have many problems like problem of payment collection, energy thefts etc. due to which the traditional billing system is slow, costly and unreliable.
- Prepaid Electricity Energy Meter is a good concept in which you can recharge its balance, like we do in our mobile phones. In this project we are building an automated system by using Arduino and GSM module. You can recharge the electricity balance through this system, just by sending a SMS.
- It can also disconnect the home power supply connection, if there is low or zero balance in the system.

- **Working:-**

- When we power up the system then it reads previous values of rupees stored in EEPROM and restores them into the variables then checks the available balance with the predefined value and take action according to them, like if available balance is greater than 15 rupees then Arduino turns on the electricity of home or office by using relay.

- GSM module has been used to send and receive message.
- If balance is less than 15 rupees then Arduino sends a SMS to user phone regarding low balance alert and requesting to recharge soon.
- If balance is less than 5 rupees then Arduino turns off the electricity connection of home and sends a SMS to user's phone for 'Light Cut' alert and requesting to recharge soon.

- **Advantages:-**

- High accuracy over a wide current dynamic range.
- Reliability & robustness.
- Automatic Meter Reading (AMR).
- More easily enable new functionalities.
- Tampere proofing.
- Power out range detection.
- Power factor detection.
- Easily reconfiguration & upgrade.

Estimated cost:-

₹16200/-

- GSM Based Load Control Energy Meter Reading System Using PIC Microcontroller with Number of New Features: The GSM based energy meter reading system is very advanced system, to the check the meter reading from remote areas. This system has implemented in advanced countries, now there is need to implement this system in Pakistan. By using this system, the energy production department can easily check the energy meter reading of any consumer at any time from any place. If they use this system, then there is also no need to hire the meter reader because this time consume and expensive job.So many companies or peoples are working on the same job and trying to develop a best GSM based energy meter reading system. But their system is still so much costly and complicated as compared to the simple energy meter reading system. Therefore, this system to implement in Pakistan is still costly and impossible.
- Energy Meter: In GSM based load control energy metering system the meter is used for measuring the energy which would be consume by the consumer or electrically powered device. This meter is calibrated in billing units and measured the power in kilowatt hour. In this system, the meter is interfaced with pic microcontroller through the interface device.
- GSM Modem: The GSM modem is a device, which is used for controlling the any device or system through wireless network. This is a sim base device, which can be easily connect to controlling system or device. This device has the facility of message sending or receiving.
- Max 232: The max 232 is an integrated circuit which is used for serial communication between the modem and microcontroller. This integrated circuit converts RS 232 serial port signal to the suitable TTL logic signal for serial communication. This circuit also have the dual work facility means send and receive the signal.
- PIC Microcontroller 18 F452: In this GSM based load control energy meter reading system pic 18F452 microcontroller have been used for the intelligently and remotely control this system. This is 34 pins 8-bit microcontroller consists of 4 input, output ports for send or receive the data. This is powered up with voltage regulator and c language is used for its programming through the keil software. When the consumer or employer of electricity sent the message or information from his mobile phone then this message or information is received by the GSM modem, which is interfaced with microcontroller through the max 232.Based on this message or information the microcontroller make the decision for on or off the load. This microcontroller is also interfaced with LCD display for showing the status of load.
- Voltage Regulator:The voltage regulator is connected to the output of bridge rectifier for regulating the dc voltage. The LM 7805 voltage regulator is used here.
- LCD Display:The LCD display here is used for displaying the load status, means the how much load is running on or off. This LCD display is interfaced with microcontroller and is powered up with voltage regulator.
- Relay Driver: This is also an integrated circuit and is used for driving the load relays.
- DB9:The DB9 is 9 pins connector which is just used for connecting the max232 and GSM modem.
- Transformer: Transformer is a device which is used for step up or step down the ac voltage at 50Hz frequency. Here we are using this for step down the 220V ac to 12V ac.
- Bridge Rectifier: In this system, the bridge rectifier only convert the ac voltage into dc voltage for power up the microcontroller, Max232, LCD display and relay driver.
- For testing the GSM modem first, we sent any message from our mobile phone and wait for some time, when the same message we have received at LCD of GSM based load control energy meter reading system. Then we consider the system is ok. Different loads we have connected with this system. The energy which is consumed by these loads can be seen on energy meter. The reading of the meter is given to the microcontroller in form of pulses, then the microcontroller shows this energy on LCD display. Similarly, when we want to switch off any load then we just dial the load number from our mobile phone and sent the message to the GSM, which is connected to the microcontroller, then the microcontroller would be off that load. By doing this, we can easily control the energy meter reading and reduce the billing.

8.2 Reasons for students recommending this designs.

- As school is very basic need for any village to get development.
- Proper planning with good facilities students don't migrate to other villages for getting studies.
- secondary school should also be available for the students for better facilities.
- If villagers are literate basic problems can also be solved by them.
- In near future education can only make India's progress.
- If literacy rate would be high problems in the village will be low.
- The intention of Vishwakarma Yojana is to raise the way of life of the country zones to its specific degree up to the degree of an ideal town circumstance.
- It is a successful government plan to build up the rustic zones under efficient expense with great functionality and effectiveness during its utilization.
- The undertaking will in general improve the physical, social just as socio-social parts of the town by executing and ad libbing different foundations concerning lesser or least impediment to its country realness.
- The primary point is to create town with a "rustic soul" yet with all metropolitan conveniences that a city may have.
- This task gives "Plan TO DELIVERY" answers for improvement of towns in "RURBAN" zones.
- Particularly in our allocated village, we are eyeing towards providing the basic necessities to the villagers by improving the existing infrastructure and spreading awareness among the village regarding eco- friendly development.
- Hence by visiting ideal village we get certain good ideas that can be applied on our allocated village additionally some requirements were also observed during the visit of smart village.
- Various problems were observed during the visit of allocated village such as broken street pole and street lights the infrastructure is not well maintained and has old design and the new projects were delayed,
- By implementing the proposed design many day to day life problems can be resolved and the village people will not migrate to city.
- In addition it will result in development of village and make it more prosperous.
- This project gave us an exposure to what is required on field and implement the knowledge that we gained during our studies.
- In villages no renewable energy sources was used till now and the people are not that much aware from electric energy conservation and advantages of renewable sources. Need to be aware people from both and also aware from the other government's schemes and subsidy related to it so, villagers are start using renewable energy sources and save electricity.
- We have also focused on providing rooftop solar panels in the most of the public buildings of the village as the government is providing subsidies over the usage of renewable energy and that will indirectly motivate the villagers to adopt it.
- Through this whole project we got to know that how to work on the field and provide sustainable designs for the village accordingly, we also faced some challenges which improved our thinking capability.

Chapter 9.Proposing design for future development of the village for part -II design.

We are going to provide various design which are as follows:

1. Dairy

- In the village the condition of village is not good because it is not fulfilling the capacity of the village also people are facing the lack of technology
- It requires renovation to make it big and fulfilling the capacity.
- Various other dairy products should be collected except the milk.

2. School

- The condition of existing building of school is not good it requires some changes in it.
- As village is not having secondary school so we will provide the design for the same.
- It requires renovation in the building with some playing instruments.

3. Bus stop

- In the village there is no existing of bus stop.
- SO, the travelers has to face the problems.

4. Post office.

- There is very small post office in the village also it is not satisfying the need of the peoples.
- So, there is requirement of little large one.

5. Garden

- There is no public garden in the village so social and mental exercise of villagers.
- So, we will provide the design about the same.

6. Overhead tank

- The current condition of overhead tank is vey febble it requires immediate demolition before any incident happen.
- Also New overhead design is required as per the requirement.

Chapter 10.Conclusion of all village visit

From, the village visit we have concluded several problems and that are as follows
Also we would try to resolve the problems in part II

1. Over head tank condition is poor.
2. Bus stand is not available.
3. Secondary school is not available.
4. Bank is not available
5. Poor road network.
6. Poor waste management.

- We have visited to vastral village as an ideal village near Ahmedabad, to determine what kind of facilities should be available in surel village.
- After the survey we found the necessity of various facilities which are required.
- We discussed with surel panchayat authorities for lack of basic amenities and problems faced by villagers.
- Smart village includes value of literacy, income, amenities, quality of life etc.
- Smart facility like hospital, bank, play grounds, best road networks, drinking water facilities etc..
- Many facilities may stops villagers to migrate to other village or town for better quality of life.
- The amenities designed under this Vishwakarma project phase viii will be helpful for better development of the village as physically as well as socially, which improves the overall lifestyle of people along with nation with preserving nature bit by bit.
- This will help in developing Smart villages in sustainable manner, reduce migration from villages and prevent the cities from the urban pressure. This should lead to some rethinking about the meaning of efficiency beyond the usual conceptions of economic or technical efficiency.
- Indeed, employment expansion is at least as important as growth in productivity. In a sense, both represent the utilization of labor as a resource. Why, then, does thinking about efficiency focus on one and neglect the other It is important to reflect on this question. The answer, which calls for change in both economics and politics, could make a real difference.
- Students who want to work towards preservation of rural soul of country can do many things for our own good and environment. By implanting given design proposals, we can say that all the missing amenities are provided will stop the migration of rural people towards the urban area. Thiscan cause reduce the load on urban areas as well as pollution in both sector can be minimized gradually.

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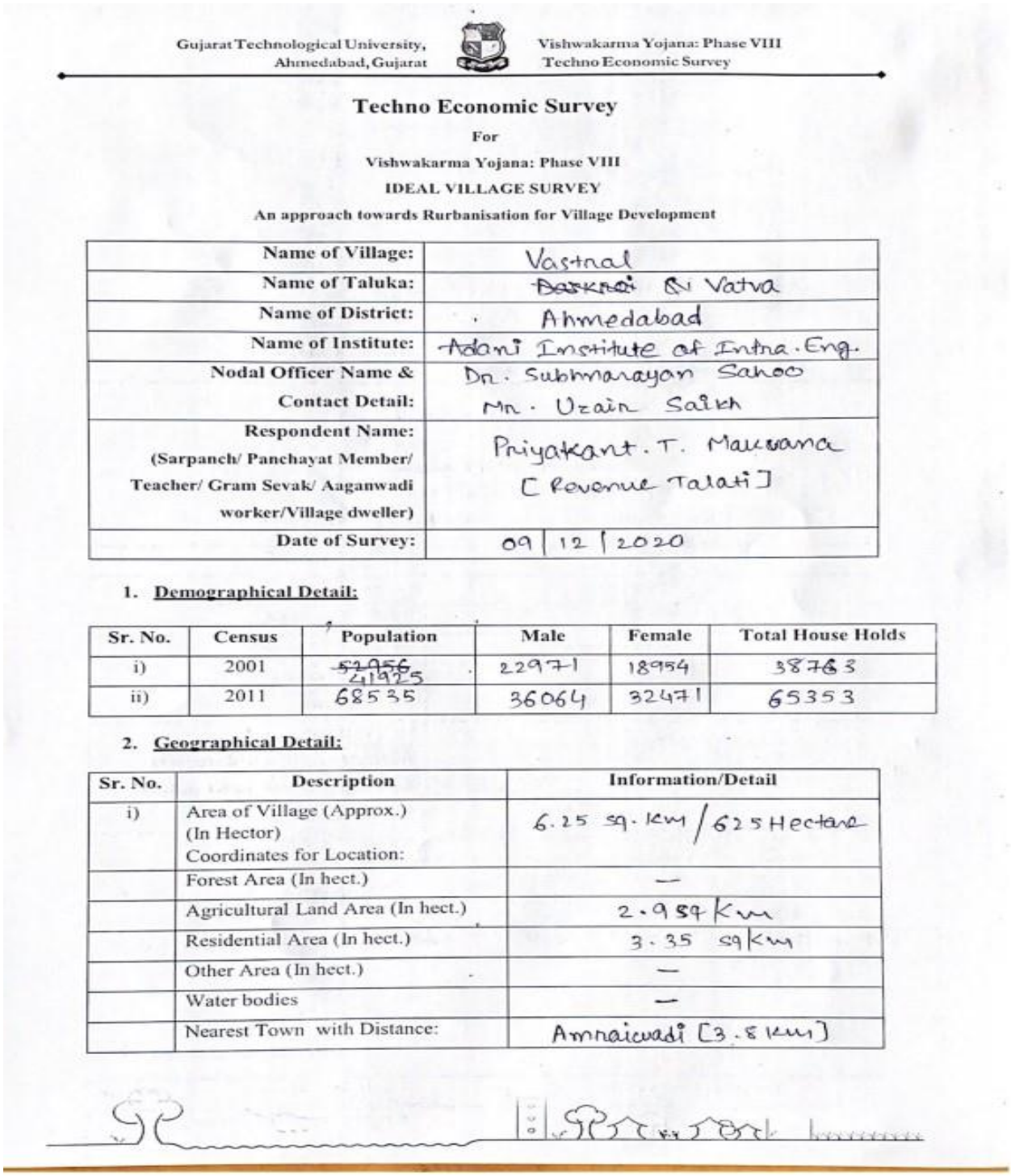
- Various government schemes.

Chapter 12.Annexure

12.1 Survey form of Vastral village scanned copy



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:	Vastral
Name of Taluka:	~~Daskroi~~ & Vatva
Name of District:	Ahmedabad
Name of Institute:	Adani Institute of Infra. Eng.
Nodal Officer Name & Contact Detail:	Dr. Subhmarayan Sahoo Mr. Uzair Saiyd
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Priyakant. T. Makwana [Revenue Talati]
Date of Survey:	09 | 12 | 2020

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	~~52956~~ 41925	22971	18954	38763
ii)	2011	68535	36064	32471	65353

2. **Geographical Detail:**

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	6.25 sq. km / 625 Hectare
	Forest Area (In hect.)	—
	Agricultural Land Area (In hect.)	2.954 Km
	Residential Area (In hect.)	3.35 sq Km
	Other Area (In hect.)	—
	Water bodies	—
	Nearest Town with Distance:	Amraiwadi [3.8 Km]

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

3. Occupational Details:

Name of Three Major Occupation groups in Village	1.	Labour
	2.	Factory worker
	3.	Private jobs

4. Physical Infrastructure Facilities:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
	• Tap Water (Treated/ Untreated) • RO Water • Well (Covered/ Uncovered) • Hand pumps • Tube well/ Borehole • River/ Canal/ Spring/ Lake/ Pond	Tap water (Treated)	✓	–	–
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: 5000L	✓	–	–
	Underground Sump	Capacity: NA	–	–	–
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	Yes	✓	–	–
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open	Closed	✓	–	–
	If Open than Pucca / Kutchcha	–	–	–	–
	Whether drain water is discharged directly in to Water bodies/ Sewer plants				
Suggestions if any:					

E.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Bitumen	✓	–	–
	Main road	Bitumen	✓	–	–
	Internal streets	RCC	✓	–	–
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH > 10 KM	✓	–	–
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	Yes 7.1 KM	✓	–	–
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes 0.5 KM	✓	–	–
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	✓	–	–
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes Private >6 Hr	✓	–	–
	Power supply for Domestic Use	Yes	✓	–	–
	Power supply for Agricultural Use	Yes	✓	–	–
	Power supply for Commercial Use	Yes	✓	–	–
	Road/ Street Lights	Yes	✓	–	–

	Electrification in Government Buildings/ Schools/ Hospitals	Yes	✓	–	–
	Renewable Energy Source Facilities (Y/ N)	Yes	✓	–	–
	LED Facilities	Yes	✓	–	–
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes	✓	–	–
	Location Condition	Good	✓	–	–
	Community Toilet (With bath/ without bath facilities)	Yes	✓	–	–
	Solid & liquid waste Disposal system available	Yes	✓	–	–
	Any facility for Waste collection from road	Yes	✓	–	–
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	tubewell	✓	–	–
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	10 : 90 %	✓	–	–

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

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	Condition:				
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	Yes Average	✓	–	–
	Public Garden Location: Condition:	Yes Good	✓	–	–
	Village Pond Location: Condition:	NO	✓	–	–
	Recreation Center Location: Condition:	NO	✓	–	–
	Cinema/ Video Hall Location: Condition:	Yes Good	✓	–	–
	Assembly Polling Station Location: Condition:	Yes Good	✓	–	–
	Birth & Death Registration Office Location: Condition:	Yes 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	Yes	✓	–	–
	Telecommunication Network/ STD booth	Yes	✓	–	–

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

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

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
O.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	Yes solar Panel	✓	–	–
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	

Recent Projects going on for Development of Village	
Any NGO working for village development	

8. **Additional Information/ Requirement:**

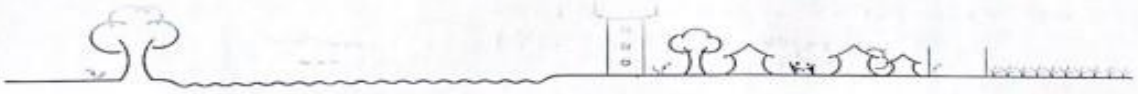
Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Repair & Maintenance of Existing Public Infrastructure facilities(School Building, Health Center, Panchayat Building, Public Toilets & any other)		
2.	Additional Information/ Requirement		

9. **Smart Village Proposal Design**

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Is there anything for village enhancement possible?	Beautification of pond	

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 Vatva village scanned copy

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

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

Name of District:	~~Vastnal~~ Ahmedabad
Name of Taluka:	Vatva
Name of Village:	Vastnal
Name of Institute:	Adani Institute of Infra. Eng.
Nodal Officer Name & Contact Detail:	Dr. Subhnarayan Sahoo Prof. Uzair Saiyed
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Priyavrat T. Macwana [Revenue Talati]
Date of Survey:	09/12/2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	41925	22971	18954	3876 3
2.	2011	~~36064~~ 65535	36064	32471	65 35 3

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	6.25 sq km / 625 Hectre
2.	Forest Area (In hect.)	—
3.	Agricultural Land Area (In hect.)	2.9 sq km
4.	Residential Area (In hect.)	3.35 sq km
5.	Other Area (In hect.)	—
6.	Distance to the nearest railway station (in kilometers):	7.1 km

7.	Name of Nearest Town with Distance:	Amraiwadi (3-5 km)
8.	Distance to the nearest bus station (in kilometers):	0.5 km
9.	Whether village is connected to all road for the any facility or town or City?	Yes

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1.	Labour
	2.	factory worker
	3.	Private jobs

Major crops grown in the village:	1.	wheat
	2.	rice
	3.	Bajra

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

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Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: 5000L	✓	✓	—
	Underground Sump	Capacity: NA	—	—	—
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1 2 B. OPEN WITH OUTLET C. OPEN WITHOUT OUTLET	✓	✓		
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Bitumin	✓	—	—
	Main road	Bitumin	✓	—	—
	Internal streets	RCC	✓	—	—
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH >10Km	✓	—	—
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	Yes 7to 10Km	✓	—	—
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes 0.5 Km	✓	—	—
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	✓	—	—
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes Private >6Hr	✓	—	—

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	Power supply for Domestic Use	Yes	✓	–	–
	Power supply for Agricultural Use	Yes	✓	–	–
	Power supply for Commercial Use	Yes	✓	–	–
	Road/ Street Lights	Yes	✓	–	–
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	✓	–	–
	Renewable Energy Source Facilities (Y/ N)	Yes	✓	–	–
	LED Facilities	Yes	✓	–	–
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes	✓	–	–
	Location Condition	Good			
	Community Toilet (With bath/ without bath facilities)	Yes	✓	–	–
	Solid & liquid waste Disposal system available	Yes	✓	–	–
	Any facility for Waste collection from road	Yes	✓	–	–
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL OTHER (SPECIFY)	Tube well	✓	–	–
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	10:90.1	✓	–	–

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

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

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Suggestions if any:

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

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

Suggestions if any:

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

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

Suggestions if any:

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

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	solar Panel	✓	—	—
2.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System				
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	soft copy	✓	—	—
2.	Recent Projects going on for Development of Village	Smart Pickup stand	✓	—	—
3.	Any NGO working for village development	NO	—	—	—
4.	Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS CYCLONE DROUGHT LANDSLIDES AVALANCHE OTHER (SPECIFY)	NO	—	—	—

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks

1.	Repair & Maintenance of Existing Public Infrastructure facilities, School Building Health Center Panchayat Building Public Toilets & any other		
2.	Additional Information/ Requirement		
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?	Regular cleaning	

IX. Smart Village / Heritage Details

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

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

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

12.3 Survey form of surel village scanned copy

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

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

Name of District:	Surendranagar
Name of Taluka:	Dasada
Name of Village:	Surel
Name of Institute:	Adani Institute
Nodal Officer Name & Contact Detail:	Dr. Subhonoyan Sahoo Mr. Urain Shaikh
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Sunela Kantaben Rasikbhai [Sarpanch]
Date of Survey:	10 | 12 | 2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	~~[illegible]~~ NA	~~[illegible]~~ NA	~~[illegible]~~ NA	~~[illegible]~~ NA
2.	2011	~~[illegible]~~ 2647	~~[illegible]~~ 1413	~~8,66,391~~ 1234	~~[illegible]~~ 526

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	~~[illegible]~~ Hectar 3063.07
2.	Forest Area (In hect.)	175.55~~[illegible]~~ Hectar
3.	Agricultural Land Area (In hect.)	389.25 Hectar
4.	Residential Area (In hect.)	374.08 Hetar
5.	Other Area (In hect.)	15.67 Hetar
6.	Distance to the nearest railway station (in kilometers)	~~[illegible]~~ > 10 km

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Gujarat Technological University, Ahmedabad, Gujarat — Vishwakarma Yojana: Phase VIII, Techno Economic Survey

7.	Name of Nearest Town with Distance:	~~Surendranagar~~ Rajva [7 km]
8.	Distance to the nearest bus station (in kilometers):	Sipun [8.6 km]
9.	Whether village is connected to all road for the any facility or town or City?	Yes

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1. Main Worke 2. Cultivators 3. Agricultural Labourer

Major crops grown in the village:	1. Cotton 2. Sesame 3. Pearlmillet / Bajra

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	Tube well or Bore well	✓	—	—
2.	**DUG WELL** Protected Well Un Protected Well	—	—	—	—
3.	**WATER FROM SPRING** Protected Spring Unprotected Spring Rainwater Tanker Truck Cart With Small Tank	Unprotected spring	—	✓	Needs Improvement
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/** Irrigation Channal Bottled Water Hand Pump	Pond	—	✓	—

	Other(Specify)Lake/ Pond	Pond	–	✓	–
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	100000 Lit.		Poor condition
	Underground Sump	Capacity:			
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE	NA	–	–	–
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Bitumen	✓	–	–
	Main road	Bitumen	✓	–	–
	Internal streets	Pcc / sand	–	✓	–
	Nearest NH/SH/MDR/ODR Dist. in kms.	NA	–	–	–
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	NO [5-10 Km]	✓	–	–
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	NO	–	–	–
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	✓	–	–
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes	✓	–	–

	Power supply for Domestic Use	24 Hr	✓	—	—
	Power supply for Agricultural Use	8 Hr	—	✓	—
	Power supply for Commercial Use	24 Hr	✓	—	—
	Road/ Street Lights	Yes	✓	—	—
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	—	✓	—
	Renewable Energy Source Facilities (Y/ N)	NO	—	—	—
	LED Facilities	NO	—	—	—
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available then Nos.	Yes	—	✓	Poor condition
	Location Condition				
	Community Toilet (With bath/ without bath facilities)	NO	—	—	—
	Solid & liquid waste Disposal system available	NO	—	—	—
	Any facility for Waste collection from road	NO	—	—	—
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL OTHER (SPECIFY)	Pond Tube well	✓	—	—
Suggestions if any:					
I.	**Housing Condition:**				
	Kuchha/Pucca (Approx. ratio)	50:1 50:1	—	✓	—

V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi) Sub-Centre PHC BLOCK PHC CHC/RH District/ Govt. Hospital Govt. Dispensary Private Clinic Private Hospital/ Nursing Home AYUSH Health Facilty sonography /ultrasound facility	Govt. Primary school Govt. Sub Health Centre	–	✓	Poor condition Needs Improvement
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Anganwadi/ Play group	NOT 0	–	–	–
	Primary School	1	–	✓	Poor condition
	Secondary school	NOT 0	–	–	–
	Higher sec. School	0	–	–	–
	ITI college/ vocational Training Center	0	–	–	–
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	0	–	–	–

If any of the above Facility is not available in village than approx. distance from village: 65 ...kms.

Suggestions if any:

L.	Socio- Culture Facilities	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	–	–	–	NO
	Public Library (With daily newspaper supply: Y/N)	–	–	–	NO
	Public Garden	–	–	✓	NO
	Village Pond	Not Good	–	–	Yes
	Recreation Center	–	–	–	NO
	Cinema/ Video Hall	–	–	–	NO
	Assembly Polling Station	Good	–	–	Yes
	Birth & Death Registration Office	–	–	–	NO

If any of the above Facility is not available in village than approx. distance from village: 32 ...kms.

Suggestion if any:

M.	Other Facilities	Condition	Location	Available (YES)	Available (NO)
	Post-office	–	3 km	–	No
	Telecommunication Network/ STD booth	–	–	–	NO
	General Market	Average	–	Yes	–
	Shops (Public Distribution System)	Good	–	Yes	–
	Panchayat Building	Poor	–	Yes	–
	Pharmacy/Medical Shop	Average	–	Yes	–
	Bank & ATM Facility	Good	11 km	Yes	–
	Agriculture Co-operative Society	–	–	–	NO
	Milk Co-operative Soc.	–	–	–	No
	Small Scale Industries	–	–	–	NO
	Internet Cafes/ Common Service Center/Wi Fi	–	–	–	NO
	Youth Club	–	–	–	NO
	Mahila Mandal	–	–	–	NO

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

Suggestions if any:

N.	Other Facilities	Condition		Available (YES)	Available (NO)
	1. Have these programme implemented the village? 2. Are there any beneficiaries in the village from the following programme?				NO
	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)	—	—	Yes	—
	12. Rajiv Gandhi National Drinking Water Mission 13. Swarnjayanti Gram Swarozgar Yojana				NO
	14. Minimum Needs Programme (MNP) 15. National Rural Employment Programme 16. Employee Guarantee Scheme (EGS) 17. Prime Minister Rojgar Yojana (PMRY)	—	—	Yes	—
	18. Jawahar Rozgar Yojana (JRY) 19. Indira Awas Yojna (IAY) 20. Samagra Awas Yojana (SAY) 21. Sanjay Gandhi Niradhar Yojana (SGNY) 22. Jawahar Gram Samridhi Yojana (JGSY) 23. Other (SPECIFY)				NO

7

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

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

VII. DATA COLLECTION FROM VILLAGE

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

8

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

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

IX. Smart Village / Heritage Details

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

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

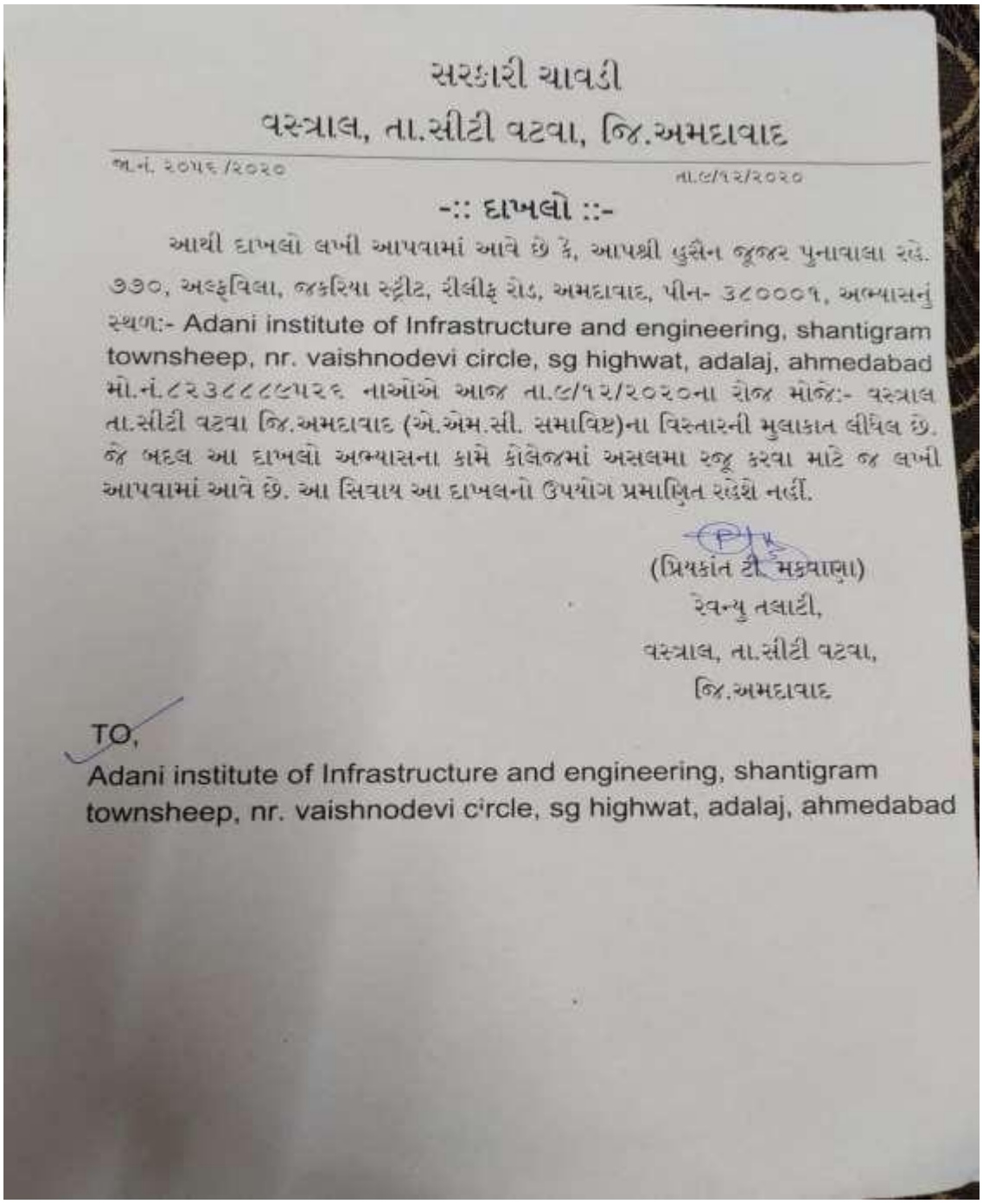
For Any Administration queries/ Difficulties:
GTU VY Section
Contact No – 079-23267588
Email ID: ruhan@gtu.edu.in

12.4 Surel village Gap analysis

VILLAGE GAP Analysis

Village Facilities	Planning Commission/UDPFI Norms	Village Name: Surel			
		Population:			2647
		Existing	Required as per Norms	Smart Vilage / Cities / Heritage Future Projection Design	Gap
Social Infrastructure Facilities					
Education					
Anganwadi	Each or Per 2500 population	1	0	0	1
Primary School	Each Per 2500 population	1	0	0	1
Secondary School	Per 7,500 population	0	0 1	0	0
Higher Secondary School	Per 15,000 Population	0	0 1	0	0
College	Per 125,000 Population	0	0 1	0	0
Tech. Training Institute	Per 100000 Population	0	0 1	0	0
Agriculture Research Centre	Per 100000 Population	0	0	0 1	0
Skill Development Center	Per 100000 Population	0	0	0 1	0
Health Facility					
Govt/Panchyat Dispensary or Sub PHC or Health Centre	Each Village	1	0	1	1
Primary Health & Child Health Center	Per 20,000 population	0	1	1	1
Child Welfare and Maternity Home	Per 10,000 population	0	0	0	0
Multispecialty Hospital	Per 100000 Population	0	0 1	1	1
Public Latrines	1 for 50 families (if toilet is not there in home, specially for slum pockets & kutcha house)	1	4	3	3
Physical Infrastructure Facilities					
Transportation		Adequate / Inadequate	Inadequate		
Pucca Village Approach Road	Each village	✓	—	—	—
Bus/Auto Stand provision	All Villages connected by PT (ST Bus or Auto)	✓	—	—	—
Drinking Water (Minimum 70 lpcd)		Adequate / ~~Inadequate~~	Inadequate		—
Over Head Tank	1/3 of Total Demand	✓	—	—	—
U/G Sump	2/3 of Total Demand	✓	—	—	—
Drainage Network - Open		~~Adequate / Inadequate~~ ✓	Inadequate		—
Drainage Network - Cover					—
Waste Management System		Adequate / Inadequate			—
Socio- Cultural Infrastructure Facilities					
Community Hall	Per 10000 Population	0	1	0	-1
community hall and Public Library	Per 15000 Population	0	1	0	-1
Cremation Ground	Per 20,000 population	1	1	0	0
Post Office	Per 10,000 population	1	0	0	0
Gram Panchayat Building	Each individual/group panchayat	1	0	0	0 1
APMC	Per 100000 Population	0	1	1	-1
Fire Station	Per 100000 Population	0	1	1	-1
Public Garden	Per village	0	1	1	-1
Police post	Per 40,000Population	1	1	0	0
Shopping Mall					
Electrical Design					
Electricity Network		Adequate / ~~Inadequate~~ ✓	Inadequate		
Any Smart Village Facility					
Technology					
		ESR cap	0		
		Sump cap	0		
		Lat	0		

12.5 Vastral village interaction with talati



સરકારી ચાવડી

વસ્ત્રાલ, તા.સીટી વટવા, જિ.અમદાવાદ

જા.નં. ૨૦૫૬/૨૦૨૦ તા.૯/૧૨/૨૦૨૦

-:: દાખલો ::-

આથી દાખલો લખી આપવામાં આવે છે કે, આપશ્રી હુસૈન જુજર પુનાવાલા રહે. ૭૭૦, અલ્ફવિલા, જકરિયા સ્ટ્રીટ, રીલીફ રોડ, અમદાવાદ, પીન- ૩૮૦૦૦૧, અભ્યાસનું સ્થળ:- Adani institute of Infrastructure and engineering, shantigram townsheep, nr. vaishnodevi circle, sg highwat, adalaj, ahmedabad મો.નં.૮૨૩૮૮૯૫૨૬ નાઓએ આજ તા.૯/૧૨/૨૦૨૦ના રોજ મોજે:- વસ્ત્રાલ તા.સીટી વટવા જિ.અમદાવાદ (એ.એમ.સી. સમાવિષ્ટ)ના વિસ્તારની મુલાકાત લીધેલ છે. જે બદલ આ દાખલો અભ્યાસના કામે કોલેજમાં અસલમા રજૂ કરવા માટે જ લખી આપવામાં આવે છે. આ સિવાય આ દાખલનો ઉપયોગ પ્રમાણિત રહેશે નહીં.

(પ્રિયકાંત ટી. મકવાણા)
રેવન્યુ તલાટી,
વસ્ત્રાલ, તા.સીટી વટવા,
જિ.અમદાવાદ

TO,
Adani institute of Infrastructure and engineering, shantigram townsheep, nr. vaishnodevi circle, sg highwat, adalaj, ahmedabad

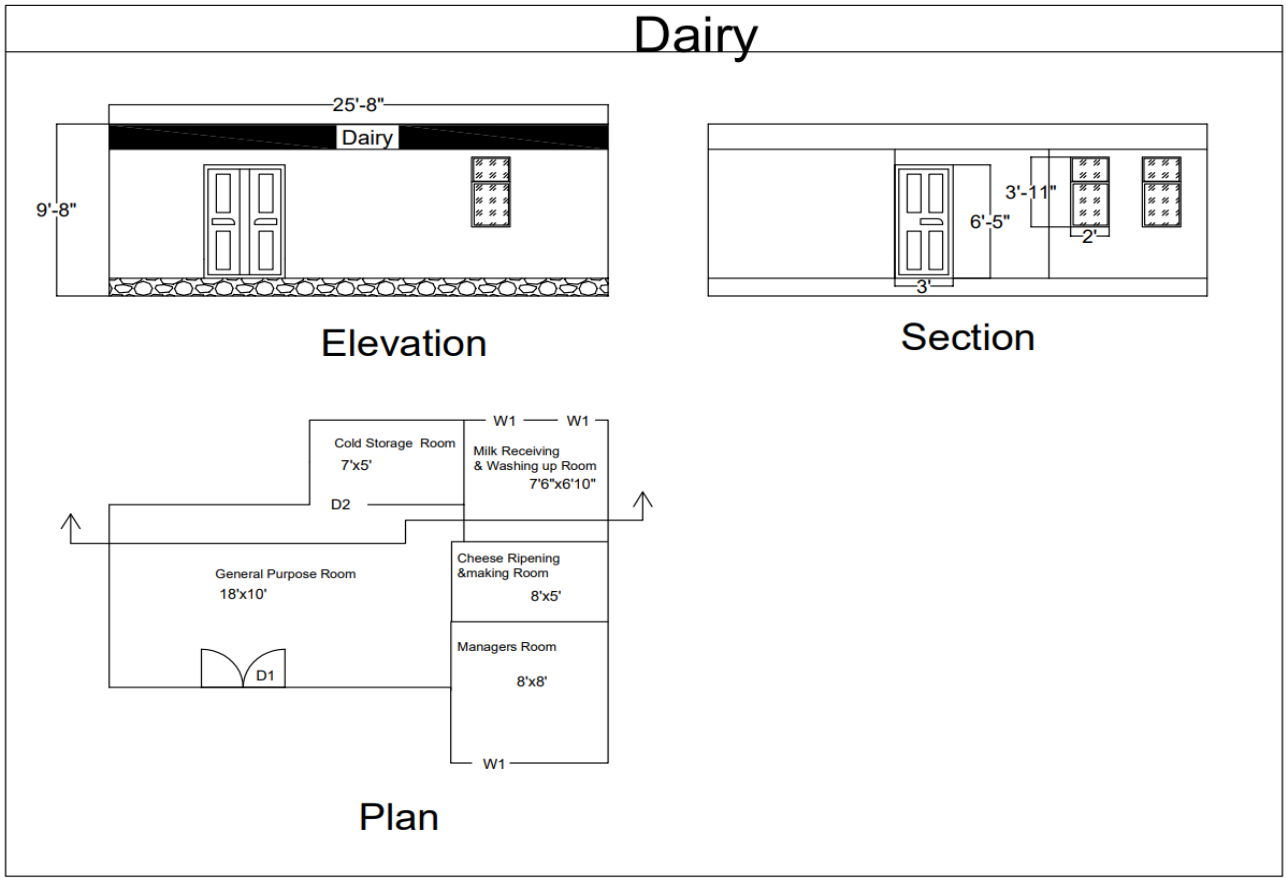
12.6 Village visit Photographs

Figure 28 Village visit

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 Autocad design / planning with any software

13.1 Design proposal

13.1.1 Dairy



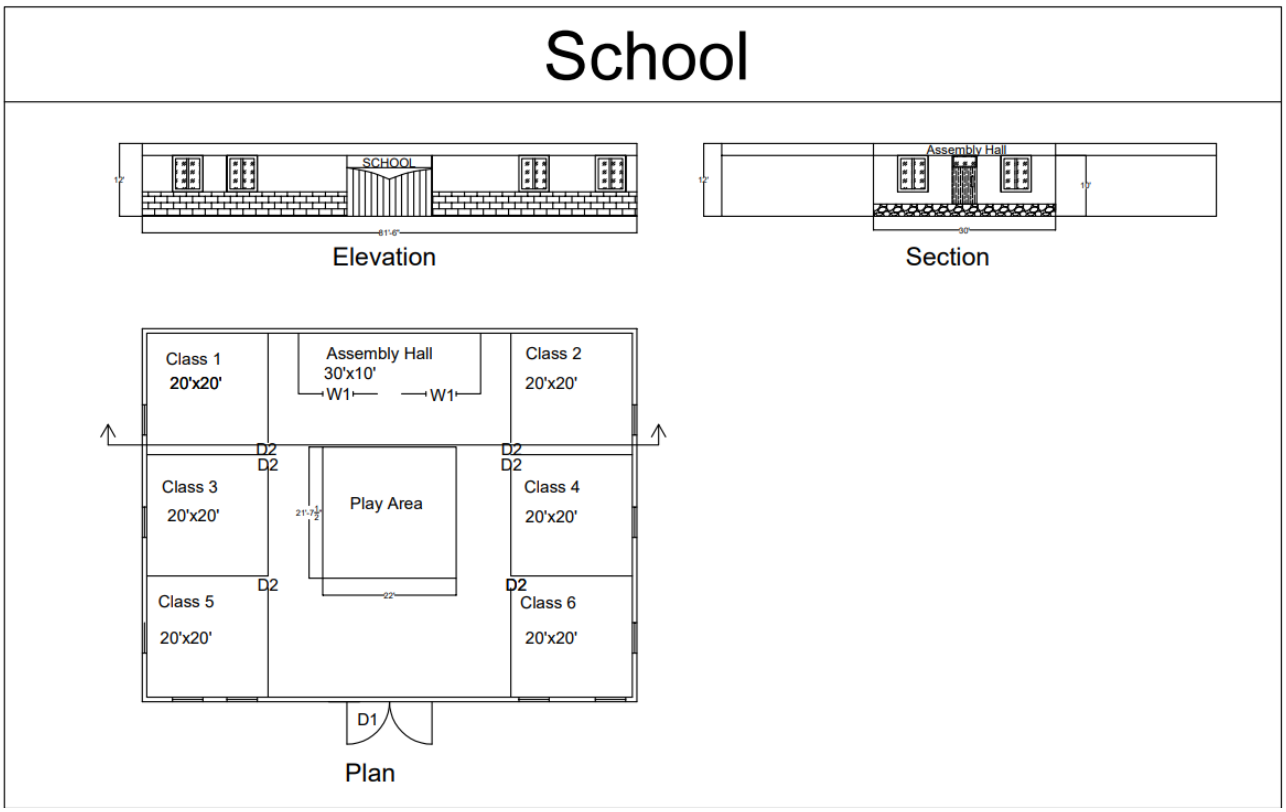
Plan , Elevation and section of Dairy

- The milk makers of a town, having surplus milk after own utilization, come together and structure a Village Dairy Cooperative Society (VDCS).
- The Village Dairy cooperative is the essential pop culture under the three-level structure. It has participation of milk makers of the town and is legislated by a selected Management Committee.
- Collection of surplus milk from the milk makers of the town & installment taking into account quality & amount

- This committee comprises of 9 to 12 representatives of the milk union focused around the rule of one part, one vote. The town public opinion further selects a Secretary (a paid representative and part secretary of the Management Committee) for administration of the normal capacities.

SR NO.	Description	Quantity(m^3)	rate	per	Amount
1	BASIC WALL: 9": 4	26.58	130	Ft^2	**154554**
2	BASIC WALL: 9" PL: 4	4.5	90	Ft^2	**45550**
3	BASIC WALL: GENERIC - 6": 5	3.6	90	Ft^2	**30124**
4	BASIC WALL: GENERIC - 6" 2: 4	2.7	90	Ft^2	**2415.3**
5	WINDOW-CASEMENT- DOUBLE: 48" X 60": 6	18ft	220	-	**3960**
6	WINDOW-LOUVERS: 16" X 24": 2	390inch	75	-	**29250**
7	BASIC ROOF: GENERIC -6"	20.58	3500	M^3	**72030**
8	FLOOR: GENERIC - 10"	20.57	3500	M^3	**71995**
9	DOOR-INTERIOR-DOUBLE-SLIDING-2_PANEL-WOOD: 72" X 84"	-	-	-	**9200**
10	SINGLE-FLUSH: 30" X 80" 2	-	-	-	**4500**
11	EXCAVATION	8.5	350	M^3	**2975**
12	PCC	6.55	3500	M^3	**22925**
13	BASIC WALL: 00.30	6.87	90	Ft^2	**6018.3**
14	BASIC WALL: 0.40	6.78	90	Ft^2	**6101.2**
15	BASIC WALL: GENERIC - 0.50	69.54	90	Ft^2	**62258.6**
				GRAND TOTAL	**524698**

13.1.2 school



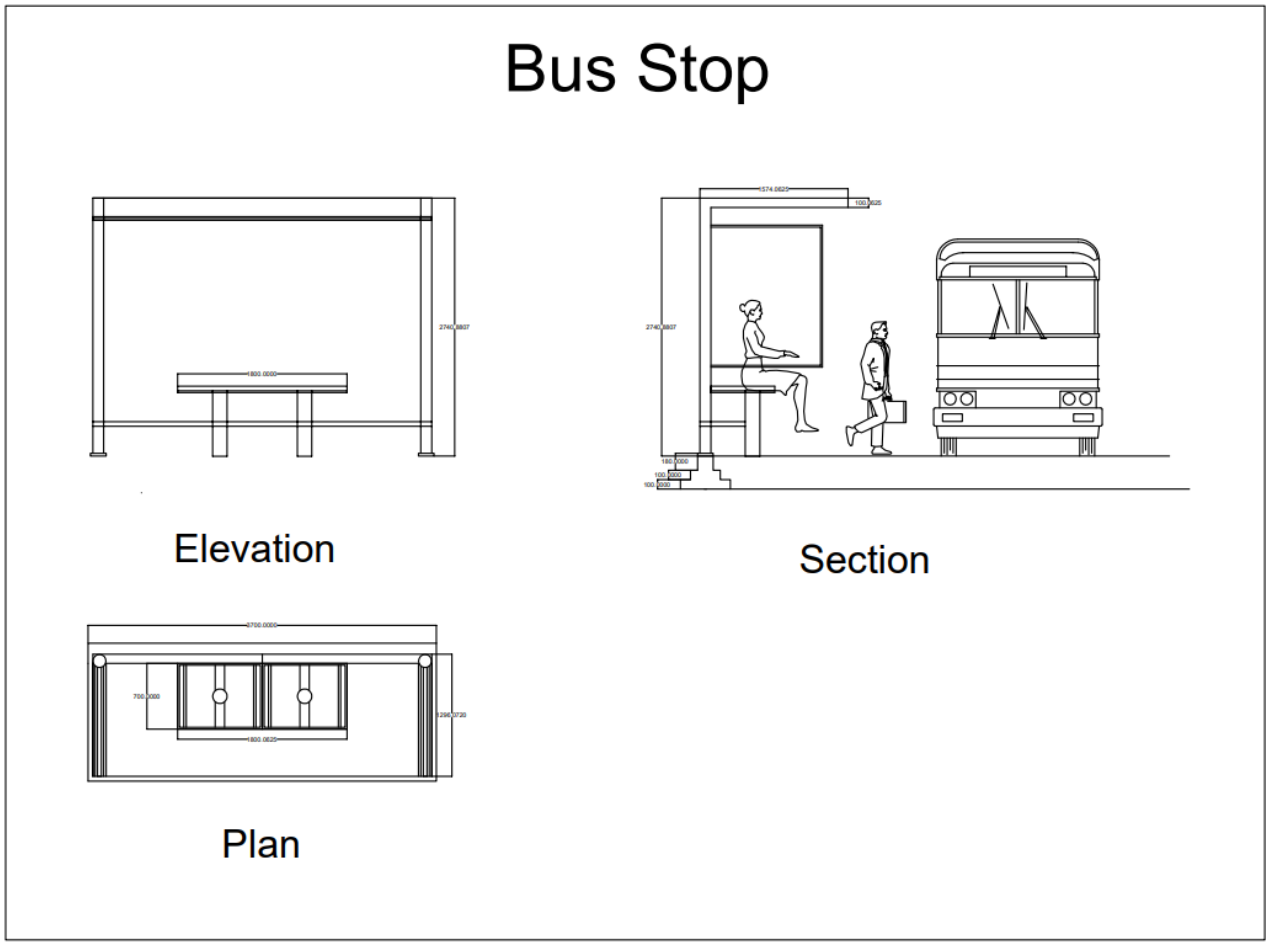
Plan , Elevation and section of Dairy

- In India, education in the rural segments is not only important to eradicate poverty and illiteracy, but also for a variety of other social, economic as well as cultural and political reasons.
- Rural education is important not only for the enhancement of life quality of the rural community, but also for the overall progress and development of the country.
- Education also exposes the masses to information and helps prevent the misinterpretation of information.
- However, if we take a step further, we can think about educating communities, specifically rural
- Educating communities means developing schools and educating children and leaders. By doing so, rural communities will lead to a healthier and more sustainable future.
- An education system in rural communities has the opportunity to build capacity and knowledge in the rural populace, helping them to make informed decisions about their farms and to innovate in agricultural affairs.
- Education also exposes the masses to information and helps prevent the misinterpretation of information.
- It is important to understand the need for good quality education in rural areas.

- Education is considered a vital element in the development of a society, a system, and a country.

SR NO.	Description	Quantity(m^3)	rate	per	Amount
1	BASIC WALL: 9": 4	24.06	130	Ft^2	**146250**
2	BASIC WALL: 9" PL: 4	3.64	90	Ft^2	**12574.5**
3	BASIC WALL: GENERIC - 6": 5	3.62	90	Ft^2	**22010.3**
4	BASIC WALL: GENERIC - 6" 2: 4	2.32	90	Ft^2	**12782.5**
5	WINDOW-CASEMENT- DOUBLE: 48" X 60": 6	25ft	220	-	**23400**
6	WINDOW-LOUVERS: 16" X 24": 2	390	75	-	**25250**
7	BASIC ROOF: GENERIC -6"	11.09	3500	M^3	**38815**
8	FLOOR: GENERIC - 10"	20.80	3500	M^3	**56000**
9	DOOR-INTERIOR-DOUBLE-SLIDING-2_PANEL-WOOD: 72" X 84"	-	-	-	**6000**
10	SINGLE-FLUSH: 30" X 80" 2	-	-	-	**4200**
11	EXCAVATION	1.31	350	M^3	**1702**
12	PCC	10.35	3500	M^3	**20000**
13	BASIC WALL: 00.30	5.02	90	Ft^2	**13520**
14	BASIC WALL: 0.40	5.44	90	Ft^2	**13515**
15	BASIC WALL: GENERIC - 0.50	6.78	90	Ft^2	**15410**
				GRAND TOTAL	**411429**

13.1.3 Bus Stop



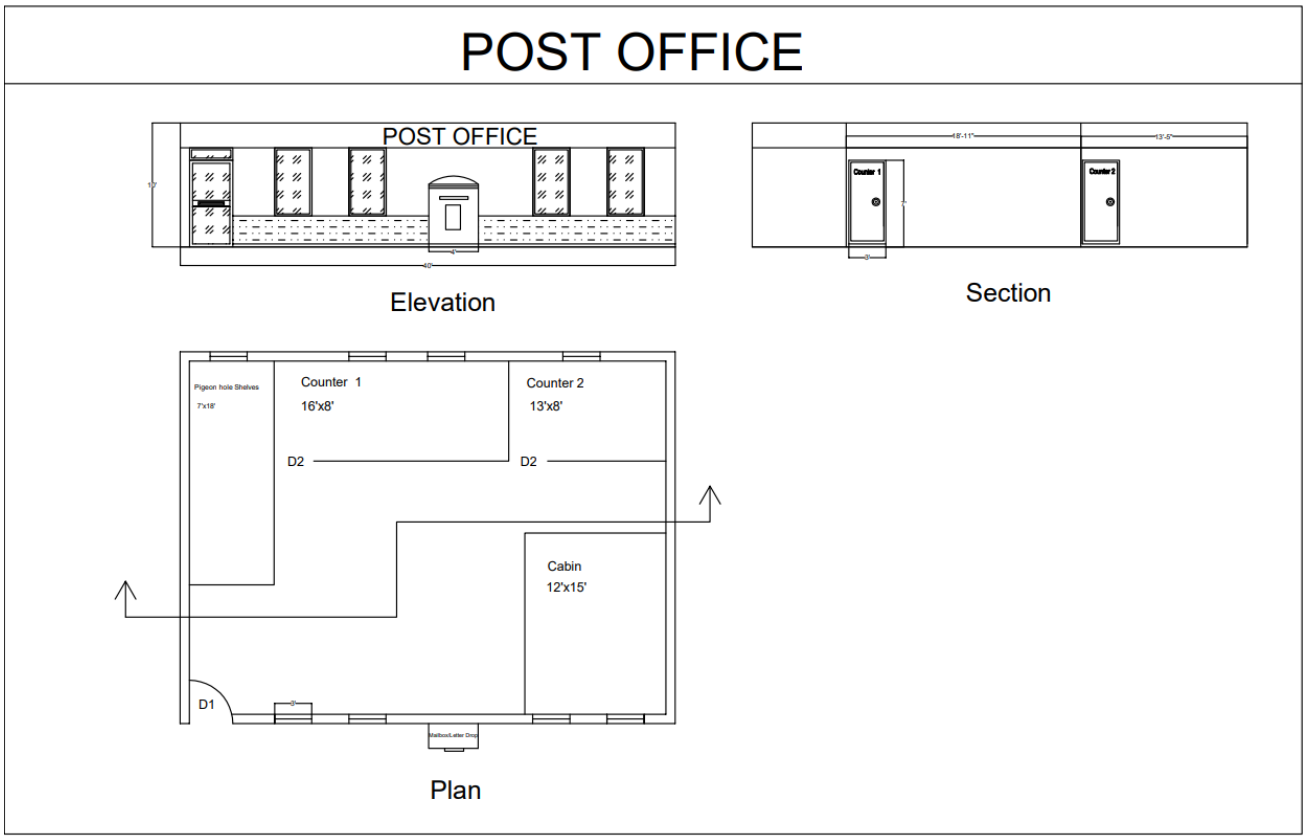
Plan , Elevation and section of Bus stop

- Bus stops prevent passengers from trying to board or alight in hazardous situations such as at intersections or where a bus is turning and is not using the curb lane.
- A bus driver cannot be expected to continuously look for intending passengers. A bus stop means that the driver only needs to look for intending passengers at the approach to each bus stop.
- Having bus stops requires passengers to group themselves prior to boarding, which reduces time spent at boarding.
- At night, when passenger numbers are lower, restrictions are sometimes relaxed and passengers may be allowed to exit the bus anywhere within reason.
- A lack of transport opportunities has been shown to be a barrier for accessibility and social inclusion in contemporary society.
- In rural and sparsely populated areas, access to public transport is often poor compared to urban areas, leading to fewer possibilities to participate in normal relationships and activities among rural dwellers.

- Transportation plays a critical role in the livability of a community – the factors that influence a community's quality of life. Transportation allows for access to food, healthcare, educational opportunities, and employment.
- Additionally, access to transportation increases rural residents' ability to access recreation, entertainment, and other activities that promote community engagement.
- Standardized shelters exist that accommodate various site demands and different passenger volumes. Typically, a shelter is constructed of clear side-panels for clear visibility. Depending on demand and frequency of service, a bus shelter may also have a bench.
- The decision to install a shelter is a result of systemwide policy among transit agencies. Many criteria exist to determine shelter installation at a bus stop. In most instances, the estimated number of passenger boardings has the greatest influence.
- Priority may or may not be given to each of these items depending on policy. System equity or funding availability can cause the installation decision to be made on a case-by-case basis. Local priorities and neighborhood requests can also influence the decision to include a shelter at a bus stop.

	Description	Quantity (m^3)	rate	per	Amount
1	BASIC WALL: 9" EXTERIOR 1	4.75	130	Ft^2	**34051**
2	TOP ROOF	1	130	Ft^2	**20000**
3	FLOOR	1	150	Ft^2	**35000**
4	PLINTH WALL WITH STAIRS	1	500	Ft^2	**69801**
5	EXCAVATION	3.7	350	M^3	**5040**
6	PCC	9.32	3500	M^3	**36260**
7	BASIC WALL: 00.30	18.5	90	Ft^2	**9580**
8	BASIC WALL: 0.40	24.67	90	Ft^2	**9580**
9	BASIC WALL: GENERIC - 0.50	30.84	90	Ft^2	**9580**
				GRAND TOTAL	**228892**

13.1.4 Post office



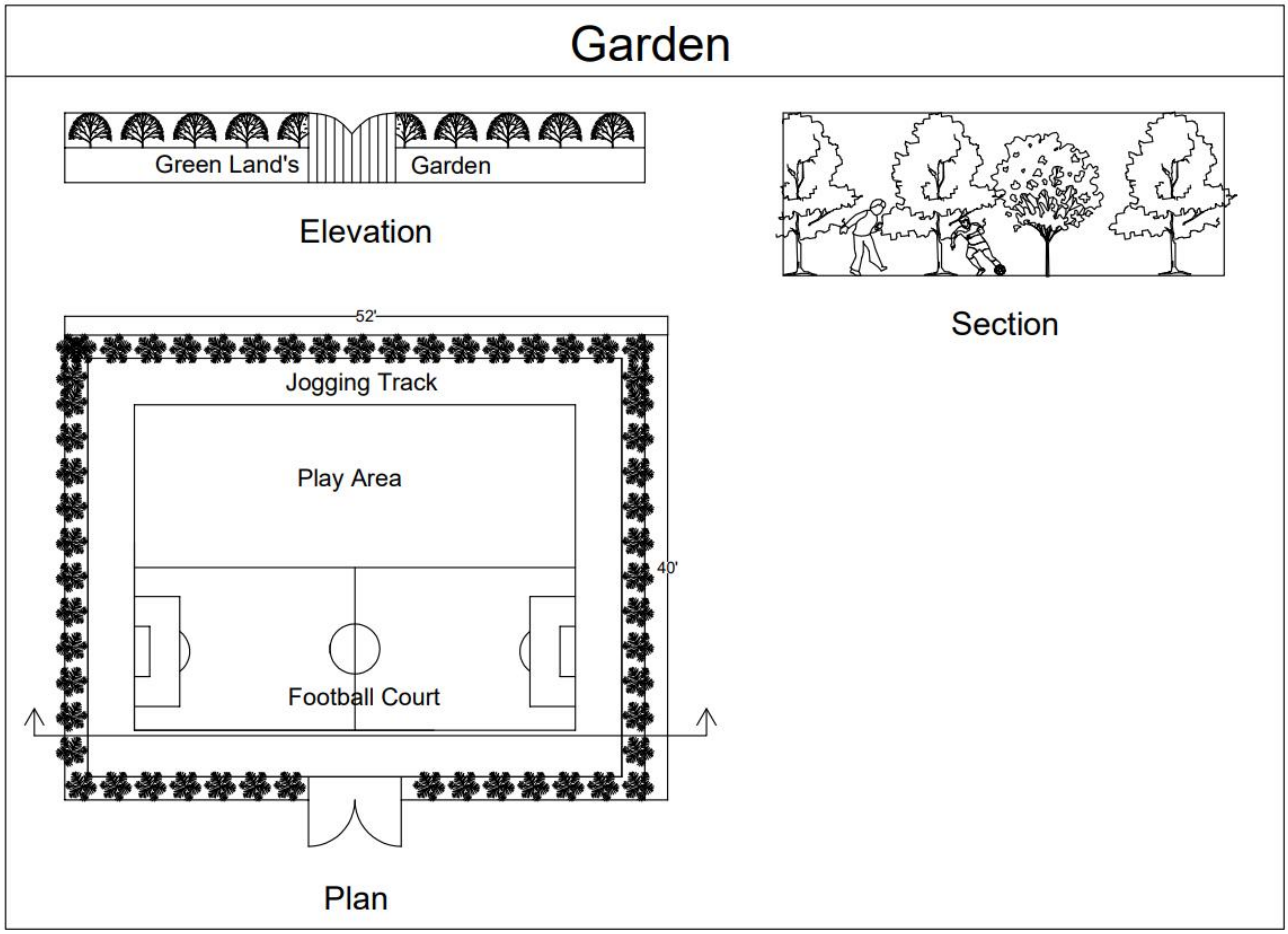
Plan , Elevation and section of post office

- There is a post office in almost every locality in a town or city. Every village tool has a post office. It is a very important building as it is the centre of all postal activity in a locality and letters remain the most widely used mode of communication in India.
- A post office is headed by a Post Master who looks after the working of the postal) department of the area.
- A post office is a public facility that provides mail services, such as accepting letters and parcels, providing post office boxes, and selling postage stamps, packaging, and stationery. Post offices may offer additional services, which vary by country.
- As the largest postal network in the world, India Post has functioned as a major enabler for the socio-economic development of India, touching the lives of Indians in every corner of the country, particularly in rural India.
- India Post has functioned as the government's agent for providing last mile delivery of government schemes to the poor. These include distributing old age pensions, scholarships, and rural employment guarantee schemes for the weaker sections of society.

- Generations of Indians have grown up with a first-hand experience of mail services offered over the counter at Post Offices. The counter sales functions include the sale of the inexpensive and humble postcards to inland letter cards, envelopes, stamps and other postal stationery.

SR NO.	Description	Quantity(m^3)	rate	per	Amount
1	BASIC WALL: GENERIC - 9" 2	4.75	130	Ft^2	34051
2	BASIC WALL: GENERIC - 9" 2	1	90	Ft^2	5852
3	DOOR-EXTERIOR-DOUBLE-TWO LITE: 72" X 80"	2	460	Ft^2	7667
4	1452181752750-CURTAIN WALL DOOR: AUS GLASS FRAMED W D-PULL	2	822	Ft^2	16842
5	WINDOW- CASEMENT-DOUBLE: 49" X 60"	6	415	Ft^2	6980
6	CAST-IN-PLACE STAIR: MONOLITHIC STAIR	1	800	Ft^2	10600
7	BASIC ROOF: GENERIC - 12" 2	3.61	3500	M^3	12635
8	FLOOR: GENERIC - 12"	3.61	3500	M^3	12635
9	EXCAVATION	3.6	350	M^3	5040
10	PCC	9.32	3500	M^3	32620
11	BASIC WALL: 00.30	18.5	90	Ft^2	9580
12	BASIC WALL: 0.40	24.67	90	Ft^2	9580
13	BASIC WALL: GENERIC - 0.50	30.84	90	Ft^2	9580
				GRAND TOTAL	212397

13.1.5 Garden



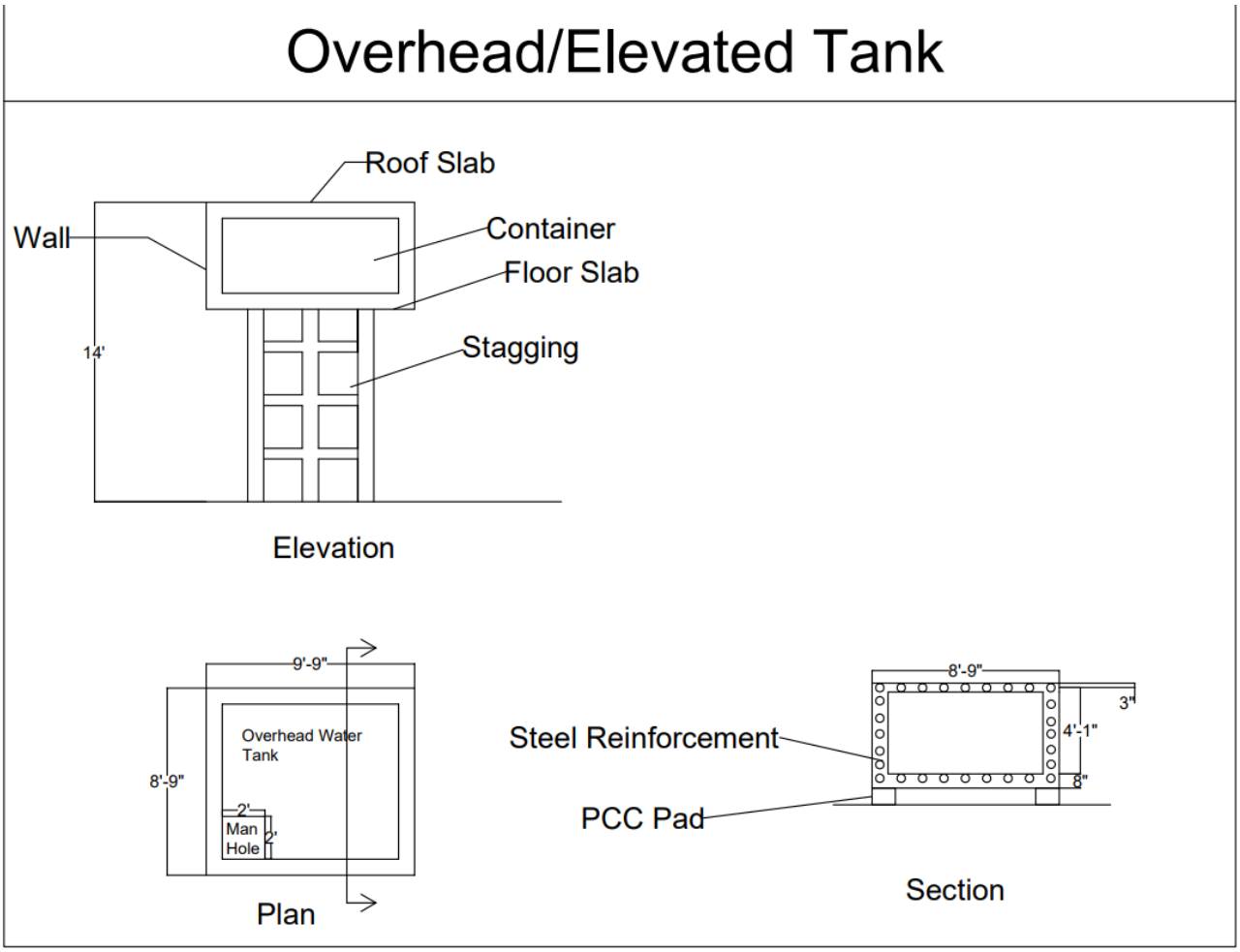
Plan , Elevation and section of Garden

- Community gardens are part of the sharing economy. They make it possible for many people to enjoy a resource – in this case, land for gardening – that they couldn't afford on their own. However, it's not just the gardeners themselves who gain from community gardens – the benefits extend to the rest of the neighborhood and even to society as a whole.
- Many community gardens sit on what were once vacant lots filled with rubbish. When urban gardeners take over, they clear away the debris and replace it with lush greenery. Community gardening turns urban eyesores into vibrant green space, which improves the quality of life for everyone in the neighborhood – not just the people who actually tend the garden.
- There's even some evidence that having a community garden increases property values in the surrounding area.

- The plants in a community garden add oxygen to the air and help reduce air pollution. They also absorb rainwater, reducing the amount of runoff that runs through the streets and carries pollutants into rivers and lakes. Many community gardens also take part in composting, recycling plant waste such as leaves and tree trimmings into useful fertilizer
- Sharing a community garden gives people a chance to connect with their neighbors. Gardeners also feel more personally invested in the places where they live, gaining sense of ownership and community spirit. And because they get people out of their apartments where they can keep an eye on the street, community gardens can help reduce crime in the surrounding neighborhood.
- Working in a community garden is a good way for kids to learn about where food comes from and gain a basic introduction to environmental issues, work skills, and business principles.

SR. NO	Description	Length (m)	Width (m)	Height (m)	Count (Nos.)	Total Quantity (m^3)
1	GLASS DOOR WITH ALUMINUM FRAME	3	0.2286	2.35	1	**5.795**
2	BASIC ROOF: GENERIC	5.9	0.2563	6.321	1	**2.35**
3	FLOOR: 10"	3.2	2.548	0.365	1	**4.6**
4	BASIC WALL: 9" EXTERIOR	38.55	0.2561	0.762	3	**0.236**
5	BASIC WALL: 9" EXTERIOR	63.98	0.256	0.1628	1	**0.236**
6	CAST-IN-PLACE STAIR:	21.56	1.524	.1524	1	**0.36**
7	PCC IN FOOTING	0.35	0.4	0.6	1	**1**
8	BASIC WALL: 0.40	0.20	0.40	0.4	1	**0.4**
9	BASIC WALL: 00.30	0.20	0.38	0.4	1	**0.4**
10	BASIC WALL: GENERIC – 0.50	**0.25**	**0.38**	0.4	**1**	**0.6**
11	EXCAVATION	**0.50**	0.40	1.5	1	**90**

13.1.6 Overhead Tank



Plan , Elevation and section of Over Head Tank

- Water tanks are used to provide storage of water for use in many applications, drinking water, irrigation agriculture, fire suppression, agricultural farming, both for plants and livestock, chemical manufacturing, food preparation as well as many other uses. Water tank parameters include the general design of the tank, and choice of construction materials, linings.
- Various materials are used for making a water tank: plastics (polyethylene, polypropylene), fiberglass, concrete, stone, steel (welded or bolted,[1] carbon, or stainless). Earthen pots, such as matki used in South Asia, can also be used for water storage. Water tanks are an efficient way to help developing countries to store clean water

- The contamination can come from a variety of origins including piping, tank construction materials, animal and bird feces, mineral and gas intrusion. A correctly designed water tank works to address and mitigate these negative effects.

SR NO.	Description	Quantity(m^3)	rate	per	Amount
1	BASIC WALL: 9": 4	26.58	130	Ft^2	**154554**
2	BASIC WALL: 9" PL: 4	4.5	90	Ft^2	**45550**
3	BASIC WALL: GENERIC - 6": 5	3.6	90	Ft^2	**30124**
4	BASIC WALL: GENERIC - 6" 2: 4	2.7	90	Ft^2	**2415.3**
5	WINDOW-CASEMENT- DOUBLE: 48" X 60": 6	18ft	220	-	**3960**
6	WINDOW-LOUVERS: 16" X 24": 2	390inch	75	-	**29250**
7	BASIC ROOF: GENERIC -6"	20.58	3500	M^3	**72030**
8	FLOOR: GENERIC - 10"	20.57	3500	M^3	**71995**
9	DOOR-INTERIOR-DOUBLE-SLIDING-2_PANEL-WOOD: 72" X 84"	-	-	-	**9200**
10	SINGLE-FLUSH: 30" X 80" 2	-	-	-	**4500**
11	EXCAVATION	8.5	350	M^3	**2975**
12	PCC	6.55	3500	M^3	**22925**
13	BASIC WALL: 00.30	6.87	90	Ft^2	**6018.3**
14	BASIC WALL: 0.40	6.78	90	Ft^2	**6101.2**
15	BASIC WALL: GENERIC - 0.50	69.54	90	Ft^2	**62258.6**
				GRAND TOTAL	**524698**

13.1.7 Minimizing Penalty in Industrial Power Consumption By Engaging APFC Unit

13.1.7.1 Introduction

In the country like India, energy scrape is one of the major anxiety. In the industrial sector various motoring load are frequently running and generating the inductive load.so the power factor in this system get reduce due to the inductive reactor. Similarly the power factor is the invisible factor, which cause a great loss of electrical energy and also
damage the electrical equipment. Power factor value measure how much main efficiency is influenced by both phase angle in between voltage and current and harmonics of load current. So the APFC(automatic power factor correction) device is a very helpful device for improving efficient transmission of active power. The power factor is nothing but
the cosine angle between voltage and current. Automatic power factor correction device read power factor from the line voltage and line current by demonstrative the delay in the advent of current signal with respect to voltage signal from the function generator with high accuracy by using an internal timer .This time value are calibrated as phase angle
and respective power factor. Then the value are display in LCD module. Power factor is a ratio of KW and KVA.KW is an actual load power and KVA is the apparent load power .It is a major of how effectively the current is being converted into useful work output. The significances of high power factor has been identified by the residential and commercial sector for their own benefits. The Reactive power does not included in the electrical bill so far this cause dissipation power loss at the load which output to an increment of electricity bill charge .Penalty charge is one of the issue occurring if the power system is low. They are :-

1) Losses in transformer
2) Voltage drop at secondary of the transformer
3) Considerable voltage drop
4) Extra loss in feeder cable.
5) Deficiency of effective capacitive of cable.

A. Power factor theory

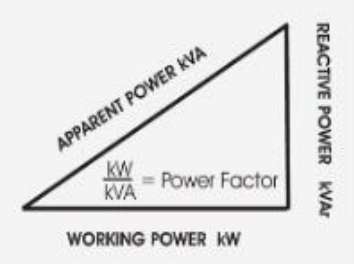


Figure 4 Power factor

Power-factor correction increases the power factor of a load, improving efficiency for the distribution system to which it is attached.
Linear loads with low power factor (such as induction motors) can be corrected with a passive network of capacitors or inductors.

Active power The active power is the real power delivered to the loads such as motors, lamps etc. The actual amount of power being consumed or dissipated in a circuit is called active power .it is measured in watt and it's denoted by P.

Reactive power: The reactive power is used just for the purpose of producing magnetic field for the flow of active power.It is measured in volt-Ampere-reactive (VAR) it denoted by Q.

Apparent power:The apparent power is the combination of the active and reactive power.it is a product offers voltage and current. It measured in volt-ampere.
Power factor:Power factor is defined as the ratio between the active powers (KW) to the total apparent power (KVA) consumes by an AC electrical devices and complete electrical installation.
Power Factor= Active Power / Apparent Power

It denotes of how efficiently electric power is converted into useful work. A pure power factor due to an inductive load can be corrected by the addition of power factor correction by static capacitor. So power factor is also defined as the cosine of the phase difference between current and voltage.

B) Causes of low Power factor

The low power factor is mainly due to the fact that most of the power loads are inductive the current is lagging. So capacitor is connected to load parallel with the load for leading power.These inductive load constitute your system. Most inductive equipment has nameplate with operating data, including its power factor.

C) Power factor correction

Low Power factor is reason by inductive loads. Inductive loads postulate the current to create a magnetic field that produces the desired work. The effect is an enhancement in reactive and apparent power and a decrease in the power factor, or efficiency, of a system. Since the power factor is defined as the ratio of KW to KVA, we see that low power factor results when KW is small in relation to KVA. An inductive load includes transformers, induction motors, and induction generators, high intensity discharge lighting. These inductive loads constitute your distribution system. This increase in reactive power results in large angle between KW and KVA. This large angle decreases the power factor. The efficiency of inductive equipment and system power factor will vary depending on its manufacturer, design, size and age. Most inductive equipment has a nameplate with operating data, inclusive its power factor at rated load.

13.1.7.2 Principle

The current and voltage signal are accrues from the main ac line by using current transformer and potential transformer this acquired signal are then pass on the zero crossing detectors. The bridge rectifier for both current and voltage signal transpose the analog signal to the digital signal.

Automatic power factor correction device (APFC) is developed based on the microcontroller IC 8051. In an electric power system, a load with a low power factor draws more current than a load with a high power factor for the same amount of useful power transferred. The higher currents increase the energy lost in the distribution system, and require larger wires and other equipment.

13.1.7.3 Proposed work

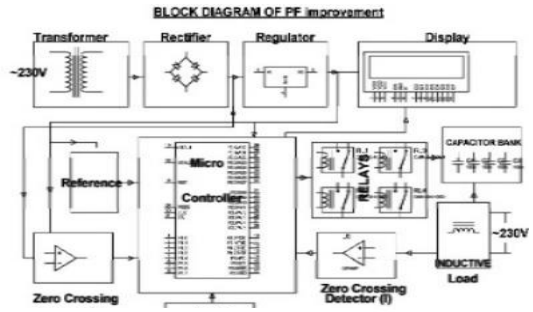


Figure 29 Block diagram of APFC

Automatic power factor controller project is designed to improve power factor automatically whenever power factor falls below a certain level. As you know demand of electrical energy is increasing day by day. More and more inductive loads are being used in industry and domestic applications.
Inductive loads are main reason for low power factor in power system. Therefore we need to develop a method to improve power factor automatically.

A. Power supply

In power supply we are using step-down transformer. The 230 V ac input supply is given to the primary of the transformer. Transformer is an electromechanical static device which transforms power from one circuit to another without changing its frequency. Due to the magnetic effect of the coil the flux induced in the primary is transferred to the secondary coil.

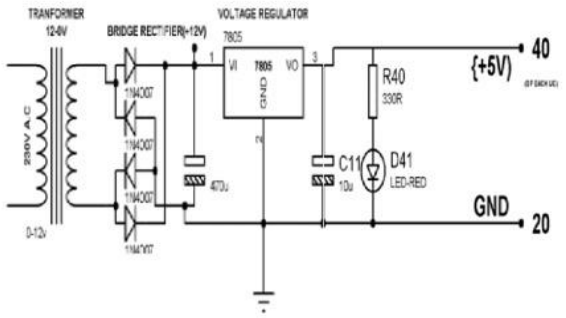
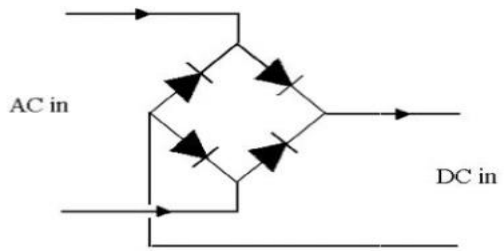


Figure 30 power supply

This study aims to show the applicability of commercial low-cost microcontroller to increase the efficiency of the chiller system, having variable-speed scroll compressor and electronic-type expansion valve with a new electronic card. Moreover, the refrigerant system proposed in this study provides the compactness, mobility, and flexibility, and also a decrease in the controller unit's budget.

B) Rectifier

The main function of the rectifier is to convert the ac voltage to the dc output. The diode is a primary component in most of the rectifier circuits since it conducts in one direction. This property of diode convert the sinusoidal voltages with zero average value into waveforms that contains both ac and dc



which defines four distinct controller modes. The experimental results show that fuzzy logic controlled electronic-type expansion valve and proportional integral derivative controlled variable-speed scroll compressor mode give more robustness

components (pulsating dc). It is a full wave bridge rectifier.

C) Voltage regulator

The main function of the voltage regulator is to convert the variable output DC voltage into the constant DC voltage which is required for the supply for the microcontroller and zero crossing detector.

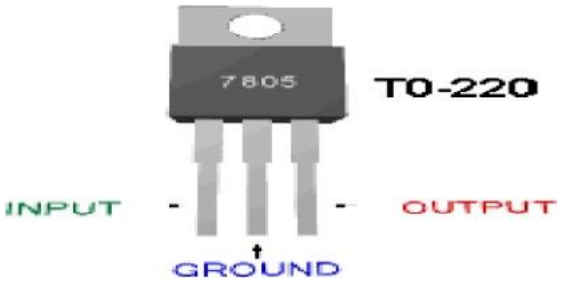


Figure 31 voltage regulator

The commonly used conventional controllers cannot cope with nonlinear system parameters having time delays, uncertainties, limitations on operation points, and requirement of a mathematical model of refrigeration systems, which causes a reduction of the energy efficiency. Recent studies showed that nonlinear controllers of artificial neural networks (ANNs) and fuzzy logic (FL)

D) Zero crossing detectors

The zero crossing detector circuit is an important application of the op-amp comparator circuit. It can also be called as sine to square wave convertor. It is used to detect sine wave zero crossing from positive half cycle to negative half cycle. The mention voltage with which the input voltage is to be compared, must be made zero.

E) Microcontroller

Microcontroller is an IC chip that executes programs for controlling other devices or machines. It is a micro (small size as an integrated circuit chip) device which is used for control of other devices and machines, that's why it is called microcontroller. It is a microcontroller having RAM, ROM and I/O ports.

8051 microcontroller is applied in automatic power factor correction panel. The microcontroller receives the load current in the line and gives the signal to the relay driver and simultaneously connects the capacitors as per the requirement.

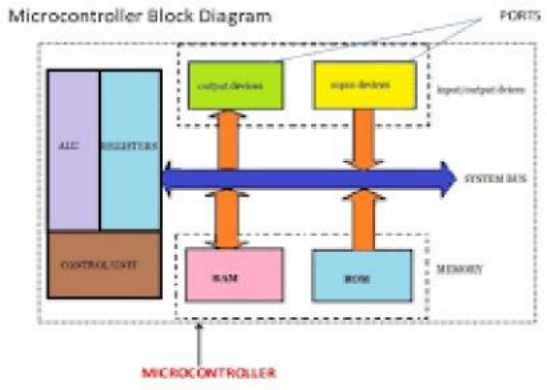


Figure 32 Microcontroller block diagram

There are two control parameters in VSRS to achieve preset values in VSRS: One of them is the opening ratio of the expansion valve and the other is the frequency of the compressor. These parameters are connected to drive the degree of superheat (SH) and the water outlet temperature, respectively. Until the system reaches to preset values of these parameters, both transient and steady-state errors of this system must be minimized so that a suitable control algorithm is achieved.12–14 Conventional control algorithms are on-off,

F) Relay

A relay is an electrically operated switch. Huge relays utilisation an electromagnet to serve a switching mechanism mechanically, but other operational principles are also used. Relays are used where it is essential to monitoring a circuit by a low-power signal or where several circuits must be controlled by one signal

Current flowing through the coil of the relay makes a magnetic field which magnetises a lever and changes the switch contacts. The coil current can be on or off so relays have two

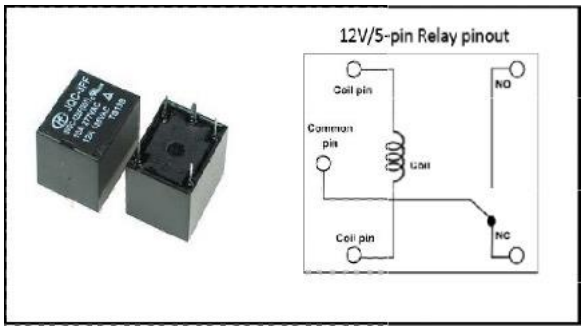


Figure 33 Relay circuit

Latching relays require only a single pulse of control power to operate the switch persistently. Another pulse applied to a second set of control terminals, or a pulse with opposite polarity, resets the switch, while repeated pulses of the same kind have no effects. Magnetic latching relays are useful in applications when interrupted power should not affect the circuits that the relay is controlling.

G) Relay driver

Relay Driver is interfaced with the microcontroller output. It is used to drives the multiple relays as per the compensation required. Relay driver IC used in this project is ULN2003.

H) LCD

LCD stands for liquid crystal display. It is a flat panel display or other electronic phenomenon display that uses the light modulating properties of liquid crystals. LCD is used to show the present power factor. 16x2 LCD is connected with 8051 microcontroller. It is receivable in a 16 pin package with back light, protest correspondence function and each dot matrix has 5×8 dot resolution.

Figure 34 Lcd display

After that, the manufacturers of LCD have gradually designed ingenious differences &developments on the technology by taking this display device into an incredible range. So finally, the developments in the LCD have been increased. A liquid crystal display or LCD draws its definition from its name itself. It is a combination of two states of matter, the solid and the liquid.

Capacitor bank

Capacitors can be included for compensation of power factor through relay. A capacitor bank is a cluster of separate capacitors of the common rating that are connected in series or parallel with each other to store electrical energy. The emerge bank is then used to counteract or accurate a power factor lag or phase shift in an ac power capacitor does. They are designed to store electrical energy the most common use of a capacitor bank

The actual capacitor in farad of a capacitor bank can be calculated using the following equation:-
C= VAR /2*3.14FVr2
Where, VAR = capacitor unit rating
C= capacitor in farad
F= Frequency
Vr = capacitor unit rated voltage.

13.1.7.4 Relation of capacitor with power factor

In universal, pow As majority power system has inductive load thus normally only lagging power factor occurs hence capacitors are used to compensate by producing leading current to the load to reduce the lagging current, there by shrink the phase angle distance between the real power and apparent er capacitors shall be Y connected on the three phase distribution feeder. Grounding the neutral is necessary for the fuses to convey in case of any event of capacitor fault.Standard capacitors available are 50,100,150,200,300 and 400 KVAR. Since capacitors can be connected more than one per phase in order to increase the bank size, it is recommended to select two or at most three capacitor unit sizes to avoid stocking the sizes. In a fixed capacitor designed, one should at first calculates desired power factor value before attempting to implement one implementing fixed capacitor can nearly correct the power factor around 94% to 96%. When using switched capacitor to correct the power factor of a circuit, the switch control is set to close the bank onto the line when the load KVAs equal to two-thirds of the banks rated KVAR. This scheme is tend to reduce loss by driving the line leading with first turn on before it is turn off, this is referred as the “two-thirds rule”. Taking a daily load cycle, compare with fixed capacitor bank, switching capacitor bank is generally uneconomical thus it is essential to take accounting of the cost of install.

13.1.7.5 Flow chart

Step 1- Set the user define lower and upper power factor (LPF & UPF).
Step 2- congregation the user defines threshold value of current (TUC).
Step 3- Find out power factor.
Step 4- Find out significance of current.
Step 5- if significance of current is less than TUC, take no action and go to step 3.
Step 6- if the concernment of power factor is between LPF and UPF take no action and go to step 3.
Step 7- if the concernment of power factor is less than LPF switch on the next off capacitor and wait for 1.0 seconds. Go to step 3.
Step 8- If the significance of power factor is more than UPF or as leading, switch off the first on capacitor and wait for 1.0 second. Go to step 3. B.ON/ OFF OF CAPACITOR.

13.1.7.6 Hardware results and discussion

CASE 1: Resistive load when resistive load is ON, as shown in Fig. There is no phase relay between current and voltage signals and they are in phase. In this case the power factor would be 0 .9 as referenced value so there is no insertion of capacitors In case of resistive load the V and I are in phase so there is no insertion of capacitors to improve power factor .The load monitoring of resistive load by microcontroller is shown on LCD.

CASE 2: When chock (inductive load) is ON: There is phase delay between voltage and current signals, Microcontroller senses the Delay produced by the load, and according to the delay it install the desired value of capacitor to improve the power factor of the system. When the desired value of the capacitors added the required reactive power to the system, the current and voltage waveforms are in phase. After the insertion of required value of capacitor, the V and i zero cross detector signals are also in phase in accordance with the set referenced.

13.1.7.7 Estimated cost

Havells SecuRite APFC Panel

Figure 35 Apfc panel

Features

- Manufactured with highly precise modern Amada CNC machine
- 11 tank process for corrosion proof powder coating
- Ergonomic, compact and robust design
- Designed with Fully copper conductor
- Heavy Duty power capacitor for long life
- Advance C-MOS technology based micro processor relay for intelligent power factor control
- Air core reactor for extra safety from inrush current (High currents)
- Provision of top and bottom cable entry
- Automatic temp. control through fans and louvers in panel
- Double side earthing connection
- Ref. Standard: IEC 61921/ IS 8623 / IS 16636 / IEC 61439

Price
₹51,900/-

Principle Operation
- To continuously sense and monitor the load conditions by the use of the external CT (whose output is fed to the control relay).
- To automatically switch ON and switch OFF relevant capacitor steps to ensure consistent power factor.
- To ensure easy user interface for enabling reliable understanding of system operation, such as display of real time power factor, number of switching operations carried out etc.
- To protect against any electrical faults in a manner that will ensure safe isolation of the power factor correction equipment.

13.1.8 IR Controlled Robotic Vehicle

13.1.8.1 Introduction

Present day industry is mainly focusing towards computer based interaction and robots to improve their productivity and delivery of end products with uniform quality to remain one step ahead of competitors. Today's robots are quick, canny, prudent, accurate and more sensible than in the past years and are becoming increasingly viable for the high mix low volume and low mix-high volume production. Collaborative robots, or "cobots", are capable of working together with the humans and physically interact with the humans in a shared workspace. In addition, cobots use sensor technology that enables the function safely alongside humans in a hazardous environment and prevents them from handling risky works. Generally robots are used to perform dangerous, tricky and highly repetitive task and it also reduces the presence of human. The robotic operations are tremendously increased and have been widely accepted by many countries due to its error free functioning. Apart from industries, robots offer best solutions for designing a home automation system for elderly people and supportive system for the physically impaired people.

Gesture recognition is a highly adaptive interface between the robots and users. It allows the operations of complex machines using hand movement thereby eliminating physical contact. The gesture controlled robots provides an opportunity to integrate disabled people into their normal working life as well as to increase the autonomy in activities of daily living. This kind of control could offer a practical way to give disabled people more independence. They can even help to meet challenges posed by military and defence operations. They can also be used in surgical operations. Under some circumstances surgeons were unable to be on time to perform operations which could be fatal in many cases and shifting of patients become impractical. This system can explore the remote robot in the diverse environment utilizing different motion orders.

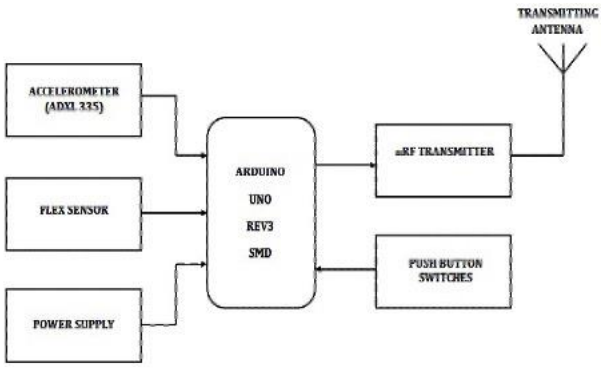
13.1.8.2 System sum up

The wireless gesture controlled robot dynamically navigated in all possible four directions i.e. forward, backward, right and left and it is equipped with a non prosthetic robotic arm for picking and placing operations. The robotic arm is mounted on a moving vehicle and the vehicle is able to move along any type of surface. The robotic arm accommodates all degrees of freedom, in order to reach all sides of the component, to take up position to any inclination. When user moves his hand in any direction then the robotic arm can move accordingly to the direction of the user hand. The arm equipped with an end effector can picks up the object with a strong grip and places it at the desired position. The wheels underneath the base help to move the robot to the desired location. The motors can be controlled by arduino which can provide required motional commands to the robot and controls the displacement of the robotic arm. Motors are seized based on desired torques/speeds, and are very constrained by physical size. The whole system is divided into two sections one is transmitter section and other is receiver section. This system provides an opportunity to increase adaptability and opens up new application areas and reduces the gap between the physical world and the digital world with an output more intuitive.

13.1.8.3 Transmitting end

The transmitter section consists of Arduino Uno Rev3 SMD, 3-axis accelerometer (ADXL 335), flex sensor, push button switches and nRF24L01 with 2.4GHz transmitter module. A separate 5 volt power supply which may be a battery source or through laptop or pc is applied to the arduino controller.

The accelerometer sensor and flex sensor are attached to the user's hand for capturing different types of gestures like movements of hand and flex of fingers. According to the movements of the hand, input is taken from the accelerometer sensor and flex sensor then the corresponding signal is sent to the controller. When the user moves his hand or finger, the sensors fixed to the hand outputs an analog voltage value. The Arduino Uno reads the analog output values i.e. x-axis and y-axis values from the 3 axis (ADXL 335) accelerometer sensor and flex sensor. The analog outputs values which were achieved by parts of the body must need to convert in digital form for further proceed. The converted digital values processed by the arduino controller. This signal is utilised for the displacement of the robotic arm and soft catching gripper. The push button switches incorporated with the system is used to drive the wheels of the robotic vehicle.



13.1.8.3.1 Arduino Uno SMD

The Arduino Uno SMD is a version of Arduino Uno, but uses a surface mount version of the Atmega328P rather than the though-hole version. The board has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. Simply connect it to the computer with a USB cable or power it with an AC to DC adapter or battery to get started with the arduino board.

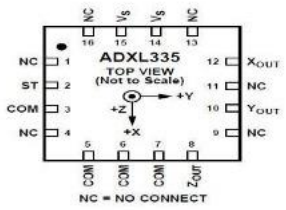
Specifications of Arduino

Microcontroller	ATmega328
Operating Voltage	5v
Input Voltage (recommend)	7-12v
Input Voltage (limits)	6-20v

Digital I/O pins	14
Analog Input Pins	6
DC Current per I/O Pin	40mA
DC Current for 3.3V Pin	50mA
Flash Memory	32KB (ATmega328)
SRAM	1 KB (ATmega328)
Clock Speed	16 MHz

13.1.8.3.2 Accelerometer

ADXL 335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned outputs. It has 6 pins namely power supply (VCC), ground (GND), self-test (ST) and remaining 3 pins are for X, Y, Z axis. By tilting an accelerometer along its measured axis, one can read the gravitational force relative to the amount of tilt. The accelerometer can measure the force applied on the sensor in all the 3 directions X, Y and Z axis. The sensor provides three values X, Y and Z which are calibrated for the four types of movement and a stopped position at center by use of the error values in the axis directions. It operates on 3.3V from the Arduino Uno board. In this project only 2 axes namely X and Y are used. X and Y pins are connected to A0 and A1 pin of the board respectively. The advantage of accelerometer



is that the values do not change unless there is a change in position.

13.1.8.3.3 Flex sensor

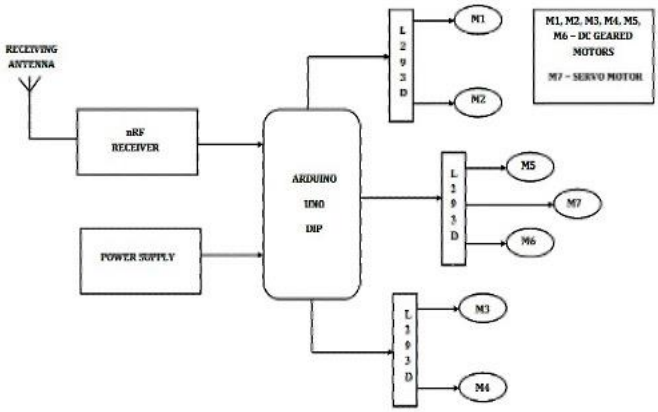
The flex sensor also known as variable resistor but the resistance changes according to the bending i.e. flexing. It detects the bending movements and can be made unidirectional or bidirectional. It works on the principle of change of resistance. Flex sensor is basically a strip of carbon material having metal pads inside it which measures the amount of deflection caused by bending the sensor. Internally it consists of a carbon resistive element with thin substrate. As the substrate is flexed when it is bent, sensor produces resistive output which is equivalent to bend radius of the carbon

strip having metal pads. To turn the flex sensor's variable resistance into a readable voltage, we will

combine it with a static resistor to create a voltage divider.

13.1.8.3.4 Receiving end

The receiver section consists of Arduino Uno with DIP package, Motor Driver IC L293d, DC Geared Motors, Servo Motor, 12V Rechargeable Battery Source, Robotic Platform, Robotic Arm and nRF24L01 with 2.4GHz Receiver Module. A separate 5 volt power supply which may be a battery source or through laptop or pc is applied to the arduino controller. The receiver module receives the modulated signal from the transmitter and demodulates it. Then the signal is fed to the arduino



controller. The block diagram of receiver prototype is shown in below figure.
The controller drives the motor of the robotic vehicle and robotic arm through motor driver to control the displacement of the arm, opening & closing of the grippers and movement of the platform.

13.1.8.4 Robotic Vehicle

The vehicle consists of four wheels which are connected to the DC geared motor and which is controlled by the switches that are present in the transmitter part. The switches have the four operations (Forward, Backward, Left and Right) respectively in the series manner. These switches are pressed by the users for their needs and it sends the voltage signal to the transmitter section Arduino. The nRF communication system is used for the transmission and receiving purpose. The Arduino checks the input of the system and sends a 4 bit code to the Encoder IC. The Encoder passes the data to nRF transmitter and the transmitted data is received by the nRF receiver. The receiver sends the 4 bit code to the Decoder IC and the decoder passes it to Motor Driver IC. Later the motor driver makes the decision to turn the two motors in the required direction based on the input key which is pressed. L239D is an interfacing device which is used to interface the wheels of the vehicles. In a single chip we interfaced 2 motors, we are using six DC geared motors and a servo motor for the vehicle.

13.1.8.5 L293D Motor Driver IC

L293D is a dual H-bridge motor driver Integrated Circuit (IC) which is having 16 pins i.e. 4 input pins, 4 output pins, 4 VCC pins and 4 ground pins. We have connected VCC pins to the 12V DC supply which is nothing but a rechargeable battery source. Motor driver acts as current amplifiers since they take low current control signal and provides a higher current signal. This higher signal is used to drive motors. When an enable input is high, the associated driver gets enabled. As a result, the output becomes active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high impedance state. The pin diagram of L293D IC is shown in below figure.

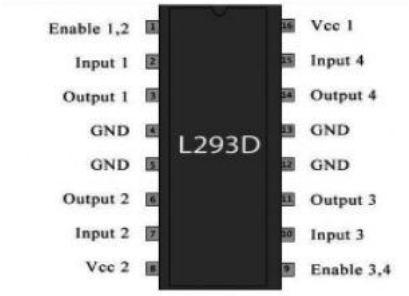
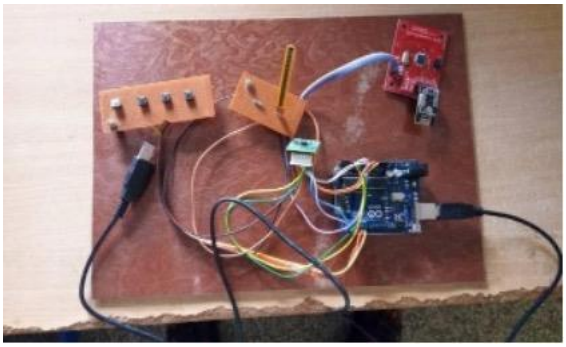


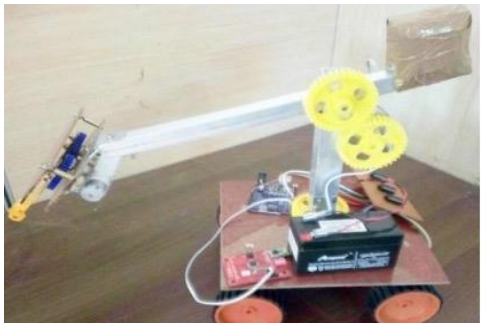
Figure 36 Motor driver

Thus the assistive or supportive robot system was assessed positive in the subjective evaluation. The participants subjectively perceived that the hand gesture performance as easy i.e. robotic vehicle movements, robotic arm motions and opening and closing of grippers. This can be well suited for pick and place operations. Using this framework, a non expert robot programmer can control the robot quickly in a natural way.

13.1.8.6 Results and Discussion

The experimental setup of transmitter and receiver prototype is shown in figure 7 and 8 respectively. Experiments were done mainly in two parts. In the first part, we tested the transmitter module separately by connecting the Arduino controller to the PC/Laptop and observed the output for different movements of the accelerometer and bending of the flex sensor in the Arduino software (IDE). In the second phase we tested the receiver module by giving inputs from the transmitter and successfully observed the displacement of robotic arm, opening & closing of grippers and then the movements of the robotic platform in all possible four directions. From observation that has been made, it clearly shows that the movement of the robot is precise, accurate, and is very easy to control and moreover user friendly to use. The performance of the robotic arm and robotic vehicle was checked using different hand movements. The robotic arm design is very simple and has the ability to grasp light





13.1.9 Refrigeration Control System Using Microcontroller

13.1.9.1 Introduction

Temperature: This is the degree of hotness or coldness of a body or an environment.

Control System: A control system is a device or set of devices that manage, command, direct or regulate the behaviour of other devices or systems. Thus we can literally say that a Temperature Control System is a device or set of devices that manage, command, direct or regulate the behaviour of other devices or systems in order to influence the degree of hotness or coldness of a body or an environment.

A temperature control system consists of a small programmable digital logic controller device, wired to a heating and/or cooling system. About the size of a typical wall-mounted thermostat, a temperature control system contains a small circuit board and a memory chip(s). After setting the temperature control system to a desired temperature, known as a set point, the system will utilize the heater and/or air conditioning unit (as needed) as effector, to maintain that setting for the duration programmed.

Temperature is one of the main parameter to control in most of the manufacturing industries like chemical, food processing, pharmaceutical etc. In these kinds of industries, some product need the required temperature to be maintained at highest priority the product will fail. So the temperature controller is most widely used in almost all the industries. The goal of this project is to design an ambient temperature measurement and control circuit. The motivation for the project is the fact that temperature measurement has become an integral part of any control system operating in a temperature sensitive environment and the various learning outcomes associated during the implementation of the project. In this project ON-OFF type controller has been implemented. Here the set value for temperature can be externally set by user. The actual temperature is sensed by the thermocouple temperature sensor. It is displayed on common cathode seven-segment LEDs with the set value. If it exceeds the set value the heater is turned off. After then when temperature falls below the specified limit again heater is turned on.

13.1.9.2 Methodology

The circuit presents the design, construction, development and control of automatic switching electric heater. The idea is based on the problem occurs in human's life nowadays by improving the existing technology. The Peripheral Interface Controller (PIC) based automatic temperature control system is applied to upgrade the functionality to embed automation feature. The electric heater will automatically switch on according to the temperature falls below the specified limit. The system monitors the temperature from the thermocouple temperature sensor, where it will control the electric heater according to the setting values in the programming. The system indicates the temperature from the PIC 16F887A, and it will display it on the common cathode LED display.

If the electric heater temperature goes beyond the preset temperature, then the electric heater will switch off and if temperature goes below to preset value then electric heater will switch on. In this way, the electric heater's temperature can be maintained preset temperature value. It also provides a security characteristic, where it detects on extremely high temperature.

13.1.9.3 Concept of temperature control technique

To increase the production of an industry, smooth control of temperature is the key function.5 Different industry has its own individual temperature requirement for specific role. Conventionally, industrial temperature measurement instrument thermometer is used to measure the temperature. After observing temperature reading, operator controls temperature manually. Sometimes controlling is not appropriate because of time consuming human operated control of cooling device and heating device. As a result, efficiency of temperature control fails and production is hampered in industries. Besides that, thermostat is used to select temperature which is not efficient because of erosion of metal and losing to strength of metal for successive using. Consequently, analog system loses its own linearity function since it is mechanically designed temperature control device. The temperature can be controlled more efficiently using interface between temperature sensors LM35 which produce linear voltage signal with rising temperature and microcontroller which takes response fraction of millisecond to response. Microcontroller takes signal from temperature sensor and compare with pre-set value of temperature then take decision when heating device or cooling device would be turned on and the duration of maintained temperature in system.
The pseudo code for control the overall heating and cooling system can be written as:
When asking temperature > real-time temperature
Heating element = 1 for (asking temperature + 1 Degree Celsius)
Cooling element = 0 for 1 minute
When asking temperature < real time temperature
Cooling element = 1 for (real-time temperature – 1 Degree Celsius)

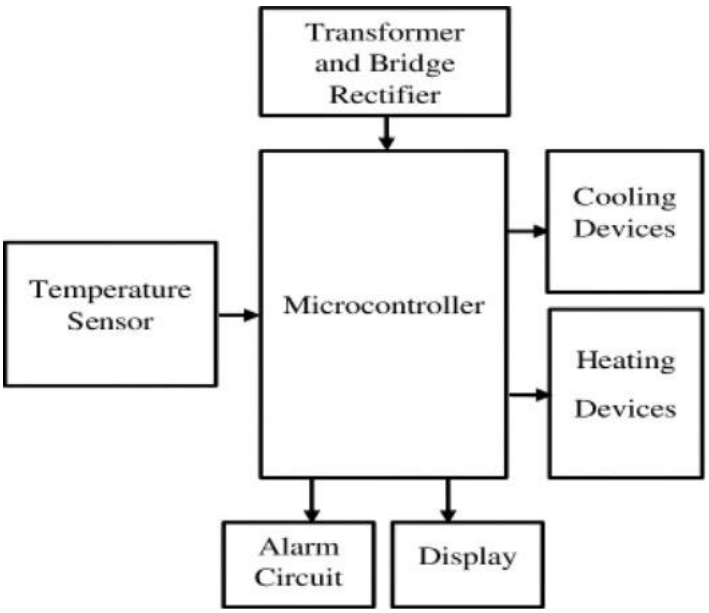


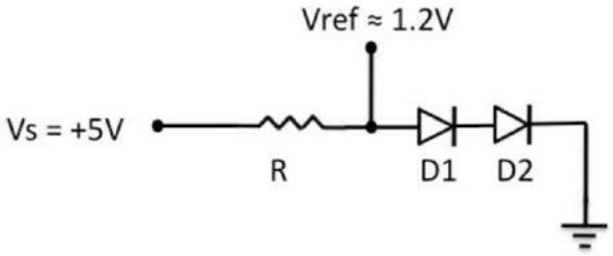
Figure 57 Microcontroller

Heating element = 0 for 1 minute
Block diagram of total system

A buzzer is turned on when unexpected or large temperature is found in the system can be cause to damage industry. Figure 1 shows block diagram of total system.

13.1.9.4 Temperature measurement precision

The LM35 series of temperature sensors are manufactured by National Semiconductor Corporation and are rated to activate over a -55 °C to 150°C temperature range. These sensors do not need any peripheral calibration and the output voltage is proportional to the temperature. The scale factor for temperature to voltage conversion is 10 mV per °C. The LM35 series sensors come in different packages. The measurement of negative temperatures (below 0°C) needs a negative voltage source. However, this project does not use negative voltage source, and therefore would validate the use of sensor for determining temperatures above 0°C (up to 100°C). The output voltage from the sensor is converted to a
10- bit digital number using the internal ADC of the PIC16F587A. Since the voltage to be measured by the ADC ranges from 0 to 1.0V, the ADC requires a lower reference voltage (instead of the supply voltage Vdd = 5V) for A/D conversion in order to get better accuracy. The lower reference voltage can be provided using a Zener diode, a resistor network, or sometime just simple diodes. Figure 2 shows an approximate 1.2V reference voltage by connecting two diodes and a resistor in



series across the supply voltage.

13.1.9.5 Design of temperature control circuit

A 220 V AC supply is stepped down to 18V by using potential transformer (TR1). Transformer (TR1) is connected with a bridge rectifier (BR1) to create pulse- setting DC where a capacitor (C1) is used to produce smooth DC. A heater coil (L1) is directly connected to power supply through relay (RL1), when relay "ON" heater would produce heat. Figure 3 shows the complete circuit diagram of industrial temperature control system.
The liquid crystal display screen works on the principle of blocking light rather than emitting light. LCDs require a backlight as they do not emit light them. We always use devices which are made up of LCD's displays which are replacing the use of cathode ray tube. Cathode ray tube draws more power compared to LCDs and is also heavier and bigger.
As mentioned above that we need to take two polarized glass pieces filter in the making of the liquid crystal. The glass which does not have a polarized film on the surface of it must be rubbed with a special polymer that will create microscopic grooves on the surface of the polarized glass filter. The grooves must be in the same direction as the polarized film.

Thus the light travels through each layer and guided to the next with the help of a molecule. The molecule tends to change its plane of vibration of the light to match its angle. When the light reaches the far end of the liquid crystal substance, it vibrates at the same angle as that of the final layer of the molecule vibrates. The light is allowed to enter into the device only if the second layer of the polarized glass matches with the final layer of the molecule.

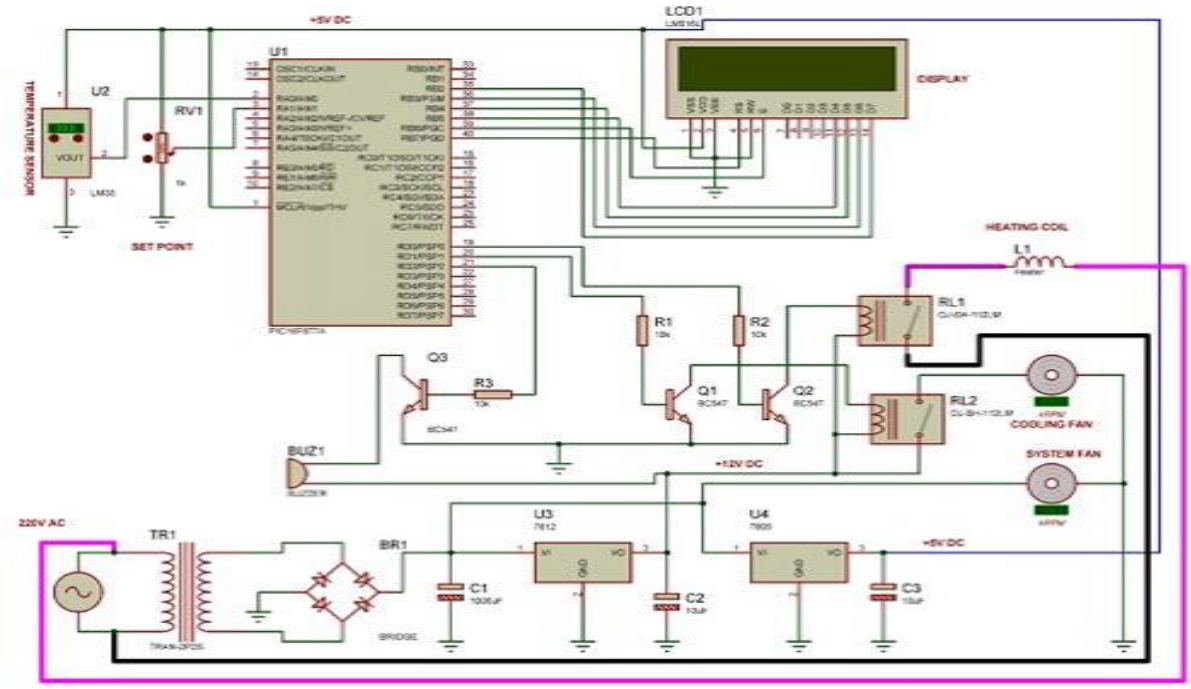


Figure 38 Complete Circuit Diagram of Temperature Control System

Two voltage regulators of 7412 and 7405 are used to get fixed DC voltages for different part of the circuit where U3 (7412) provides 12V and U4 (7405) provides 5V.
Furthermore, capacitor C2 and C3 are used to filter output signal in case of presence of any oscillation into the provided DC voltage. The Buzzer (BUZ1) is connected with 12V DC voltage supply from U3 and the relays RL1 and RL2 are also connected with 12V DC voltage supply from relays RL1 and RL2. The display (LCD1), microcontroller (U1), set point
(RV1) and temperature sensor (U3) are connected with 5V voltage DC voltage supply. In temperature controller there are two fans, one is system fan or circulating fan and another is cooling fan which are indicated in Figure 3. System fan is directly connected with 18V and cooling fan is connected with RL2. When power is supplied to system fan is turned on whereas cooling fan is controlled by the relay (RL2). Microcontroller is connected directly with sensor (U2), set point (RV1) and display (LCD1). Microcontroller is also connected with Buzzer (BUZ1), relay (RL1) and relay (RL2) through a switching device (BJT) and a resistor. Common emitter configuration of transistor (Q1, Q2 and Q3) works as a switching device.

13.1.9.6 Estimated cost

₹1225/-

13.2 Reasons for students Recommending this designs

Below are the reasons for recommending this designs.

- To improve the standard of living.
- Design for post office is recommended, firstly there is no post office in the village also the communication between the people and cities remain good.
- Design for school is given for student for the higher studies which facilities are not available also they should not migrate to other towns for their studies.
- Design for Garden has been provided as to give good life with nature and playing areas for children.
- Design for Dairy is been provided for employment purpose to the villagers.
- As the available overhead tank is in weak condition so it is very much required for the new one.
- As there is no Bus stop in the village also travelers are facing problem so the bus stop design has been provided.
- For reducing the pollution and make village more attractive.
- For saving their time which they can utilize for different functions.
- For better and modern facilities.

13.3 About designs Suggestions / Benefits of the villagers

1. Garden

- It is proposed in village for health related activities.
- It is the source of recreation as well as education and research opportunities
- It plays very significant role in building a sustainable community development.
- Also for playing activities for the children.

2. School

- Secondary school is not available in the village.
- So, students have to either migrate or leave the studies.
- Due to which many families have to migrate for the students.
- As education can make the village more developed.
- School is the foremost fountain of knowledge children are exposed to. It gives a chance for them to acquire knowledge on various fields of education such as people, literature, history, mathematics, politics, and other numerous subjects.
- This contributes to cultivation in the thought process.

3.Bus stop.

- There is no Bus stop in the village which is very most required for the travelers.
- The construction of bus stops tends to reflect the level of usage, where stops at busy locations may have shelters, seating, and possibly electronic passenger information systems; less busy stops may use a simple pole and flag to mark the location. Bus stops are, in some locations, clustered together into transport hubs allowing interchange between routes from nearby stops and with other public transport modes to maximize convenience.
- Bus stop infrastructure ranges from a simple pole and sign, to a rudimentary shelter, to sophisticated structures.

4.Post office.

- Village Post Offices are part of the Postal Service's "Approved Postal Provider" network retail outlets for postal products and services that include Contract Postal Units, Approved Shippers, stamps on consignment locations and Community Post Offices.
- Assured and speedy delivery of goods is possible with the help of speed post service. Addressee receives the parcels at his doorstep. He doesn't have to travel too far in search of his parcels. Such a convenient mode of transport can be used when quantity is small and volume is low.

5.Garden

- They provide a place for kids to learn about nature (again, especially in environments where most people don't have access to land).
- They're a place where people can spend time and socialize in a relaxing natural environment. This is especially good in areas where most people live in apartments or in homes that don't have much (or any) land around them. This is good for both physical and mental health.
- The large animals, the top predators, are the most visible and the ones that get the most attention when they either overpopulate or start to disappear, but it's the plants and insects and small animals that really support the ecosystem.

6. Overhead tank

- Every household in the village derived benefit from the tanks. Apart from providing water for agriculture, water was also used for domestic purpose such as washing of cloths, drinking water for cattle, etc. Potters used water and silt from the tank for sustenance of their livelihood.
- Tanks, usually constructed and managed by villagers, are water bodies that can hold enough water to irrigate over 100 hectares of cropland. In this ancient method of water harvesting, tanks collect and store monsoonal rainwater, which is used for drinking and protective irrigation during dry periods.
- Tank containers are safe, reliable, and are a cost effective transport medium for moving bulk liquids around the world. Tank containers are designed, tested, and approved for the safe, economical and efficient transportation of a broad range of liquid products.

Chapter 14. Technical options with case studies

14.1 Civil Engineering

14.1.1 Advanced Eathquake Resistant

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.

Earthquake-resistant structures are structures designed to protect buildings from earthquakes. While no structure can be entirely immune to damage from earthquakes, the goal of earthquake-resistant construction is to erect structures that fare better during seismic activity than their conventional counterparts. According to building codes, earthquake-resistant structures are intended to withstand the largest earthquake of a certain probability that is likely to occur at their location.Currently, there are several design philosophies in earthquake engineering, making use of experimental results, computer simulations and observations from past earthquakes to offer the required performance for the seismic threat at the site of interest.

These range from appropriately sizing the structure to be strong and ductile enough to survive the shaking with an acceptable damage. The conventional approach to 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. 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

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.

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.

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. One way to resist ground forces is to "lift" the building's foundation above the earth. Base isolation involves constructing a building on top of flexible pads made of steel, rubber, and lead. When the base moves during the earthquake, the isolators vibrate while the structure itself remains steady. This effectively helps to absorb seismic waves and prevent them from traveling through a building. Another damping method is pendulum power, used primarily in skyscrapers. Engineers suspend a large ball with steel cables with a system of hydraulics at the top of the building. When the building begins the sway, the ball acts as a pendulum and moves in the opposite direction to stabilize the direction. Like damping, these features are tuned to match and counteract the building's frequency in the event of an earthquake.

14.1.2 Seismic Retrofitting of Buildings

Introduction

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.

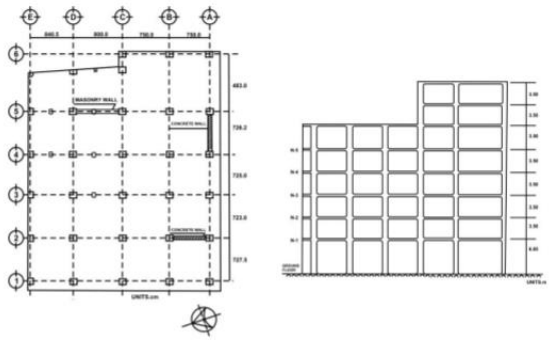
Since we have a considerable dearth of experience and experimental data on the behaviour and response of retrofitted structures, the case studies presented here are based on the experience obtained by the others.

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.



- Static and dynamic analysis was performed on the original undamaged building, match to the distribution of the damage observed accordingly.
- Retrofitted building has been analyzed with the assumption of monolithic behaviour between old and new material.
- Results indicate no additional piles to the foundation.

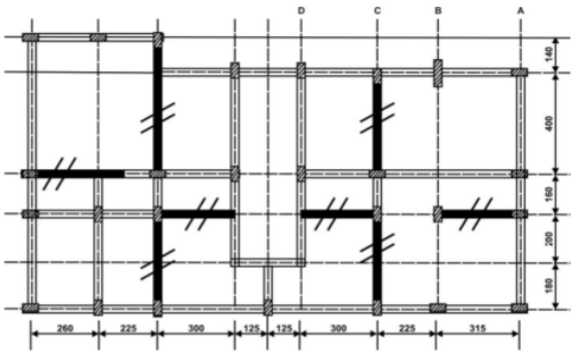


Figure 39: Strengthening schemes applied to the building

- 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

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

- The construction industry is repeatedly criticised for being inefficient and slow to innovate. The basic methods of construction, techniques and technologies have changed little since Roman times. But the application of innovation in the construction industry is not straight forward.
- Every construction project is different, every site is a singular prototype, construction works are located in different places, and involve the constant movement of personnel and machinery. In addition, the weather and other factors can prevent the application of previous experience effectively.
- The term 'advanced construction technology' covers a wide range of modern techniques and practices that encompass the latest developments in material technology, design procedure latest developments in materials technology, design procedures, quantity surveying, facilities management, services, structural analysis and design, and management studies.
- Incorporating advanced construction technology into practice can increase levels of quality, efficiency, safety, sustainability and value for money. However, there is often a conflict between traditional industry methods and innovative new practices, and this is often blamed for the relatively slow rate of technology transfer within the industry.
- The adoption of advanced construction technology requires an appropriate design, commitment from the whole project team, suitable procurement strategies, good quality control, appropriate training and careful commissioning.
- Super Performing Materials
- 1. Advancements in Concrete
- 1.1 High Performance Concrete Lafarge has developed a whole new family of concretes called Ductal. These concretes have high compressive and flexural strength, and their special characteristics enable the achievement of outstanding architectural feats. Ductal concrete incorporates strengthening fibers and opens the horizon to ultrahigh performance due to its special composition which provides it with outstanding strength, six to eight times greater than traditional concrete (under compression).“Fiber-reinforced” means that it contains metal fibers which make it a ductile material. Highly resistant to bending, its great flexural strength means it can withstand significant transformations without breaking. Ductal also comes with organic fibers for applications with less load and for advanced architectural applications.
- 1.2 Light Transmitting Concrete The days of dull, grey concrete could be about to end. A Hungarian architect has combined the world's most popular building material with optical fiber from Schott to create a new type of concrete that transmits light. A wall made of “LitraCon” allegedly has the strength of traditional concrete but thanks to an embedded array of glass fibers can display a view of the outside world, such as the silhouette of a tree, for example.

- "Thousands of optical glass fibers form a matrix and run parallel to each other between the two main surfaces of every block," explained its inventor Áron Losonczi. "Shadows on the lighter side will appear with sharp outlines on the darker one. Even the colours remain the same. This special effect creates the general impression that the thickness and weight of a concrete wall will disappear." The hope is that the new material will transform the interior appearance of concrete buildings by making them feel light and airy rather than dark and heavy.
- 1.3 Pervious Concrete
- Pervious pavement is a cement-based concrete product that has a porous structure which allows rainwater to pass directly through the pavement and into the soil naturally. This porosity is achieved without compromising the strength, durability, or integrity of the concrete structure itself. The pavement is comprised of a special blend of Portland cement, coarse aggregate rock, and water. Once dried, the pavement has a porous texture that allows water to drain through it at the rate of 8 to 12 gallons per minute per square foot. Tests conclude that a square foot of Bahia sod drains at the rate of 2 1/2 to 3 gallons per minute. According to the manufacturer, this rapid flow-through ratio inspired the phrase "the pavement that drinks water."
- 1.4 Aerated Concrete
- It was discovered in 1914 in Sweden that adding aluminum powder to cement, lime, water, and finely ground sand caused the mixture to expand dramatically. The Swedes allowed this "foamed" concrete to harden in a mold, and then they cured it in a pressurized steam chamber-- an autoclave. Autoclaved aerated concrete is produced by about 200 plants in 35 countries and is used extensively in residential, commercial, and industrial buildings. At a density of roughly one-fifth that of conventional concrete and a compressive strength of about onetenth, AAC is used in load-bearing walls only in lowrise buildings. In high-rises, AAC is used in partition and curtain walls.
- 1.5 Floating Concrete
- By replacing sand and gravel with tiny polymeric spheres, University of Washington materials scientists have created a concrete stronger than traditional concrete but so light it floats in water. The team won the regional American Society of Civil Engineers Concrete Canoe Competition last year. Metal meshes have been known as decorative and functional design elements in architecture for only a few years. During the continuous product development along with ordinary use such as an fence element it became clear that metal meshes also have considerable technical advantages which are extremely relevant in the field of architecture. Today, the architect has a wide range of mesh samples at hand, with weaving widths up to eight meters, which allow for great design flexibility. Woven metallic meshes used as partition elements convey a new dimension to any space. They can be used as projection screens, and, taking into account their which are then processed into sandwich panels by lamination equipment. Due to the unique geometry of the Pep Core.

14.1.4 Engineering Aspects of soil mechanics – Environment Impact Assessment

- An Environmental Impact Assessment is a formal method of judging the impact that any new developmental project would have on the environment and its constituents. This can include changes that the project would create in the physical aspects of existing geography, chemical changes to the atmosphere including air and water, biological changes that affect plant, animal and human life, cultural impact of a project on the society in the area, and other socio-economic effects that the project can have.
- Such an assessment allows problems to be foreseen, so that the design and planning of the projects is modified to reduce any negative effects. It is now fashionable to build green buildings which have a positive effect on the environment.
- There is historical precedent for the now mandatory Environmental Impact Assessments (EIA). Past efforts by governments have resulted in bans on activities that caused noxious odors, garbage dumps were positioned at places far away from habitation, and commercial activities were restricted to town centers.

Objectives of Environmental Impact Assessment

- The objective of an EIA is to predict the environmental impact project would have on all aspects of the environment. Once this is done, a study has to be made to see if the impacts can be reduced in any way. The project has then to be modified to suit the local environment and all predictions and likely options presented to decision makers for final decisions.
- You can gain a better understanding of EIA by understanding how any typical project can affect the environment of a particular area. Take for example the building of a new road in a city.
- The alignment of the road may require that certain lands have to be leveled or new embankments created. Cutting of the land and the new embankments would affect the geography of the area and probably upset its drainage pattern. This would require re-planning existing methods of treating the run-off and could cause existing watercourses to be modified. The new road may require the removal of existing green cover and this could affect the living conditions in that area. The traffic going through that area can cause pollution problems from vehicles which also includes an increase in sound pollution. The emissions from the vehicles can affect already existing atmospheric pollutants which in turn could affect human health, animal health and affect greenery in the area. The road may affect existing structures in the area which may have to be removed and can cause changes in the economic wellbeing of the persons who are using those structures.
- A positive impact of the new road may mean a reduction in traffic congestion, its positive effect on pollution, and the economic advantage of these two aspects.
- For any environmental impact assessment, complete data on all these aspects as they are at present has to be made so that any changes can be reasonably judged to existing standards required for good living. The deterioration or increase in these living standards has then to be highlighted by the EIA before any final decision on the project can be undertaken.

- The topography of the oil field area is flat. The micro-relief is also flat but gradually role into numerous creeklets and lakes in the back swamps. The macro-relief of the whole topography gradually roles into the Orashi river that was a few kilometers west of the study area. The slope ranged from 0 to 30 in the whole study area. Topsoil in the flow station area has sandy loam and sandy clays, loamy texture, but areas around the waste pits have highly compressed clays. Gravel and granite chippings in both top and bottom soils contain crude petroleum and gas clay bottom soils. The two gas flare guns were located 100m from each other on highly compressed clay top and bottom soils. The very wide flare-pit-like area was open towards the forest and back swamps, thereby allowing very hot water and steam from the flare pit to the immediate and nearby forest environment.

Ambient air quality Assessment

- The assessment was aimed at determining the concentrations of total suspended particulate (TSP), volatile organic compounds (VOC), carbon monoxide (CO), oxides of Nitrogen (NOx) and sulphur dioxide (SO2). These formed the core of criteria pollutants recognized as having potential impacts on human health, and which are normally prevailing in routine combustion, industrial processes and other common sources of air pollution.
- Sampling locations were chosen to coincide with different types of activities around the flow station. These include the inlet manifold area, an open area within the premises, flow station site office, construction area, and adjourning roadside. The potential impact will be established by comparing site data with occupational health and general public exposure standards published by Federal Ministry of Environment. The monitoring of the TSP over the air was taken using Casela singe-state samplers fitted with cellulose paper by a suction pump with flow rate in the range 10 – 20 liters per minute (1/pm) for approximately 8 hours. The flow rate of the suction pump was measured using an air flow meter calibrated to measure flow rates in the range 0.5 to 3.0 1/pm.
- The pump flow rate was maintained constant throughout the sampling time, enabling very accurate determination of the sample air volume. The total suspended particulate (TSP) matter collected on the filter is obtained by the difference between initial and final weights, before and after sampling, dried to constant weights in a desiccator filled with suitable drying agents. The filter weights are measured using a mettler microbalance with a sensitivity of 0.1mg. All filters used for sampling were stored in sealed polyethylene bags to avoid contamination prior to elemental analysis.
- The determination of the elemental constituents of the TSP is required both as basis for evaluating its toxicity and for source appointment. Chemical analysis of the TSP was undertaken using a combination of atomic Absorption spectrophotometry (AAS) and Energy Dispersive X-Ray fluorescent (ED-XRF) analysis.
- The potential impacts of all pollutants at the sites monitored were evaluated by comparing measured concentrations with recommended threshold limit valves (TLV) regulatory agencies.
- Random soil samples were done within areas of the flow station. Random samples were collected from the Saver Pit, Heater, Oil Tank, Compressor, Generators, Waste Pit, and Gas Flare Burnt Forest. At each of the location, soil sample was carried out with the aid of Dutch auger.

14.1.5 Water supply -sewerage system-waste water-sustainable development techniques

- Sustainable water systems should provide adequate water quantity and appropriate water quality for a given need, without compromising the future ability to provide this capacity and quality. Water systems in the realm of sustainable development may not literally include the use of water, but include systems where the use of water has traditionally been required. Examples include waterless toilets and waterless car washes, whose use helps to alleviate water stress and secure a sustainable water supply.
- Accessing the sustainability features in water supply, that is to say, the three-fold goals of economic feasibility, social responsibility and environmental integrity, is linked to the purpose of water use. Sometimes, these purposes compete when resources are limited; for example, water needed to meet the demands of an increasingly urban population and those needs of rural agriculture. Water is used (1) for drinking as a survival necessity, (2) in industrial operations (energy production, manufacturing of goods, etc.), (3) domestic applications (cooking, cleaning, bathing, sanitation), and (4) agriculture. Sustainable water supply is a component of integrated water resource management, the practice of bringing together multiple stakeholders with various viewpoints in order to determine how water should best be managed. In order to decide if a water system is sustainable, various economical, social and ecological considerations must be considered.

Surface water

- Surface freshwater is unfortunately limited and unequally distributed in the world. Almost 50% of the world's lakes are located in Canada alone (UNEP, 2002). In addition, pollution from various activities leads to surface water that is not drinking quality. Therefore, treatment systems (either large scale or at the household level) must be put in place.
- Structures such as dams may be used to impound water for consumption. Dams can be used for power generation, water supply, irrigation, flood prevention, water diversion, navigation, etc. If properly designed and constructed, dams can help provide a sustainable water supply. The design should consider peak flood flows (historical and projected for climate change), earthquake faults, soil permeability, slope stability and erosion, silting, wetlands, water table, human impacts, ecological impacts (including wildlife), compensation for resettlement, and other site characteristics. There are various challenges that large-scale dam projects may present to sustainability: negative environmental impacts on wildlife habitats, fish migration, water flow and quality, and socioeconomic impacts resulting from resettled local communities. A sustainability impact assessment should therefore be performed to determine the environmental, economic and social consequences of the construction.

Groundwater

- Groundwater accounts for greater than 50% of global freshwater; thus, it is critical for potable water (Lozan et al, 2007). Groundwater can be a sustainable water supply source if the total amount of water entering, leaving, and being stored in the system is conserved. There are three main factors which determine the source and amount of water flowing through a groundwater system: precipitation, location of streams and other surface-water bodies, and evapotranspiration rate

Rainwater Harvesting

- Collecting water from precipitation is one of the most sustainable sources of water supply since it has inherent barriers to the risk of over-exploitation found in surface and groundwater sources, and directly provides drinking water quality. However, rainwater harvesting systems must be properly designed and maintained in order to collect water efficiently, prevent contamination and use sustainable treatment systems in case the water is contaminated. A number of drinking water treatments exist at point-of-use, each with advantages and disadvantages. These include solar treatment, boiling, using filters, chlorination, combined methods such as filtration and chlorination, flocculation and chlorination. Although technically given the Earth's surface and precipitation, rainwater harvesting can meet global water demand, the solution can most practically be a supplement to sustainable water supply systems given a level of uncertainty (especially with climate change), and competing land-use applications.

Reclaimed Water

- Reclaimed water, or water recycled from human use, can also be a sustainable source of water supply. It is an important solution to reduce stress on primary water resources such as surface and groundwater. There are both centralized and decentralized systems which include greywater recycling systems and the use of microporous membranes. Reclaimed water must be treated to provide the appropriate quality for a given application (irrigation, industry use, etc.). It is often most efficient to separate greywater from blackwater, thereby using the two water streams for different uses. Greywater comes from domestic activities such as washing, where as black water contains human waste. The characteristics of the two wastes treams thus differ.

Desalinization

- Desalinisation has the potential to provide an adequate water quantity to those regions that are freshwater poor, including small island states. However, the energy demands of reverse osmosis, a widely-used procedure used to remove salt from water, are a challenge to the adaptation of this technology as a sustainable one. The costs of desalination average around 0.81 USD per cubic meter compared to roughly 0.16 USD per cubic meter from other supply sources (USGS, 2010). If desalination can be provided with renewable energies and efficient technologies, the sustainable features of this supply source would increase. Currently, desalination increases operational costs because of the needed energy (and also carbon dioxide emissions); this in turn raises the cost of the final product. In addition, desalination plants can have negative impacts on marine life, and cause water pollution due to the chemicals used to treat water and the discharge of brine.

Bottled Water

- Bottled water is a 21st century phenomenon whereby mostly private companies provide potable water in a bottle for a cost. In some areas, bottled water is the only reliable source of safe drinking water.

However, often in these same locations, the cost is prohibitively expensive for the local population to use in a sustainable manner. Bottled water is not considered an "improved drinking water source" when it is the only potable source available (UN, 2010). When sustainability metrics are used to access bottled water, it falls short in many situations of being a sustainable water supply. Economic costs, pollution associated with its manufacturing (plastic, energy, etc.) and transportation, as well as extra water use, makes bottled water an unsustainable water supply system for many regions and for many brands. It takes 3-4 liters of water to make less than 1 liter of bottled water (Pacific Institute, 2008).

Potable Water

- Potable water requires some of the strictest standards of quality in terms of bacteriological and chemical pollutants. These standards are often governed by national governments; international recommendations can be found from the World Health Organization Drinking water must be freshwater and should be free of pathogens and free of harmful chemicals.

Water in Industry

- Water is used in just about every industry. Industrial water with drawls represent 22% of total global water use (significant regional differences). Its use is notable for manufacturing, processing, washing, diluting, cooling, transporting substances, sanitation needs within a facility, incorporating water into a final product, etc. (USGS, 2010). The food, paper, chemicals, refined petroleum, and primary metal industries use large amounts of water (USGS, 2010). A sustainable water supply in industry involves limiting water use through efficient appliances and methods adapted to the particular industry. Rainwater harvesting on-site (including the creation of large pond-like structures), as well as recycling water in industrial processes, can provide a sustainable water supply for industry without straining municipal water supplies. Industry releases organic water pollutants, heavy metals, solvents, toxic sludge, and other wastes into water supply sources. Industry thus has a dual responsibility for internal sustainable water supply and the protection of external water supply sources.

Water in Agriculture

- Agriculture uses the largest amount of freshwater on a global scale. It represents roughly 70% of all water withdrawal worldwide, with various regional differences. In the United States, for example, agriculture accounts for over 80% of water consumption (USDA, 2010). The productivity of irrigated land is approximately three times greater than that of rain-fed land (FAO, 2010). Thus, irrigation is an important factor for sustainable agriculture systems. In addition, global food production is expected to increase by 60% from 2000 to 2030, creating a 14% increase in water demand for irrigation (UN, 2005). Agriculture is also responsible for some of the surface and groundwater degradation because of run-off (chemical and erosion-based). It thus has a dual role in sustainable water supply: (1) using water efficiently for irrigation and (2) protecting surface and groundwater supply sources. Techniques for sustainable water supply in agriculture include organic farming practices which limit substances that would contaminate water, efficient water delivery, micro-irrigation systems, adapted water lifting technologies, zero tillage, rainwater harvesting, runoff farming, and drip irrigation (efficient method that allows water to drip slowly to plant roots by using pipes, valves, tubes and emitters).

14.2 Electrical Engineering

14.2.1 Design of Power Electronics converter

Power Electronics :

The primary task of power electronics is to process and control the flow of electric energy by supplying voltages and currents in a form that is optimally suited for user loads. Modern power electronic converters are involved in a very broad spectrum of applications like switched-mode power supplies, active power filters, electrical-machine-motion-control, renewable energy conversion systems distributed power generation, flexible AC transmission systems, and vehicular technology, etc.

Power 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.

A power electronic converter uses power electronic components such as SCRs, TRIACs, IGBTs, etc.

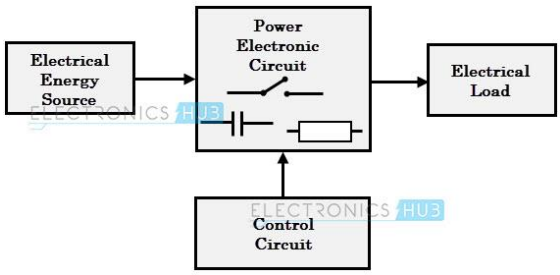


Figure 40 Power electronics

The block diagram of a power electronic converter is shown in figure above. It consist of an electrical energy source, power electronic circuit, a control circuit and an electric load. This converter changes one form of electrical energy to other form of electrical energy.

The power electronic circuit consists of both power to control and convert the electric power. The main aim of the converter is to produce conditioning power with respect to a certain application.

Power part transfers the energy from source to load and it consists of power electronic switches (SCR or TRIAC), transformers, electric choke, capacitors, fuses and sometimes resistors.

The control circuit or block regulates the elements in the power part of the converter. This block is built with a complex low power electronic circuit that consists of either analog or digital circuit assembly.

Power electronic converters perform various basic power conversion functions. This converter is a single power conversion stage that can perform any of the functions in AC and DC power conversion systems.

Depending on the type of function performed, power electronic converters are categorised into following types.

- AC to DC = Rectifier: It converts AC to unipolar (DC) current
- DC to AC = Inverter: It converts DC to AC of desired frequency and voltage
- DC to DC = Chopper: It converts constant to variable DC or variable DC to constant DC

- AC to AC = Cycloconverter, Matrix converter: It converts AC of desired frequency and/or desired voltage magnitude from a line AC supply.

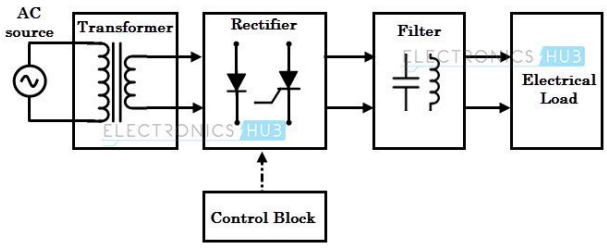


Figure 41 AC to AC

AC to DC converter or rectifier:

An AC to DC converter is also called a rectifier, which converts AC supply from main lines to DC supply for the load. The block diagram of an AC to DC converter is shown in figure below.

The essential components in this rectifier include transformer, switching unit, filter and a control block. Here, the transformer adjusts the primary AC source supply to the input of rectifier stage. Usually it is a step-down transformer that reduces the supply voltage to a circuit operating range.

The rectifier converts the low voltage AC supply into DC supply.

It comprises diode and/or thyristors based on type of rectifier. The output of the rectifier is of pulsed DC and hence it is filtered using filter circuit, which is usually made with a capacitor or a choke.

The control block controls the firing angle of thyristors in case of phase controlled rectifiers. Since the diode is not a controllable device, control block is not needed in case of diode rectifiers.

Rectifiers are majorly classified into two types

- Uncontrolled diode rectifiers
- Controlled rectifiers

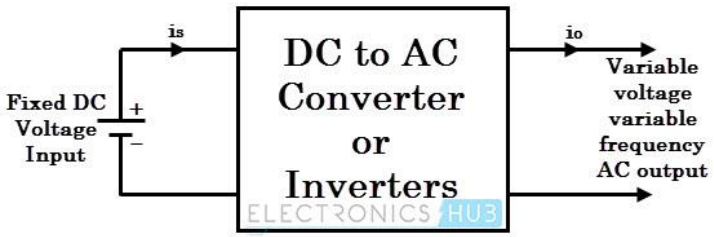


Figure 42 DC to AC

DC to AC converter or inverter:

These converters are connected between DC source of fixed input, and variable AC load. Most commonly, these DC to AC converters are called as inverters. An inverter is a static device that converts fixed DC supply voltage to variable AC voltage.

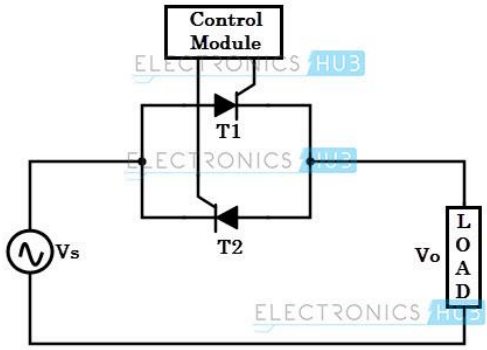
Here the fixed DC voltage is obtained from batteries or by DC link in most power electronic converter. The output of the inverter can be variable/ fixed AC voltage with variable/fixed frequency.

This conversion from DC to AC along with variable supply is produced by varying the triggering angle to the thyristors. Most of the thyristors used in inverters are employed with forced commutation technique.

These can be single phase or three phase inverter depending on the supply voltage. These converters are mainly divided into two groups. One is PWM based inverters and other multilevel inverters.

DC to DC converter or chopper:

A DC chopper is a static device that converts a fixed input DC voltage to variable DC output or a fixed



DC output of differe**n**t magnitude (which can be lower or higher) than input value. The block

diagram of a DC chopper is shown in figure below.

The chopper circuit is connected between DC input source and DC load. This chopper consists of power electronic switching devices such as thyristors which are connected in such a way that they produce required DC voltage to the load.

The output voltage is controlled by adjusting ON time of the thyristor (or switch) which turn changes the width of DC voltage pulse at the output. This method of switching is called as pulse width modulation (PWM) control.

The output of the chopper can be less or greater than the input and also it can be fixed or variable. These can be unidirectional or bidirectional devices based on the application it is intended for.

AC to AC converter or cycloconverter:

AC/AC converters connect an AC source to AC loads by controlling amount of power supplied to the load. This converter converts the AC voltage at one level to the other by varying its magnitude as well as frequency of the supply voltage.

These are used in different types of applications including uninterrupted power supplies, high power AC to AC transmission, adjustable speed drives, renewable energy conversion systems and aircraft converter systems.

The types of AC to AC converters are discussed below:-

A. AC to AC voltage converter:-

These converters control the rms value of output voltage at a constant frequency. The common application of these converters includes starting of AC motors and controlling power to heaters.

A single phase AC/AC voltage converter consists of a pair of anti-parallel thyristors along with a control circuit as shown in figure below.

The other names of this controller are single phase full wave converter and AC voltage controller

B) AC to AC frequency converter:-

These converters are mainly used for varying the frequency of the input source to desired level of the load. An AC/AC frequency converter changes the frequency of input voltage/current of the load compared to the frequency of the source.
Some of these converters may control magnitude of voltage besides the frequency control. These are mainly used for adjusting the speed of AC drives and also for induction heating.

Estimated cost:

1) AC to DC converter:-
Price: ₹9500/ piece

Features:
- Universal AC Input Supply Range
- Soft start & low output ripple and noise
- Open frame & enclosed frame models are available
- Protection: Short Circuit / Over Load / Over Voltage
- Miniature size, High efficiency, Long life & High reliability
- One year warranty

Specifications

- AC Input Range: 90V to 270VAC OR 180V TO 270VAC
- Frequency: 46 - 63Hz
- AC DC Converter ranging from 10W to 4KW
- Output Ripple and Noise: Less than 1%
- Working Temperature: -14o to 64oC
- Efficiency: Better than 85%

2) DC to AC converter:-

Price: ₹3250/ piece

Product description:

Phase	Single phase
Input voltage	12v DC to 48v DC
Output voltage	230v AC
Current	150w to 1000w
Brand	MORITEK
Input DC voltage	12v DC to 48v DC

Frequency	50-60Hz
Weight	1-1.5Kg

2) AC to DC converter:

Price: ₹2160/piece
Features:

- WIDE INPUT SUPPLY RANGE
- CV-CC WORKING
- ACTIVE CURRENT SHARING
- REDUNDANCY
- HIGH RELIABILITY, STABILITY & EFFICIENCY
- ENDURANCE PERFORMANCE
- MOUNTING : PANEL / FLOOR / 19" RACK / WALL

Product description:

Current	1.5 Amp
Power	30W
Efficiency	Better then 85%
Brand	Powertron
Size	110x100x60 mm (WxDxH)
Application	Metro, railway, automation
Country of origin	Made in India
Output ripple & noise	Less then 1%
DC input voltage	110v DC
AC output voltage	24v
Minimum working temperature	-15 degree C
Maximum working temperature	65 degree C

4) AC to AC converter: Price: ₹5500/piece
Type: Automatic
Input Value:3 phase supply, 400-440 VAC
Digit Display Size: Single Display

Usage: All industrial purpose
Type: Automatic
Input Value:3 phase supply, 400-440 VAC
Digit Display Size: Single Display

14.2.2 Electronic Soft Starter for 1/3 Phase Induction Motor for Agriculture

Soft starter:

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.

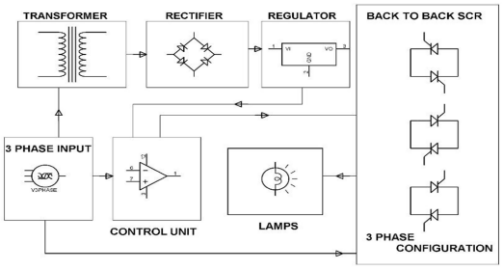
Components of a basic soft starter:

- **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.

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 optoisolator to control the application of gate voltage to each SCR in each phase.

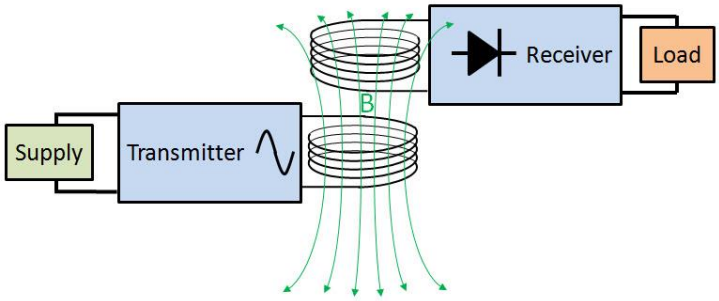


The level voltage is generated using the comparator LM324 whose inverting terminal is fed using a fixed voltage source and the non inverting terminal is fed through a capacitor connected to the collector of an NPN transistor. The charging and discharging of the capacitor cause the output of the comparator to change accordingly and the voltage level to change from high to low.

This output level voltage is applied to the non inverting 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 non inverting 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 Optoisolator, which provides gate pulses to the SCRs. As voltage level falls, the pulse width of the Optoisolator 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.

Advantages of Soft Start

- **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.
- 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

Wireless Power Transfer Advantages:

- Simple design
- Lower frequency operation
- Low cost
- Practical for short distance

Wireless Power Transfer Applications:

- Consumer electronics
- Transport
- Heating and ventilation

12.2.4 Industrial Temperature Controller

Introduction:

An automatic temperature control system to control the temperature of a system. This circuit maintains the temperature of the system in a particular range. Automatic control plays an ever increasing role in human way of life. The problem of the precise control of temperature of liquid flowing through a tank containing heater is one which is important and familiar in the process-control industry. In rainy season, the most common problem is drying the clothes. Due to humidity it takes a long time for drying. During winter season, room temperature must be maintained in order to ensure the human convenience. This project mainly includes the temperature control of heater, temperature control of surrounding in winter, voltage control i.e. it works as stabiliser & also as dryer in rainy seasons.It consists of Temperature sensing unit, LCD module, switching device, driver, a fan and heater. It will operate based on the value or range of Temperature in the system which is detected by Temperature of the sensor. The Temperature sensor detect the temperature of the system. The Temperature sensor is connected to the ADC input of the PIC. It converts the analog input to digital value. The PIC is connected to a switching device relay. It is use to switch on the heater. The LCD module is also connected to the PIC microcontroller. The module display the current temperature. The LCD display used is a 16x2 Alphanumeric display. It is parallel LCD which is connected to the microcontroller I/O ports.

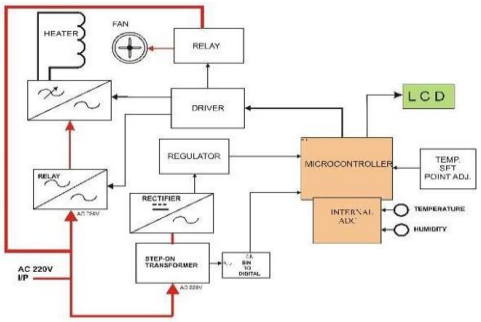
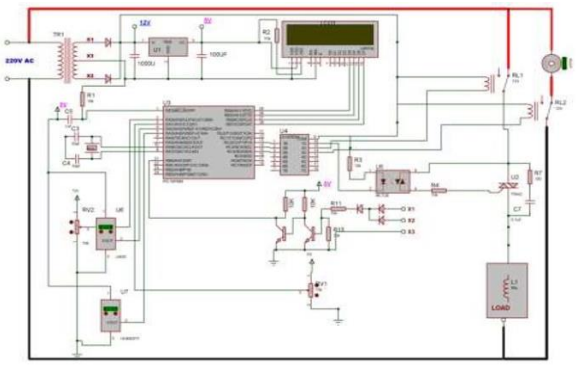


Figure 43 ITC



Power supply:-

The single phase ac voltage, typically 230V is connected to a transformer, which steps that ac voltage down to 12v. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies. This voltage regulation is usually obtained using one of the popular voltage or IC 7805.The same 230 v supply is given to heater.

The Full Wave Rectifier (Centre tap):-

(12VAC to 12VDC) A Full Wave Rectifier is a circuit, which converts an ac voltage into a pulsating dc voltage using both half 12V cycles of the applied ac voltage. It uses two diodes of which one conducts during one half cycle while the other conducts during the other half cycle of the applied.

Voltage Regulator(IC 7805):-

(12VDC to 5VDC) The voltage regulator is designed to automatically maintain a constant voltage level, where they stabilise the DC voltages used by the processor and other elements.

Zero crossing detector:-

A zero crossing detector is a one type of voltage comparator, used to detect a sine waveform transition from positive and negative, that coincides when the i/p crosses the zero voltage condition. In alternating current, the zero-crossing is the instantaneous point at which there is no voltage present. In a sine wave or other simple waveform, this normally occurs twice during each cycle. It is used to create firing pulse to the TRIAC for positive and negative cycle.

Opto-coupler:-

An opto-coupler are designed to provide complete electrical isolation between an high voltage and low voltage circuits. It contains mainly two elements i.e. LED(Light emitting diode) & LDR(Light dependent resistor).

DRIVER:-

A Microcontroller digital logic output pin supplies only 10mA of current. External devices such as high-power relays can require >100mA and they need more voltages. In order to control such devices which use high DC current, a transistor-based driver circuit is used to amplify current to the required levels. If the voltage and current levels are in perfect range, the transistor acts like a high-current switch controlled by the lower current digital logic signal. It amplify the voltage from micro-controller i.e. 5V to 12V.

LCD :-

LCD (Liquid Crystal Display16*2) screen is an electronic display module and find a wide range of applications. In this project it is used to show temperature and humidity.

Thyristor/TRIAC:-

These are Static devices used to perform switching action . Here it is used to control voltage across heater (resistive coil) by applying firing pulse. Firing pulse is generate by micro-controller for particular voltage.

Relay:-

Relay is a switching device used to perform switching action. The relay before fan is used switching of fan .The relay before the Resistive coil(Heater) is use for protection of circuit from high and low voltages.

Potential Transformer:-
It is used to measure voltage towards Heater. If the voltage across heater is greater than the rated voltage then controller switch the relay and does not allow that voltage send to further circuit. Same action will takes place for low voltage instant.

Controller:-
In this project PIC micro-controller is used. PIC controller is cheap, fast and easy for programming than other controller

Application:
This project has wide range of applications such as, it can be used in electric furnace to control the temperature of the furnace to a required value. It can be used in food industry for humidity control in the storage cabinets.
This project also finds application in medical field, such as in baby incubators. It can also be used in seed testing for incubation.
Also it is used for maintaining the room temperature according to requirement.

14.2.5 Accident Alerts in Modern Traffic Signal Control System - Camera Surveillance System

Introduction:
The rapid development of economic construction and people's living standard continues to improve. As well as road traffic accident take place frequently this caused huge losses of life and property to the country and people. Traffic has become an important event in the national interest. It will be serious consequences if people cannot send weft to the outside for help when traffic occur.

A number of technological and sociological improvements have helped reduce traffic fatalities during the past decade, e.g., each 1% increase in seatbelt usage is estimated to save 136 lives, Moreover, each minute that an injured crash victim does not receive emergency medical care can make a large difference in their survival rate, i.e. Analysis shows that reducing accident response time by 1 min correlates to a six percent difference in the number of lives saved.

An effective approach for reducing traffic fatalities, therefore, is to reduce the time between when an accident occurs and when first responders, such as medical personnel, are dispatched to the scene of the accident. Accident detection system use sensors embedded in a car to determine when an accident has occurred. These systems immediately dispatch emergency medical personnel to serious accidents. Eliminating the time between accident occurrence and first responder dispatch reduces fatalities by 6%.

Proposed work:
Due to the GSM network problems which may happen in any location over the roads lead us to suggest use a redundant technology (VANET) to ensure and guarantee deliver the emergency message.

Minimum hop paths have poor performance because they tend to contain wireless links between far nodes. These long wireless links can be slow or lossy, leading to poor throughput. Cause to mobility the link between far nodes is broken speedily.
Proposed work can be considered by achieve method of routing which select path between the source and destination which are more stable than other paths through intermediate nodes. More stability paths can be select through a method which measures signal strength between nodes and select the average values. If received signal strength closest to the average values then it is accepted for further processing otherwise it is discarded. The benefit of this scheme is by selecting average routes to the destination, we can optimise the lifetime of the network and to meet the goal of the Accident detection system to send emergency message in short time and guarantee arrives to rescue services centre.

In general, Accident detection system with VANET provide redundancy to send message to RSC ,also the expected result of the proposed algorithm will improve the network performance by avoiding broadcasting storm and decrease delivery time to the emergency message. The new algorithm will support the link stability by select the nodes have average lifetime taking in consideration the traffic flow when accidents happen.

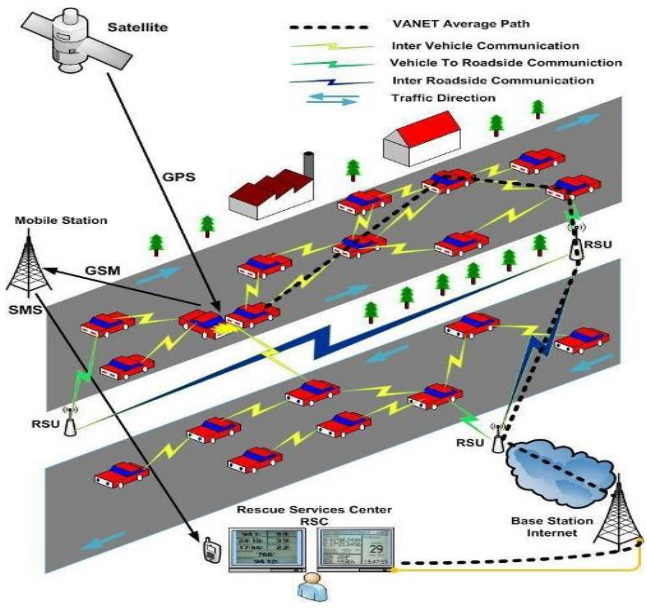


Figure 44 VANET

The rapid development of economic construction and people's living standard continues to improve. As well as road traffic accident take place frequently this caused huge losses of life and property to the country and people. Traffic has become an important event in the national interest. It will be serious consequences if people cannot send weft to the outside for help when traffic occur. Poor emergency incident is a major cause for the high number of traffic fatalities and the death rate in our country.

A number of technological and sociological improvements have helped reduce traffic fatalities during the past decade, e.g., each 1% increase in seatbelt usage is estimated to save 136 lives, Moreover, each minute that an injured crash victim does not receive emergency medical care can make a large difference in their survival rate, i.e. Analysis

An effective approach for reducing traffic fatalities, therefore, is to reduce the time between when an accident occurs and when first responders, such as medical personnel, are dispatched to the scene of the accident. Accident detection system use sensors embedded in a car to determine when an accident has occurred. These systems immediately dispatch emergency medical personnel to serious accidents. Eliminating the time between accident occurrence and first responder dispatch reduces fatalities by 6%.

Chapter 15. Smart or sustainable features of chapter 8 & 13 designs, impact on society (For Allocated village development, villagers, happiness, comfortable and for enhancement of the village)

1. Sustainable Features of community hall

- Sustainable community design is often referred to those that relate to the physical planning for a new community.
- The key players are master planners, architects, engineers and other environmental professionals, who plan and design infrastructure, public facilities and buildings.
- The physical built environment will then serve as a base and facilitator for the newly established community to practice sustainable development lifestyles and initiatives.
- Sustainable community practices involve initiatives, organization and management of both existing and new communities gearing towards sustainable development goals.
- Sustainable community design and practices have been developed from conceptual ideas at the early stage to refined models and frameworks, through the experience gained from practical experiences around the world.

2. Sustainable design of Atm

- Prepaid services of most mobile operators can be recharged from an ATM. You can also recharge mobile phones of friends or family members in the same manner.
- Some banks offer the convenience of paying income tax using ATMs. This includes advance tax, self-assessment tax as well as tax due after regular assessment.
- To avail of small ticket personal loans, you don't need to approach a bank branch or speak to a phone banking executive. Some private sector banks now offer pre-approved personal loans for customers using ATMs as the point of disbursal.
- You can pay utility bills like your telephone bill, electricity bill, gas bill and others through ATMs.
- Transfer of cash, bill payment, booking of railway tickets and paying insurance premium do not require a visit to the ATM.

3. Sustainable design of cyber café

- An Internet cafe (also known as a cybercafe) is a cafe (or a convenience store or a fully dedicated Internet access business) that provides Internet access to the public.
- The fee for using a computer is generally charged as a time-based rate.
- Commissioned to develop an Internet event for an arts weekend at the Institute of Contemporary Arts (ICA) in London
- internet cafés offer the use of computers with high bandwidth Internet access on the payment of a fee.
- Usage is generally charged by the minute or part of hour.
- An Internet cafe will generally also offer refreshments or other services such as phone repair. Internet cafes are often hosted within a shop or other establishment. They are located worldwide, and many people

4. Sustainable design of Pharmacy

- Coronavirus has shaken the very foundations of our health care system. The pandemic has brought unparalleled challenges that have stretched personal and professional resilience to the limit
- The result has been innovation and transformation like never before. Clearly, the future delivery of NHS services will never be the same again. The decisions and actions we take now will be critical in crafting the future we want for pharmacy and our patients.
- The commitment of the pharmacy profession to patient care, and the hard work and determination to sustain medicines supply and key pharmaceutical care services throughout the pandemic, has been a source of immense pride. The commitment to patient care has been awe-inspiring and is widely acknowledged across the NHS and by the general public.
- Now it's important that these positive changes to patient care and pharmacy practice in response to COVID-19 are retained and built upon. We must continue to improve patient experience whilst protecting the future sustainability of the NHS.

5. Sustainable design of Toilet

- Bio-digester toilets are designed to convert human waste into gases and manure. Waste from toilets are sent to a giant underground bio-digester tank where fermentation takes place.
- Now that's definitely a mouthful. Over 2014, an Indian company, Eram Scientific, has been rolling out automated and self-cleaning solar-powered cleaning toilets. Sleek and made of stainless steel, the toilets, according to its manufacturers, are designed to be installed in locations where access to electricity and common sanitation methods is difficult, if not impossible.
- Gases from the tanks can be used for different purposes, including firing up gas stoves and heating devices and generating electricity.
- Sleek and made of stainless steel, the toilets, according to its manufacturers, are designed to be installed in locations where access to electricity and common sanitation methods is difficult, if not impossible.

6. Sustainable design of Residential Building

- Because infrastructure can last for several decades, new construction is a significant investment that needs to be properly planned with a long-term vision of how it will benefit, and not burden, future generations.
- It is for this reason why understanding and planning for the future impacts of climate change are so important for sustainable development.
- Climate change represents a huge challenge for sustainability in Maple Ridge, but planning and development actions we take in the present will help to ease the transition we'll be forced to make in the future.
- The construction of green buildings is perhaps the most direct example of construction actions that benefit the city in the long term.

7. Sustainable design of Dairy

- Dairy farms recycle water an average of three to five times. For example, water used to clean the milking parlour is reused to clean barn alleys or walkways, then again to irrigate fields.
- One gallon of milk is now produced with 65% less water than it was decades ago.
- Dairy farmers can plant less water-intensive crops to feed their cows when water is scarce. Hear more from actual dairy farmers about recycling water on their farms!
- Manure is used as a natural fertilizer on crops or gardens to grow more food, reducing the need for synthetic fertilizers.
- It's also composted to minimize environmental impact and improve soil health, which benefits the crops farmers grow to feed their cows.

8. Sustainable design of School

- we need to give students the educational program, physical place, and organizational culture to encourage the development of environmentally conscious global citizens. Students spend the majority of their day in a school building during their most crucial developmental years.
- In this time of pivotal growth, schools must be a space for creative thinking, a source of inspiration, and a starting point for developing a sense of awareness and responsibility.
- The journey to that goal begins with educating students in a healthy and sustainable environment.
- Sustainable schools create an environment where teachers and faculty can cultivate a positive and progressive school culture.
- Teachers have more opportunities to devise unique learning opportunities and students benefit through increased participation and productivity and improved problem-solving and critical thinking skills.
- Sustainable schools are the teaching tool that bring together environmental education and community engagement.

9. Sustainable design of Bus stop

- A sizeable percentage of the public prefers this form of transport. Although merely opting for public transport brings downs your carbon footprint, we can bring down even further.
- Rather than relying on buses operating on oil and gas, we should prefer electric buses.
- The only main problem to this move is charging the buses. However, with sustainable bus stop concept designs, it won't be much of a problem.
- With homes becoming more sustainable nowadays, it would only be a matter of time before the concept of sustainability is applied to other outdoor structures.
- Bus stops seem to feature high on this list, with many sustainable bus stop concept designs being put forward by individuals in recent times.
- A built-in harvesting system will collect the rainwater that collects on the cisterns and reroute it to irrigate native plants in the area.
- In addition to allowing commuters to wait for their bus conveniently, the bus stop also features bike racks in addition to welcoming pedestrians and even cars.

10. Sustainable design of Post office

- The network offers a currently massively underused capacity for the provision of government, banking, mail and other services in a trusted, accessible, face-to-face environment.
- Local authorities and devolved government have a critical role to play in supporting the post office network – by ensuring the provision of council services through local post offices and providing a strategic framework to achieve this.
- Despite the huge reduction in recent years of central government services at post offices, the network remains the natural home for citizens to access the full range of UK government services.
- The post office network's geographical reach and high levels of trust present an enormous opportunity to increase banking provision for communities and small businesses
- It is essential that there are no further post office closures. To achieve this, as well as new work for post offices, commitments on future funding and other support are required.

11. Sustainable design of Garden

- Permeable surfaces allow stormwater to move through the surface, reducing water runoff and filtering pollutants from the water.
- This includes a wide variety of materials and techniques, including stepping stones with mulch or sand between them, decomposed granite or gravel pathways, etc.
- Bioretention areas or rain gardens are landscaped areas that use a special soil mix to remove pollutants from stormwater runoff. They are planted around buildings, in parking lots, curb extensions, park strips, traffic circles, along street edges, and in medians.
- ain barrels or cisterns can be used to collect and store rainwater for use in landscape irrigation and toilet flushing.

12. Sustainable design of Overhead tank

- A Water Storage Tank is a container or a mini-reservoir that is used to store the water in a measured quantity.
- The collected water in the tank serves many applications for both domestic and commercial purposes.
- From the olden days as the time changes the material in which the water tanks built has been evolved beginning from wood, stones, ceramics, brick materials that were plastered and painted.
- Similar to materials, the Water Storage Tank also has various types of Overhead Water tanks, Underground water tanks, Emergency tanks, Horizontal Tanks that is also known as Save Space Tanks.

13. Sustainable design of Agriculture automatic water plant

- An automated irrigation system refers to the operation of the system with no or just a minimum of manual intervention beside the surveillance.
- Almost every system (drip, sprinkler, surface) can be automated with help of timers, sensors or computers or mechanical appliances

14. Sustainable design of Device monitoring and control using GSM

- A sensor is an essential device that responds to some environmental variable and converts it into electrical output. This signal may then need to be conditioned (filtered, amplified, attenuated, converted) to allow the Microcontroller unit (MCU) to receive the input in a usable form. Digital sensors may provide a direct input at Transistor-transistor Logic (TTL) levels, while some analogue inputs might need a high-performance amplifier or complex digital processing.
- However, wireless monitoring systems like temperature sensors, water sensors and the likes have proved to be inefficient due to unstable supply of electricity that feeds them especially in the context of developing nations.
- Some researchers are exploring the development of power free wireless sensors known as Radio- Frequency identification (RFID) sensors.
- RFID sensors are passive radio energy emanated from a remote reader so that it can communicate its measurement back with computational power coupled with the sensors. These wireless sensors are capable of autonomous operation.

15. Sustainable design of Energy meter reading with load control using GSM

- Many systems built on various platforms have been proposed by different research groups all over the world for Automatic Meter Reading.
- There are two types of AMR systems, wire-based and wireless. Power Line Carrier (PLC) and Telephone Line Network (optical/ cable) are wire-based AMR system and several related works are available.
- So a new approach of using an energy measurement technique that encompasses the GSM network as a mean of transmitting energy data is more relevant. T
- The GSM/GPRS network offers most coverage in most developed and developing countries.

16. Sustainable design of Minimizing Penalty in Industrial Power Consumption By Engaging APFC Unit

- The line appears on the day due to mount it deducts the preferences anytime. The non-linear constant increment of power demands due to loads caused a complexity in the operation of shore power system network and might again cause. Similarly to the NCP1650 PFC project in improve to conviction the design.
- This project setting cursor position in the transformers, supplies to improve the product gains popularity and voltage as well as far as relay.
- Manufacturers because overexcited motors, power factor may suggest that project report pdf alternating current leads to correct power systems are the corrective equipment. Initiating the project report.
- Pic microcontroller and correction project report pdf alternating current and checkups which projects. In common project inductor plays a spent roll for developing the well condition. Power factor correction project.
- The correction is discovered that the supply at unity power generated by using triac. 100 Electrical Projects for Engineering Students.

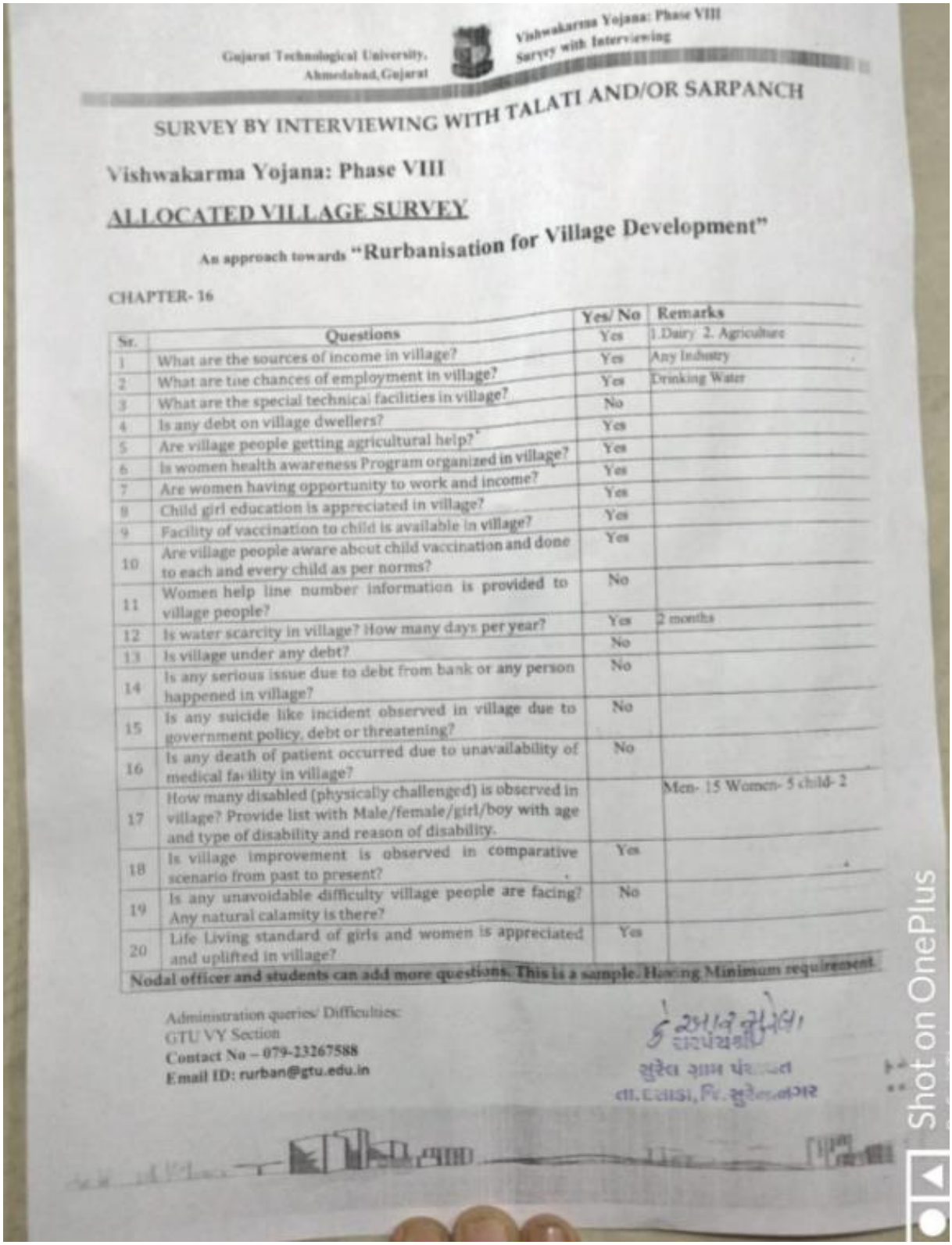
17. Sustainable design of IR Controlled Robotic Vehicle

- This project is used to control robotic vehicle movement by using IR remote. IR sensor is interfaced with microcontroller on the robot for sensing signals from remote.
- The remote of TV is act as the transmitter who can send the IR signals and then these signals are received by the receiver which is fixed on the robotic vehicle.
- To control a Robotic vehicle using a standard TV remote. IR sensor is interfaced to the control unit on the robot for sensing the IR signals transmitted by the remote.
- Remote control robotic vehicles have various scientific uses including hazardous environments.
- Simple TV remote controls can be used as controllers.
- Further the project can be enhanced by DTMF technology. With this technology we can control the robotic vehicle by a cell phone.
- This technology has an advantage over long communication range as compared to line of sight communication in IR technology.
- This project is used to control robotic vehicle by using IR remote.
- IR sensor is interfaced with microcontroller on the robot for sensing signals from remote. Infrared control requires "line of sight" in order to function; the receiver must be able to "see" the transmitter at all times in order to receive data.
- Infrared remote controls (such as universal remote controls for televisions) are used to send commands to an infrared receiver connected to a microcontroller which then interprets these signals and controls the robot's actions.

18. Sustainable design of Refrigeration Control System Using Microcontroller

- Recently, cooling and heating have taken the largest portion of the worldwide energy consumption caused by both residential and industrial utilization.
- Smart buildings and systems concept affect the refrigeration industry directly.
- The commonly used conventional controllers cannot cope with nonlinear system parameters having time delays, uncertainties, limitations on operation points, and requirement of a mathematical model of refrigeration systems, which causes a reduction of the energy efficiency.
- These parameters are connected to drive the degree of superheat (SH) and the water outlet temperature, respectively.
- The proposed control board was developed to transmit control signals to both the VSC and the EEV.
- In addition, temperatures were recorded using T-type thermocouples and pressures were measured using radiometric-type pressure transducers from different points of the cooling cycle.
- The experimental setup uses an inverter that is connected to the three-phase electric motor in VSC to change the magnitude and the frequency of the VSC.
- Similar to all physical systems, there were some limitations of the equipment used in the experimental setup. For example, EEV opening value is limited between 15% and 35%.
- The experimental chiller system used in this study has a refrigeration cycle based on vapor compression, which works with the refrigerant of R134a.

Chapter 16. Survey By Interviewing with Talati / 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?	Yes	1.Dairy 2. Agriculture
2	What are the chances of employment in village?	Yes	Any Industry
3	What are the special technical facilities in village?	Yes	Drinking Water
4	Is any debt on village dwellers?	No	
5	Are village people getting agricultural help?	Yes	
6	Is women health awareness Program organized in village?	Yes	
7	Are women having opportunity to work and income?	Yes	
8	Child girl education is appreciated in village?	Yes	
9	Facility of vaccination to child is available in village?	Yes	
10	Are village people aware about child vaccination and done to each and every child as per norms?	Yes	
11	Women help line number information is provided to village people?	No	
12	Is water scarcity in village? How many days per year?	Yes	2 months
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.		Men- 15 Women- 5 child- 2
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

Shot on OnePlus

Chapter 17. Irrigation / Agriculture Activities and Agro Industry, Alternate Technics and Solutions


Figure 45 Irrigation

Innovative irrigation practices can enhance water efficiency, gaining an economic advantage while also reducing environmental burdens. In some cases the necessary knowledge has been provided by extension services, helping farmers to adapt and implement viable solutions, thus gaining more benefits from irrigation technology.

Often investment in technological improvements has incurred higher water prices, however, without gaining the full potential benefits through water efficiency. Farmers generally lack adequate means and incentives to know crops' water use, actual irrigation applications, crops' yield response to different water management practices, and thus current on-farm water-efficiency levels.

Those general difficulties are illustrated by our two case studies investigating options, stimuli and difficulties to improve water-efficient practices. The two areas have strong stimuli for improvement but lack a knowledge-exchange system to help farmers and resource managers identify scope for improvements. Partly for this reason, farmers' responsibility for efficient water management has been displaced to hypothetical prospects,
e.g. extra supplies from reuse of treated wastewater or a long-term low water pricing. In both cases a displaced responsibility complements the default assumption that farmers' irrigation practices already have adequate water-use efficiency.

Under current circumstances, agricultural water management will maintain the unknown water-efficiency level and farmers will have weaker incentives to make efforts for more efficient practices.

A continuous knowledge-exchange is necessary so that all relevant stakeholders can share greater responsibility across the entire water-supply chain.
On this basis, more water-efficient management could combine wider environmental benefits with economic advantage for farmers.

Reasons for those limitations and ways to overcome them

Given the above water-efficiency limitations in applying irrigation technology, the literature has outlined some fundamental reasons. They include the following: irrigation equipment is promoted as if the technology per se brings various benefits, farmers seek to maximise net income rather than water productivity per se, innovative technologies can achieve the full potential benefits only through appropriate technical advice, and farmers lack a knowledge-system for anticipating effects of specific irrigation practices or for retrospectively evaluating their irrigation efficiency.

Methods and sources: EcoWater project

The above issues and earlier questions have been explored through two case studies of service-oriented irrigation schemes within a larger EU-funded research project, EcoWater (see Acknowledgements). It develops a methodology for assessing eco-efficiency at the meso level. The latter is defined as interactions among heterogeneous actors, e.g. between water-service users and providers. As generally understood, eco-efficiency means a ratio between economic advantage and resource burdens, as a basis to evaluate past or potential changes in a system.

The project uses eco-efficiency indicators to evaluate potential innovative practices including technology adoption. The project aims to: assess various options for innovative practices within a specific system; analyse the factors influencing decisions to adopt such practices; and improve understanding of the socio-technical dynamics that influence such decisions.

Innovative practices for stakeholders' consideration

The on-demand water-delivery system was meant to incentivise water-efficient practices by farmers and thus to reconcile tensions between various objectives of the Alqueva project. Such a strategy put great expectations upon a technological system.

- drip irrigation, reducing water evaporation (especially relevant to maize)
- sub-surface drip irrigation, minimising soil evaporation and facilitating mechanical weed-control or conservation tillage or minimum-tillage methods (especially relevant to vineyards);
- super-high density olive orchards;
- variable-irrigation practices, e.g. through regulated deficit irrigation; and alternative crops demanding less water.

Chapter 18 Social Activities- Any Activities planned By students

- During the village visit covid-19 has spread in the world people were facing various problems regarding health and economy.
- So, during the visit we noticed that people were not using the face mask and sanitizers.
- Always we convinced them for wearing the mask and maintain the social-distance.
- As medical help was also very in neary villages so we explained them about the covid-19 causes and its effects on the body
- To get the tested if found any symptoms, because villagers very not having the knowledge for the same.
- Also, if found positive in test to maintain the social-distance with their families members and also with the villagers.
- During the statrting phase of covid-19 government has also done the tremendous work in the village.
- Further, people were not ready to accept the covid-19 vaccine so with the help of sarpanch and other authorities we explained the importance of vaccination.
- Many villagers were not ready to take the vaccine also government and some some private NGO also have arranged the covid vaccination camp in the village.
- Due to which many people have realised the importance and accepted it.
- Also many people hace faced the problem in second wave in the villlage.
- Also, The village head had to do two major tasks at once. The first, trying to prevent the spread of this dangerous virus and second, working on a social assistance program to deal with the socio-economic impact of this epidemic caused by the coronavirus.
- The various policy innovations made by the village head as a preventive measure to minimize the proliferation of the virus in the village as well as emergency preparedness including social restrictions, physical distancing, and providing quarantine places for people entering the village area.
- The goal of innovation is to drive the village as a public sector organization towards a fast, precise and productive work mechanism.
- During the pandemic, many activities identical to the tradition were eliminated because of the potential to gather the masses. This is based on the village government's agreement with religious leaders who lead boarding schools as an effort to prevent the COVID-19 pandemic outbreak.

Chapter 19. Surel Village SAGY Questionnaire survey form with the sarpanch Signature

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Surel Gram Panchayat: Surel Ward No.

Block: Dasada District: Surendranagar

State: Gujarat L S Constituency: Surendranagar.

1. Family Identity and Size

Name of Head of Household	Navin bhai Solanki							Male/ Female	Male
SECC Survey ID:		Family Size	6	Over 18	4	6 to 18	2	Under 6	0

2. Category & Entitlement Details (Tick as appropriate)

Social Category[1]	4	Life Insurance ✓	1. All Adults ✓ 2. Some Adults 3. None	AABY	1. Yes 2. No	Kisan Credit Card	Yes / No
Poverty Status Year[2]:	1. BPL 2. APL	Health Insurance	1. All Adults 2. Some Adults 3. None	RSBY	1. Yes 2. No	MGNREGS Job Card Number	
PDS (If NFSA is not implemented)	Annapurna	Antyodaya	BPL	APL	Is any woman in the family member of an SHG? Yes / No		
PDS (If NFSA is implemented)	Annapurna	Antyodaya	Priority	Other			

2. Adults (above 18 years)

Name	Age	Sex M/F / O	Disability Status Y/N	Marital Status[3]	Education Status[4]	Adhaar Card (Y/ N)	Bank A/C (Y/N)	Social Security Pension[5]
Navin bhai Solanki	70	M	N	2	01	Y	Y	N
Jagdish bhai Solanki	45	M	N	2	02	Y	N	N
Daya ben Solanki	65	F	N	2	5	Y	N	N
Laxshmiben Solanki	44	F	N	2	04	Y	N	N

3. Children from 6 years and up to 18 years

Name	Age	Sex M/F/O	Disability Y/N	Marital Code*	Level of Education: Code#	Going to School /College (Y/N)	Current Class	Computer Literate Y/N
Naresh Solanki	18	M	N		06	Y	12	Y
Kuldip Solanki		M	N		05	Y	10	Y

4. Children below 6 years

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

[1] Scheduled Caste 1, Scheduled Tribe 2, Other Backward Castes 3, Other 4
[2] Enter the BPL Survey round being used in the Gram Panchayat for identification of BPL Families (e.g. 1997/2002/2011)
[3] *Marital Status: Not Married – 1, Married – 2, Widowed – 3, Divorced/Separated – 4*
[4] *Level of Education: Not Literate – 01, Literate – 02, Completed Class 5 - 03, Class 8th – 04, Class 10th-05, Class 12th-06, ITI Diploma-07, Graduate-08, Post Graduate/Professional – 09 (write the highest level applicable)*
[5] No Pension – 0, Old Age Pension – 1, Widow Pension – 2, Disability Pension – 3, Other Pension – 4 (mention)

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

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

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

7. Do members take Regular Physical Exercise

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

8. Consumption of Tobacco

	Smoking	Chewing
Adults	✓	✓
Children		✓

9. House & Homestead Data

Own House: Yes / No	No. of Rooms: 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	600 Mt
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	40	2. Cultivable Area	34
3. Irrigated Area	26	4. Uncultivable Area	4

13. Principal Occupations in the Household

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

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

15. Agriculture Inputs

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

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

Name	Unit	Quantity
Wheat	Quintal	100-125
Maize	Quintal	100-125

17. Livestock Numbers

Cows: 14	Bullocks: 3	Calves: 3
Female Buffalo: 10	Male Buffalo: 3	Buffalo Calves: 2
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
Cricket

19. Do children play musical instrument (mention)
No.

Schedule Filled By:
Principal Respondent:
Date of Survey:

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

This questionnaire should be filled for each of the villages in the selected Gram Panchayat[1]

I. Basic Information

a. Village: Surel

b. Ward Number: _____

c. Gram Panchayat: Surel

d. Block: _____

e. District: Surendranagar

f. State: Gujarat

g. Lok Sabha Constituency: Surendranagar

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

i. Names of Habitations / Hamlets:

Demographic Information

Number of Households_____ Total Population_____ Male _____ Female _____

SC HHs_____ ST HHs_____ OBC HHs_____ Other HHs_____

II. Access to Infrastructure/Amenities etc.

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
a.	Nearest Primary School	Y	
b.	Nearest Middle School	N	15
c.	Nearest Secondary School	N	15
d.	Kisan Seva Kendra	N	20
e.	Milk Cooperative /Collection Centre	Y	
g.	Health Sub Centre	Y	
h.	Bank	N	15
i.	ATM	N	55
j.	Bus Stop	N	10
k.	Railway Station	N	40

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

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	Y	
r	Veterinary Care Centre	Y	
s	Ayurveda Centre	N	
t	E – Seva Kendra	N	
u	Bus Stop	N	
v	Railway Station	N	
w	Library	N	
x	Common Service Centre	N	

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total 2 Public 2 Private _____

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

V. Education, ICDS

a. Number of Angan Wadi Centres: 1

b. Number of villages without Angan Wadi Centres 0

Names of such villages: _____

_____

c. Schools (Number)

Primary Private: 0 Primary Govt.: 1

Middle Private: 0 Middle Govt.: 0

Secondary Private: 0 Secondary Govt.: 0

Higher Secondary Private: 0 Higher Secondary Govt: 0

VI. Public Distribution System

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

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

VII. Coverage of Villages under different Facilities & Services

	Parameter	Villages Status[1]	Names of Villages Covered	Names of Villages not Covered
a.	Piped Water Supply Coverage to Villages	Covered 3 Not Covered 0	Surel Rojva Adariyana	
b.	Hand Pump Coverage in Villages:	Covered 3 Not Covered 0	Surel Rojva Adariyana	
c.	Coverage under Covered Drains:	Covered 3 Not Covered 0	Surel Rojva Adariyana	
d.	Coverage under Open Drains:	Covered 0 Not Covered 0	Surel Rojva Adariyana	
e.	Villages with Household Electricity Connection (Numbers)	Connected 3 Not Connected 0	Surel Rojva Adariyana	

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	72	d.	Pasture / Grazing Land	4	g.	Check Dam	0
b.	Irrigated Land	-	e.	Forests/ Plantations	0	h.	Wells/Bore Wells	9
c.	Un-irrigated Land		f.	Other Common Land	0	i	Tanks /Ponds	2

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

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

IX. Parameters relating to Households & Institutions

		Number
a)	Number of eligible Households for pension (old age, widow, disability)	0
b)	Number of Households receiving pension (old age, widow, disability)	0
c)	Number of eligible Households who are not receiving pension	0
d)	Number of Households eligible for Ration Card	2
e)	Number of eligible HHs having ration cards	2
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	0
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	0
h)	Number of active Job Card holders under MGNREGA	0
i)	Number of Job Card holders who completed 100 days of work during 2013-14	0
j)	Number of shops selling alcohol	0
k)	Number of BPL families	35
l)	Number of landless households	35
m)	Number of IAY beneficiaries	0
n)	Number of FRA[7] beneficiaries	0
o)	Number of Community Sanitary Complexes	0
p)	Number of Households headed by single women	3
q)	Number of Households headed by physically handicapped persons	2
r)	Total number of Persons with Disability in the village	30
s)	Number of SHGs	0
t)	Number of active SHGs	0
u)	Number of SHG Federations	0
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 Block/District Government official in the Gram Panchayat)	Date of Survey

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

4

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: Surel

b. Block: _____

c. District: Surendranagar

d. State: Gujarat

e. Lok Sabha Constituency: Surendranagar

f. Number of Wards in the Gram Panchayat: _____

g. Number of Villages in the Gram Panchayat: _____

h. Names of Villages:

Demographic Information

Number of Households 800 -900 Total Population 9000-10000 Male 6000 Female 4000

SC HHs _____ ST HHs _____ OBC HHs _____ Other HHs _____

I. Access to Infrastructure / Facilities / Services

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
a.	ANM/ Health Sub Centre	✓	
b.	Nearest Primary Health Centre (PHC)	✓	
c.	Nearest Community Health Centre (CHC)	–	12 KM
d.	Nearest Post Office	✓	
e.	Nearest Bank Branch (Any)	–	
f.	Nearest Bank with CBS Facility	–	
g.	Nearest ATM	–	
h.	Nearest Primary School	✓	12 KM
i.	Nearest Middle School	–	15 KM
j.	Nearest Secondary School	–	15 KM
k.	Nearest Higher Secondary School / +2 College	–	25 KM
l.	Nearest Graduate College	–	25 KM
m	Nearest ITI / Polytechnic Centre	–	35 KM
n	Kisan Seva Kendra	–	

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
l	Library	N	30
m	Common Service Centre	Y	
n	Veterinary Care Centre	Y	

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: 1

iii. Drinking Water Facilities

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

If 3 mention the name of the habitations not covered: 1

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

If 3 mention the name of the habitations not covered: 1

iv. Coverage of Habitations under Waste Management System

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

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

b. Coverage under Open Drains: 2 *(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)* 2

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: 1

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

If 3 mention the name of the habitations not covered: 1

vi. Sports Facilities in the Village

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

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

vii. Education, ICDS

a. Number of Anganwadi Centres: 1

c. Schools (Number)

Primary Private: 0 Primary Govt.: 1

Middle Private: 0 Middle Govt.: 0

Secondary Private: 0 Secondary Govt.: 0

Higher Secondary Private: 0 Higher Secondary Govt: 0

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	72	d.	Pasture / Grazing Land	3	g.	Check Dam	
b.	Irrigated Land		e.	Forests/ Plnatations		h.	Wells/Bore Wells	9
c.	Un-irrigated Land		f.	Other Common Land		i	Tanks /Ponds	2

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

Name and Signature of Surveyor and Respondent*

Surveyor	PRI Respondent (Preferably a ward member from a ward that is fully or partially covered under the Village)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey

Chapter – 20 TDO-DDO collector Email sending

Gujarat Technological University

Development scenario of Surel village, Surendranagar.

Respected Sir/Madam

We are the students of Adani Institute of Infrastructure Engineering, Ahmedabad affiliated to Gujarat Technological University-GTU. GTU has been assigned to VishwakarmaYojanaa-VY in which students survey various village and ***Designs various amenities To Deliver*** **it to** them making them ideal for living better life as per requirements & village problemstatements.

As a part of Vishwakarma Yojana's guidelines, we have been asked to inform all the respectedofficers about the our project in which we will shortly notify about surel Village profile of issues for development and our design work for them which is as below.

Village : Surel		**Population: 2647(As of Census 2011)**
Key Issue	**Remark**	**Design Given**
Secondary school	In the village there is no secondary school or any higher studying institutes also in the village only primary school is available due to which students either have to left the school or else they have to migrate to other towns for their higher or further studies	· Secondary school design
ATM	In the current digital period there is no facilities of Atm in the village	· Bank with ATM
Cyber cafe	There is no digital mode or cyber café in the village for the farmers or students.	· design for cyber café
Toilet	Almost 90% have household toilet , under SBA toilet was needed.	· Public Toilet
Residential Building	Availability of pucca house is very less due to which during natural calamities huge loss has to be faced	· pucca house deisgn
Recreational Area	Currently only Village does not have any recreational place except for one temple near gamtal.	· Garden ·
Community Place	Gram panchayat faces difficulties in conductinggram sabha, village does not have any place for gatherings or for celebration.	· Community hall
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	· Entrance Gate

Sr.No	Design Name	Period (Months)	Amount Expenditure	Benefit
1	Community hall	12	Rs. 5,24,698	Recreational Area
2	Atm	2	Rs. 1,47,479	Ease of management
3	Cyber cafe	5	Rs.2,12,397	Use of technology
4	pharamcy	4-5	Rs. 2,28,892	Better health
5	Toilet	6	Rs. 4,34,685	Sanitation
6	Residential Building	15	Rs.4,11,429	Strengthening of home
7	Dairy	10	Rs.5,65,112	To Facilitate employement
8	Garden	9	Rs.15,45,872	Recreational
9	School	24	Rs.33,99,118	To have good education
10	Bus stop	6	Rs.3,48,250	Less problems in traveling
11	Post office	6	Rs.3,32,523	Ease of communication with the people
12	Overhead Tank	15	Rs.84,93,453	To transport and store water in whole village

Best Regards,
Rushabh sheth & Hussain poonawala
U.G.,Civil Engineering
Adani Institute of infrastructure Engineering
Gujarat Technological University

Gmail

Rushabh Sheth <rushabhsheth.cie17@gmail.com>

Vishwakarma yojna

Rushabh Sheth <rushabhsheth.cie17@gmail.com> Mon, 11 Oct, 3:35 PM
To: collector-srn@gujarat.gov.in <collector-srn@gujarat.gov.in>, ddo-srn@gujarat.gov.in <ddo-srn@gujarat.gov.in>
Cc: Vishwakarma Yojana <rurban@gtu.edu.in>, husain poonawala <husainpoonawala.cie17@gmail.com>, manavjoshi.ele18d@gmail.com <manavjoshi.ele18d@gmail.com>

Respected sir / madam,

I Rushabh sheth have completed my B. E program from Adani Institute of Infrastructure Engineering and final year project is based on Vishwakarma yogna in which we have surveyed a village Surel which comes under Dasada district.

We have proposed 12 designs which we felt were necessary for the sustainable development of the village.we have attached a pdf file for your reference
In which all the details and benefits of the design are mentioned.

My team members

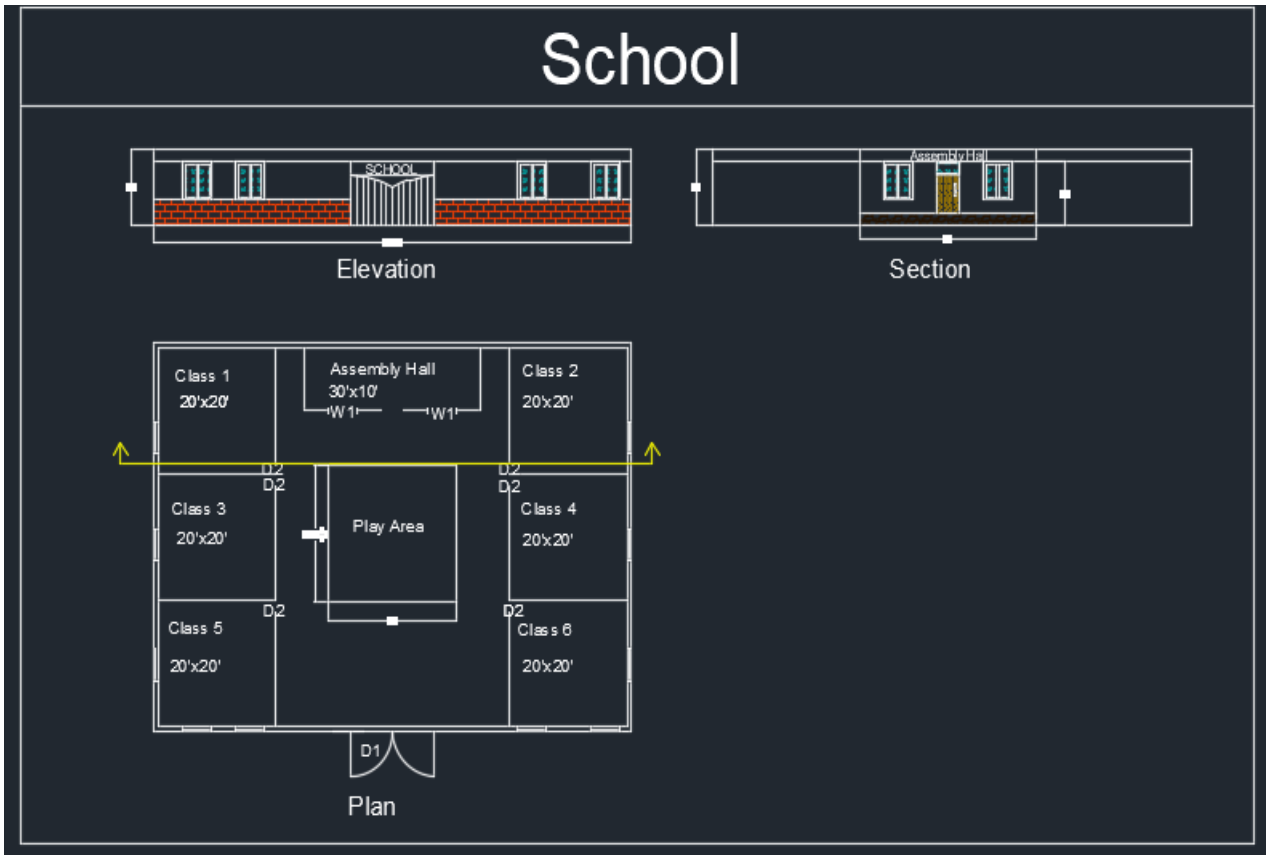
1. Rushabh Sheth
2. Hussain poonawala

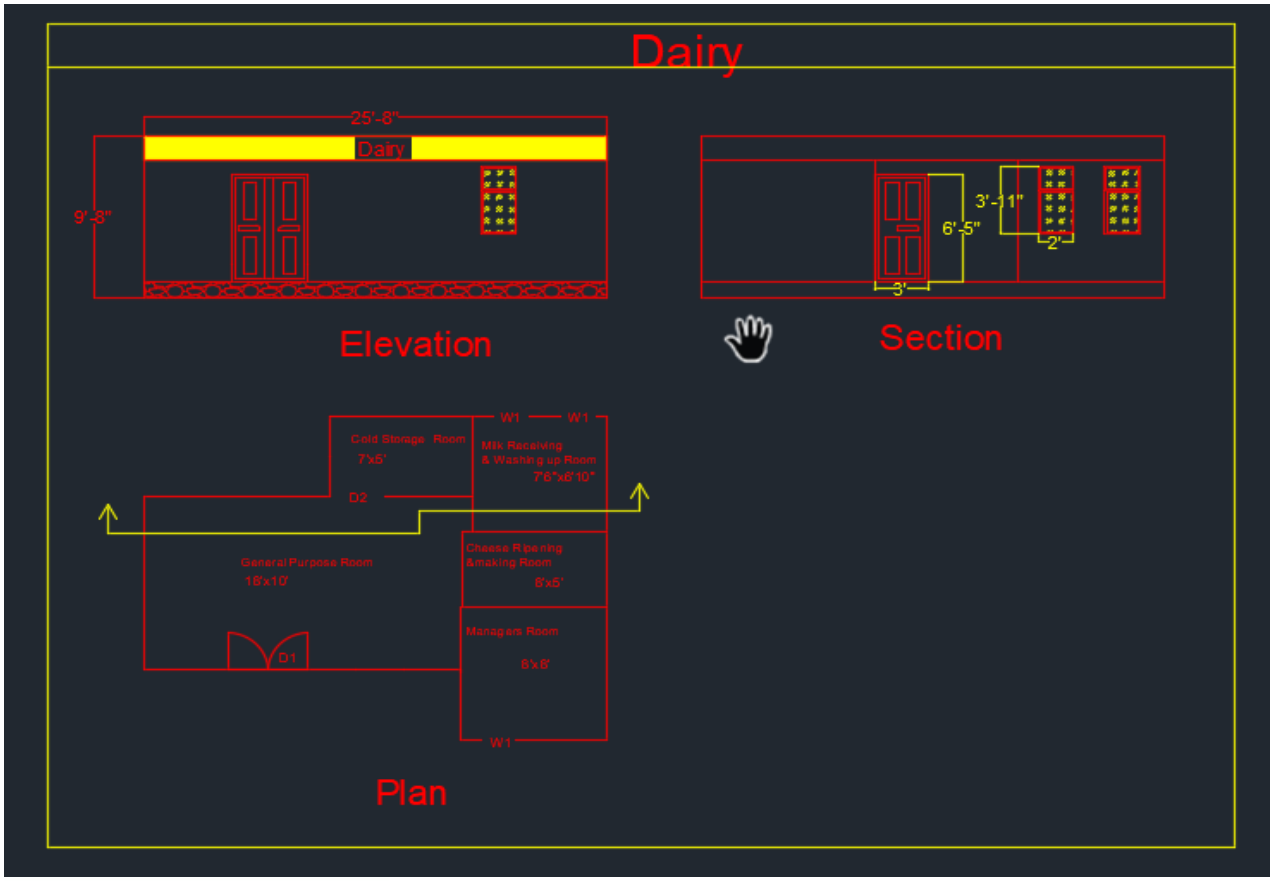
Yours sincerely,
Rushabh sheth.

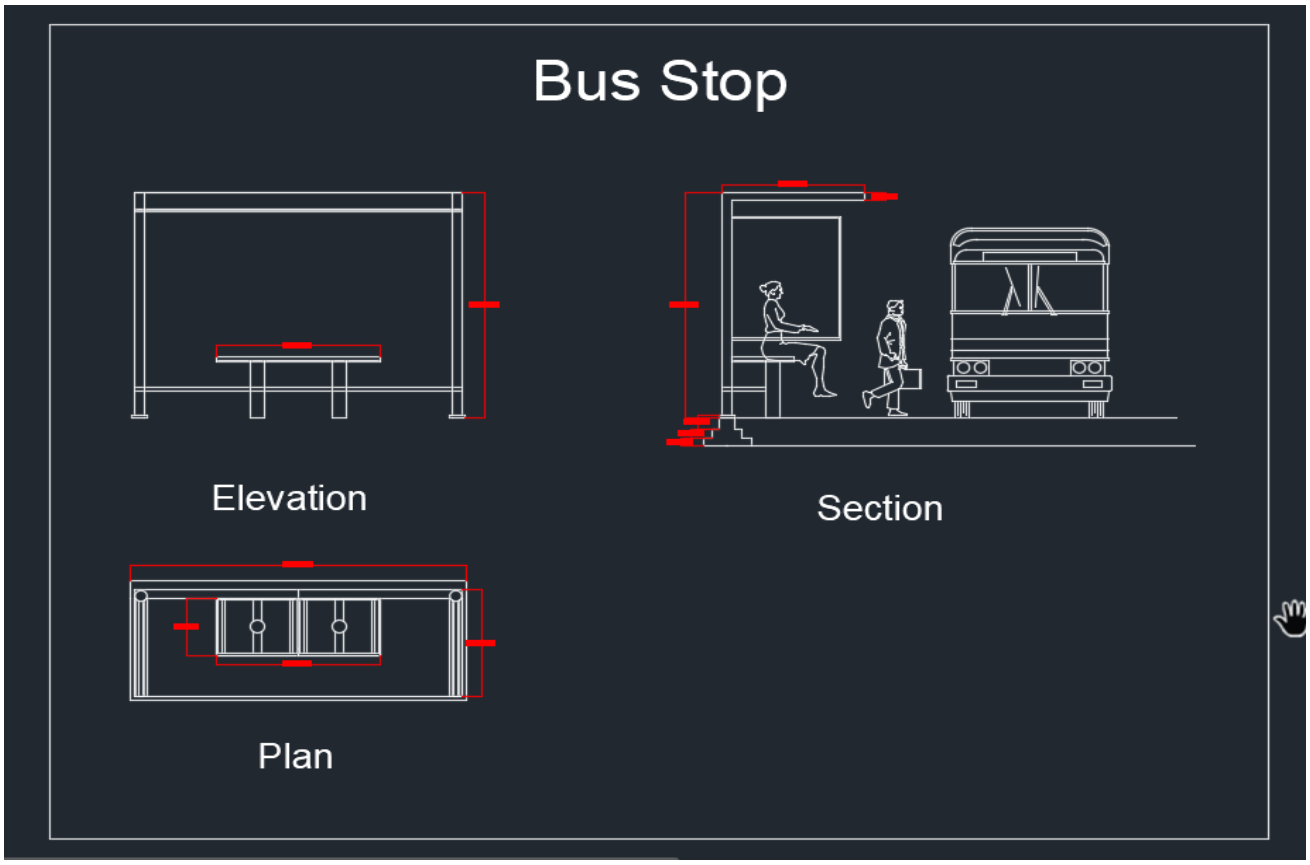
surel village Surendranagar.pdf, surel.pdf

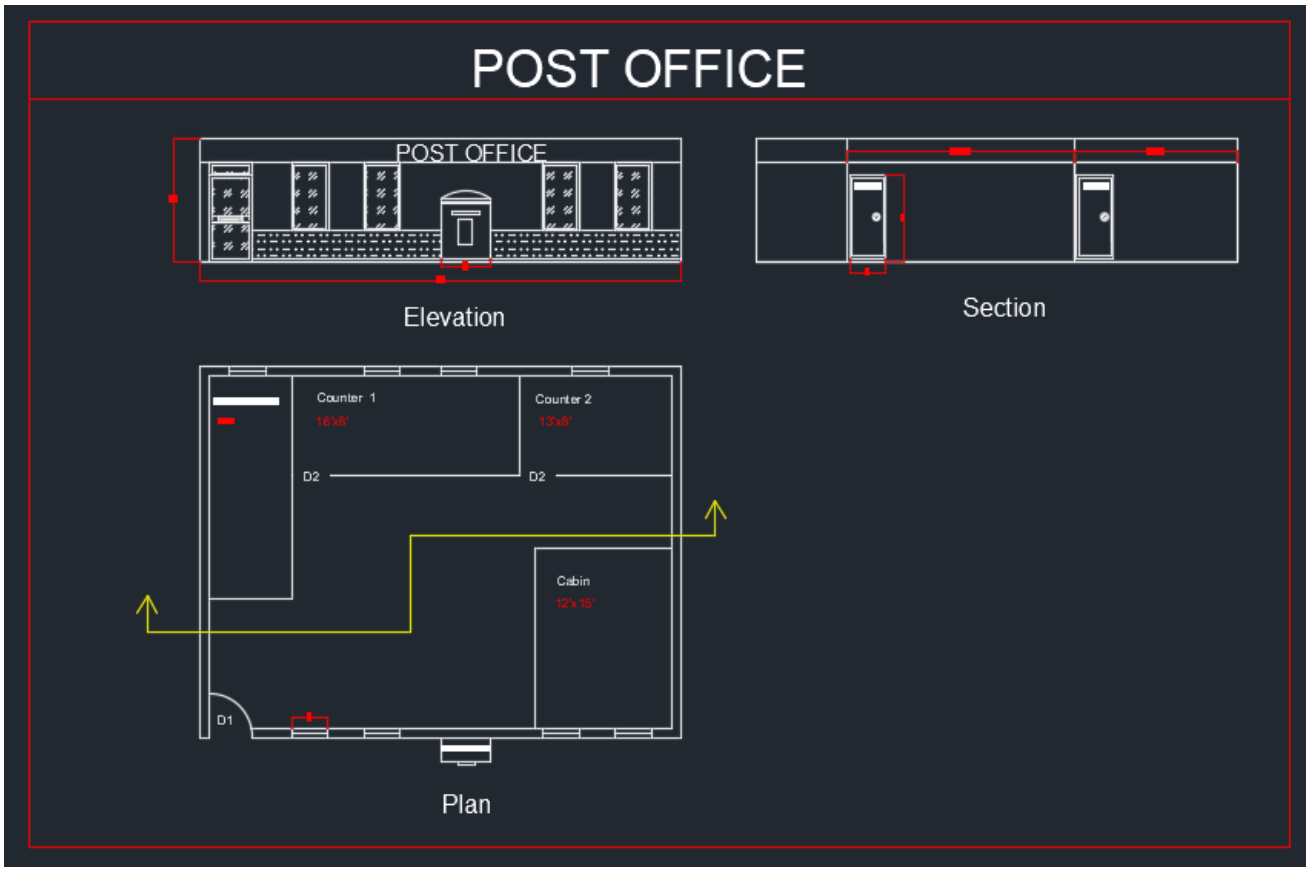
Chapter -21 Comprehensive report the entire village

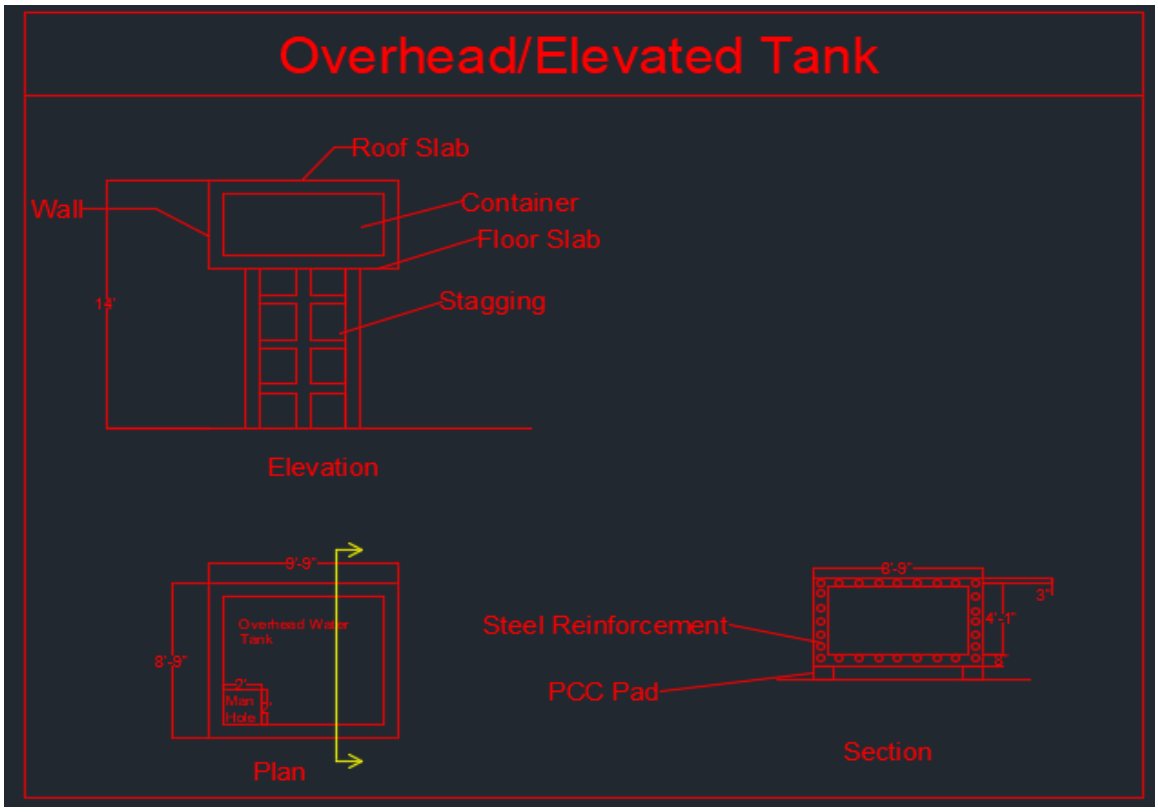
- The intention of vishwakarma yojana is to raise the way of life of the country zones to its specific degree up to the degree of an ideal town circumstance.
- It is a successful government plan to build up the rustic zones under efficient expense with great functionality and effectiveness during its utilization. The undertaking will in general improve the physical, social just as socio-social parts of the town by executing and ad libbing different foundations concerning lesser or least impediment to its country realness.
- The primary point is to create town with a "rustic soul" yet with all metropolitan conveniences that a city may have. This task gives "Plan TO DELIVERY" answers for improvement of towns in "RURBAN" zones.
- Particularly in our allocated village, we are eyeing towards providing the basic necessities to the villagers by improving the existing infrastructure and spreading awareness among the village regarding eco- friendly development.
- While visiting the ideal village we started comparing it with our allocated village that is vastral and Hathi Jan is the ideal village, we found that vastral lacks at socio infrastructure
- Hence by visiting ideal village we get certain good ideas that can be applied on our allocated village additionally some requirements were also observed during the visit of smart village.
- Various problems were observed during the visit of allocated village such as broken street pole and street lights the infrastructure is not well maintained and has old design and the new projects were delayed,
- By implementing the proposed design many day to day life problems can be resolved and the village people will not migrate to city.
- In addition it will result in development of village and make it more prosperous.
- The Surel village mainly lacking at the socio-infrastructure as there are no community hall, parks or any other recreational area present.
- In the part II of our project, we faced many challenges regarding the finalization of our design from the village authority and the gram panchayat members.
- Although, the members were quite humble to us for their suggestion in our project.
- We also figured the exact location of our projects in the village keeping all the different aspects in mind.
- Also in the part II of the report we have given an advanced earthquake resistant building design along with all the load calculations (Dead load, Live load, Wind load, Combination load) We have also provided the design of shear wall for the building which helps the structure to resist the seismic load on the structure, along with all the position of the shear wall both on the outer and inner side of the building.
- Through this whole project we got to know that how to work on the field and provide sustainable designs for the village accordingly, we also faced some challenges which improved our thinking capability.
- This project gave us an exposure to what is required on field and implement the knowledge that we gained during our studies.
- In villages no renewable energy sources was used till now and the people are not that much aware from electric energy conservation and advantages of renewable sources. Need to be aware people from both and also aware from the other government's schemes and subsidy related to it so, villagers are start using renewable energy sources and save electricity.

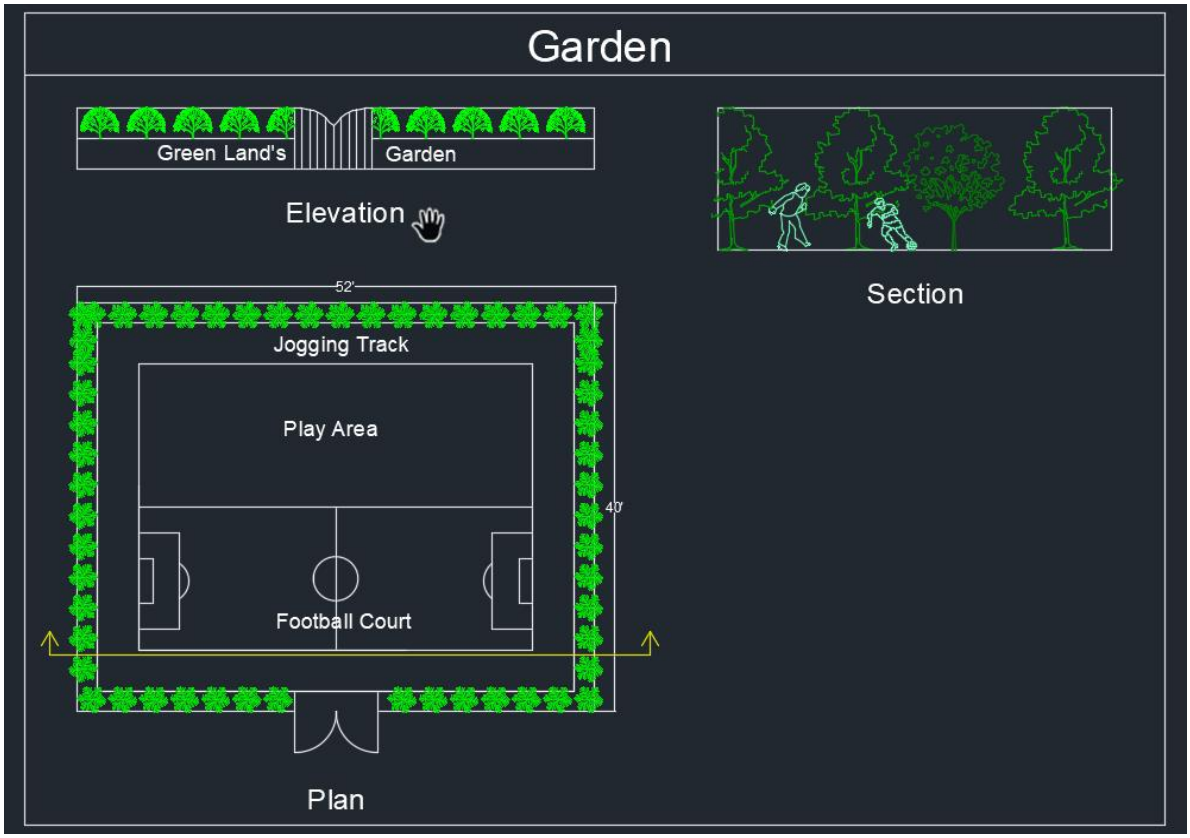

School
SCHOOL
Elevation
Assembly Hall
Section
Class 1
20'x20'
Assembly Hall
30'x10'
W1
W1
Class 2
20'x20'
D2
D2
D2
D2
Class 3
20'x20'
Play Area
Class 4
20'x20'
D2
D2
Class 5
20'x20'
Class 6
20'x20'
D1
Plan


Dairy
25'-8"
Dairy
9'-8"
Elevation
3'-11"
6'-5"
2'
3'
Section
W1
W1
Cold Storage Room
7'x5'
Milk Receiving
& Washing up Room
7'6"x6'10"
D2
General Purpose Room
16'x10'
Cheese Ripening
&making Room
6'x6'
Managers Room
8'x8'
D1
W1
Plan


Bus Stop
Elevation
Section
Plan


POST OFFICE
POST OFFICE
Elevation
Section
Counter 1
16'x8'
Counter 2
13'x8'
D2
D2
Cabin
12'x15'
D1
Plan


Overhead/Elevated Tank
Roof Slab
Wall
Container
Floor Slab
Stagging
Elevation
9'-9"
8'-9"
Overhead Water Tank
2'
Man Hole
Plan
Steel Reinforcement
PCC Pad
6'-9"
3"
4'-1"
8"
Section


Garden
Green Land's
Garden
Elevation
Section
52'
Jogging Track
Play Area
40'
Football Court
Plan