DETAIL PROJECT REPORT

VISHWAKARMA YOJANA: VIII
AN APPROACH TOWARDS RURBANISATION
BHUTSAD Village
NAVSARI District

PREPARED BY

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GIDC DEGREE ENGINEERING COLLEGE, NAVSARI

NODAL OFFICERS NAME:
Prof. SUNIL V. JAGANIYA
Prof. ANKUR P. DESAI

YEAR:2020-21

GUJARAT TECHNOLOGICAL UNIVERSITY
Chandkheda,Ahmedabad– 382424 Gujarat

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CERTIFICATE

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

Detail Project Report for,

VILLAGE: BHUTSAD

DISTRICT: NAVSARI

Under

VishwakarmaYojana: Phase-VIII

in partial fulfillment of the project offered by

GUJARATTECHNOLOGICALUNIVERSITY,CHANDKHEDA

during the academic year 2020-21.
This project work has been carried out by them under our super vision and guidance.

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College Name:	GIDC Degree Engineering College, Navsari
College Stamp:	

ABSTRACT

Vishwakarma Yojana project and how you do your vision project:

The project aims to provide urban amenities in rural areas while maintaining the rural soul. This will help in developing villages sustainably, reduce migration from villages, and prevent the cities from urban pressure.

About your village description:

Bhutsad is a Village in Jalalpore Taluka in Navsari District of Gujarat State, India. It is located 7 km towards South from District head Quarters Navsari. Bhutsad Pin code is 396450 and postal head office is Eru. Navsariis near to the Arabian sea. There is a chance of humidity in the weather.

About the existing village condition:

Bhutsad Local Language is Gujarati. The village has a total population is 622 and the number of houses is 141. The female Population is 49.7%. The village literacy rate is 75.9% and the Female Literacy rate is 36.0%.

About your proposed designs your view for village development:

- Transportation Facilities
- Electric Facilities
- Educational
- Health-Related issues
- Banking
- Rainwater Harvesting

About future scope of the village development:

- Community Hall
- Garden
- Medical
- ATM
- Public Toilet

Key Words: Vishwakarma Yojana, Rural Development, Bhutsad Village, Implementation, Facilities.

ACKNOWLEDGEMENT

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

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

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ABBREVIATIONS

SHORT NAME / SYMBOL	FULL NAME
ATM	Automated Teller Machine
SWOT	Strengths, Weaknesses, Opportunities, Threats
LED	Light Emitting Diode
UDPFI	Urban Development Plans Formulation and Implementation
PHC	Primary Health Center
CHC	Community Health Center
APMC	Agricultural Produce Market Committee
CFL	Compact Fluorescent Lamp
NHB	National Housing Bank
NCU	Neonatal Care Unit
NGO	Non-Governmental Organization
RPM	Revolution Per Minute
HP	Horse Power
AC	Alternating Current
DC	Direct Current

Chapter: 1 Ideal Village Visit

1.1 Background & Study Area Location

Bhutsad is a Village in Jalalpore Taluka in Navsari District of Gujarat State, India. It is located 7 km towards South from District headquarters Navsari. Bhutsad Pin code is 396450 and postal head office is Eru, district Navsari.

Bhutsad Local Language is Gujarati. The village has a total population is 622 and the number of houses is141. The female Population is 49.7%. The village literacy rate is 75.9% and the Female Literacy rate is 36.0%.**Figure 1: Map of Bhutsad village**

1.2 Concept: Ideal Village

1.2.1 Objectives of the Ideal Village

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

1.2.2 Case Study of Ideal Village ofGujarat

Punsari Village, Gujarat Punsari is a village located in Sabarkantha district in the state of Gujarat, India. Punsari is considered India's smartest village. The village is located about 80km from the state capital, Gandhinagar. Punsari is 20km from Parvati Hills. Parvati Hills is the largest tabletop land of India. The village follows the Panchayati raj system. The village has transformed the panchayat. There has been the use of new and advanced technology in education. This village has a wi-fi connection for all people. Efforts have been made for the empowerment of women and increasing security in the village. Some of the facilities provided by the panchayat include local mineral water supply, sewer & drainage project, a healthcare center, banking facilities, and toll-free complaint reception service. Consequently, Punsari received the award of being the best Gram Panchayat in Gujarat. The village's model has been appreciated by delegates from Nairobi and they are keen to replicate this in Kenyan villages.

1.2.3 The Idea of a Model Village

An ideal village has a good system of sanitation and drainage. Because filth and rubbish of the village should be regularly removed away into the compost pits. An ideal village has very good drains so that the dirty water of the village is properly drained away.

Agriculture and Industry:

People of an ideal village are good farmers and good artisans. They grow food crops, commercial crops, and oil-seeds. They take up the improved method of farming. They do all kinds of home-industry including spinning and weaving.

Educational facilities:

There are Primary schools, High schools, and craft schools in an ideal village. Primary education is free and compulsory.

Clinical facilities:

In an ideal village, there are clinical facilities for men and domestic animals. Hence, there are dispensaries and veterinary dispensaries.

People:

People of an ideal village are very neat and clean. They are quite enlightened. They have a sense of discipline and co-operation. They have a spirit of service and sacrifice. They follow the principles of plain living and high thinking. They are never idle. They are active and cheerful. Constant labor is their chief motto.

Conclusion:

An ideal village makes all possible provision for the all-round development of her people. It is our main duty that we should lift every village of India to a much higher level. The idea of an ideal village will certainly help us in discharging our duty.

1.2.4 Ancient History civil/Electrical concept about Indian Village/other countries perspective about village and its new development

The history of Indian villages presents an interesting occupation scenario, which has changed with time. Agriculture and farming were the prominent occupations of the Indian villagers during the ancient period and the other occupations included doing clerical jobs in king's courts or working as soldiers for the emperors. The Indian villagers remained dependent on agriculture for several centuries till the British period. However, the scenario changed during the British rule with the introduction of several industries. The villagers started to move to the urban areas, leaving their traditional occupation of agriculture. They joined different industrial organisations as workers or labourers and found alternate occupation. However, agriculture is still the principal occupation in most villages in India.

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

Physical and Demographic:

Bhutsad is a Village in Jalalpore Taluka in Navsari District of Gujarat State, India. It is located 7 km towards South from District headquarters Navsari. Bhutsad Pin code is 396450 and postal head office is Eru, district Navsari.

Infrastructures details:

Figure 2: Gram Panchayat

Figure 3: Aanganwadi

Figure 4: Temple

Figure 5: School

Figure 6: Library

Figure 7: Water Tank

Figure 8: Bus Stop

Figure 9: Hall

1.4 SWOT analysis of an ideal village:

Strengths:

- Developed infrastructure.
- Sugar Factory.
- Clean Environment

.• Well-monitoring System.

Weakness:

- Not use of any renewable sources.
- Majority of residences connected to overhead lines.

Figure 10: SWOT Analysis

Opportunities:

• Solar roofs can be developed
.• Rainwater harvesting
.• Solar plates on street lights.

Threats:

• Pollution due to industrial areas

1.5 Prospects of the village

The main prospects of the village are

- Providing technical knowledge to peoples.
- More and more use of Renewable energy sources.
- Encourage people for saving habit
- Opening Skill Development Centers.

1.6 Benefits of the visits of the ideal village/smart village

This visit to the village proved to be useful in a variety of ways and also gave an idea for the various development sectors still needed in Indian rural areas that need special attention and concern. Also, different methods and techniques were known which, when project.we got an idea about an ideal village. We had seen many kinds of new technologies which can be used in the village that are being used in the urban area. It improved our communication skills and we knew how to interact with the different peoples. Looking at the ideal village, we know what a village really should be like. No pollution, No Tension, No worries.

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

There is a 66 KV sub-station that supplies power to the village. The Sarpanch aims at getting Wi-Fi connectivity in the entire village so that the villagers can use unlimited internet once they purchase the modem from the panchayat office.

Figure 11: Punsuri village

The panchayat in this village has made efforts to provide the best possible facilities to students. Air-conditioners and CCTV cameras are installed in the primary schools. Apart from schools, 25 CCTVs are installed at prime junctions of the village so that the litterbugs can be spotted and punished.

Mini-buses are used for transport purpose within the village. The panchayat has started a bus facility called the *Atal Express* for women which is used for the import of milk.

Chapter: 2 Village Literature Review

2.1 Introduction: Urban & Rural:

Urban:

An urban area is a human settlement with high population and infrastructure facilities of the built environment. Urban areas are created through urbanization and are categorized as cities, towns, or suburban settlements are proper, planned settlements built up according to a process called urbanization.

Rural:

A rural area is a land that has few homes or other buildings, and not very many people. A rural areas population density is very low. Rural areas may develop randomly based on natural vegetation and fauna available in a region. According to the census 2011, there are 6, 40,867 villages in India. The area where more than 75% of the male population is associated with the agricultural activity is known as a rural area.

2.2 Imporatance in Rural Development

Rural development is considered to be of noticeable importance in the country today than in the olden days in the process of the evolution of the nation. It is a strategy that tries to obtain an improved and productivity, higher socio-economic equality and ambition, and stability in social and economic development.

The primary task is to decrease the famine that exists in roughly about 70 percent of the rural population, and to make sufficient and healthy food available.

The secondary task is to ensure the availability of clothing and footwear, a clean environment and house, medical attention, recreational provision, education, transport, and communication.

2.3 Ancient Village / Different Definition of Rural-Urban Villages:

A village is a clustered human settlement or community, larger than a hamlet but smaller than a town, with a population ranging from a few hundred to a few thousand.

Urban:

For the Census of India 2011, the definition of the urban area is as follows;
1. All places with a municipality, corporation, cantonment board or notified town area committee,etc.
2. All other places which satisfied the following criteria:
i) A minimum population of 5,000;
ii) At least 75 percent of the male main working population engaged in non-agricultural pursuits.

2.4 Scenario: Rural/Urban village of india population growth

Population

Population Growth:

Population by Rural-Urban Residence – India – 2011
Total:1,210,194,422 (100%)
Rural:833,087,662 (68.84%)

Urban:377,105,760 (31.16%)

Table 1: Population of Rural and Urban areas as per census 2001 and 2011

	2001	2011	Difference
India	102.9	121.0	18.1
Rural	74.3	83.3	9.0
Urban	28.6	37.7	9.1

2.5 Scenario: Rural/Urban village of Gujarat as Per Census 2011 and Least

Population in crores in Gujarat

Table 2: Gujarat population

	2001	2011	Difference
Gujarat	5.06	6.04	0.98
Rural	3.16	3.47	0.31
Urban	1.19	2.57	1.38

2.6 Rural Issues & Concerns

Rural electrification is one of the main requirements for a country like India with a major population of approximately 70% living in rural areas. In India, the village is said to be electrified if electricity is used in the inhabited locality within the revenue boundary of the village for any reason what-so-ever. An interesting but sad fact is that only 44% of the rural household of India has access to electricity. 7 out of 29 states have more than 70% of the rural household without access to electricity. The expansion of electricity services and electrification are vital to both the economic and social development of India. However, the current state of electricity services in most of the states of India indicate signs of crisis and are with severe shortcomings in many areas:

2.7 Various Measures for Rural Development:

Rural development is the process of improving the quality of life and economic well-being of people living in relatively isolated and sparsely populated areas. Rural development has traditionally centered on the exploitation of land-intensive natural resources such as agriculture and forestry. However, changes in global production networks and increased urbanization have changed the character of rural areas. Increasingly tourism, niche manufacturers, and recreation have replaced resource extraction and agriculture as dominant economic drivers. The need for rural communities to approach development from a wider perspective has created more focus on a broad range of development goals rather than merely creating an incentive for agricultural or Resource-based businesses. Education, entrepreneurship, physical infrastructure, and social infrastructure all play an important role in developing rural regions.

2.8 Bhutsad Village Street Light Condition

The current scenario:

The above Figure shows the condition of streetlight in Bhutsad village. The streetlight has no individual pole on lanes. The light is embedded in the electrical pole itself which is not safe. Another disadvantage is the manual operation of turning ON and OFF the streetlights. If someone forgets to turn OFF the streetlights then it will result in wastage of electricity, which is not the ideal case.

The proposed solution:
This project is aiming to develop an independent and individual automatic streetlight which will operate automatically by sensing the light conditions around it. The streetlights will automatically turn ON after sensing low light in the environment after evening time.

Figure 12: Street Light

2.9 Other Projects / Schemes

1) Schemes: Bachat Lamp Yojana

Ministry: Ministry of Power

Date of Launch: 2009

Sector: Electrification

Provisions: We all know that CFLs are great electricity savers and as compared to Incandescent bulbs they consume a lot less energy and give out the same amount of light. But as compared to incandescent, CFLs are costly. The cost deters a lot of people from buying energy-efficient CFL. To tackle this problem, BEE (Bureau of Energy Efficiency) has launched a scheme called Bachat Lamp Yojana (BLY) to distribute quality long-life CFLs in exchange for an incandescent lamp at Rs 15 to residential consumers. With this article, we will try to explain the BLY program and how that can be availed.

2)Schemes: Deendayal UpadhyaGram Jyoti Yojana

Ministry: Ministry of Power

Date of Launch: 2015
Sector: Rural Power Supply

Provisions: The DDUGJY scheme will enable to initiationof much-awaited reforms in the rural areas. It focuses on feeder separation (rural households & agricultural) and strengthening of sub-transmission & distribution infrastructure including metering at all levels in rural areas. This will help in providing round the clock power to rural households and adequate power to agricultural consumers‟ The earlier scheme for rural electrification viz. Rajiv Gandhi Grameen Vidyut Karan Yojana (RGGVY) has been subsumed in the new scheme as its rural electrification component.

3) Schemes: Digital India Programme

Ministry: Ministry of Communication & Information Technology

Date of Launch: 2 July2015

Sector: Digitally Empowered Nation

Provisions: Digital India is a campaign launched by the Government of India to ensure that Government services are made available to citizens electronically by improving online infrastructure and by increasing Internet connectivity or by making the country digitally empowered in the field of technology.

Digital India was launched by the Prime Minister of India NarendraModi on 2 July 2015 to connect rural areas with high-speed Internet networks and improve digital literacy. The vision of the Digital India Programme is inclusive growth in areas of electronic services, products, manufacturing and job opportunities, etc. and it is centered on three key areas – Digital Infrastructure as a Utility to Every Citizen, Governance & Services on Demand, and Digital Empowerment of Citizens.

4) Schemes: Indira Awaas Yojana/ PradhanMantri Gramin Awaas Yojana (PMAY)

Ministry: Ministry of Rural Development

Date of Launch: 1985
Sector: Housing, Rural

Provisions: Pradhan Mantri Gramin Awaas Yojana (PMAY), previously Indira Awaas Yojana (IAY), is a social welfare flagship Programme, created by the Indian Government, to provide housing for the rural poor in India. A similar scheme for the urban poor was launched in 2015 as Housing for All by 2022. Indira Awaas Yojana was launched by Rajiv Gandhi, the then Prime Minister of India, as one of the major flagship programs of the Ministry of Rural Development to construct houses for the BPL population in the villages. Under the scheme, financial assistance worth 70,000 (US$1,000) in plain areas and 75,000 (US$1,100) in difficult areas (high land area) is provided for the construction of houses. The houses are allotted in the name of the woman or jointly between husband and wife. The construction of the houses is the sole responsibility of the beneficiary and engagement of contractors is strictly prohibited. Sanitary latrine and smokeless challah are required to be constructed along with each IAY house for which additional financial assistance is provided from "Total Sanitation Campaign" and "Rajiv Gandhi Grameen Vidyutikaran Yojana" respectively. This scheme, operating since 1985, provides subsidies and cashassistance to people in villages to construct their houses, themselves.

5)Schemes: Pradhan Mantri Gram Yojana

Ministry: Ministry of Rural Development

Date of Launch: 23 July 2010

Sector: Modal Village

Provisions: Pradhan Mantri Adarsh Gram Yojana (PMAGY) is a rural development Programme launched by the Central government in India in the financial year2009–10 for the development of villages having a higher ratio (over 50%) of people belonging to the scheduled castes through the convergence of central and state schemes and allocating financial funding on a per village basis. The plan is considered ambitious as it aimed to bring several development programs to the villages. Some of these programs are Bharat Nirman, PradhanMantri Gram SadakYojana (PMGSY) for rural roads, water supply, housing, electrification, and other big-ticket schemes like SarvaShikshaAbhiyan, MahatmaGandhi National Rural Employment Guarantee Act, ICDS,

sanitation. This program would apply to around 44,000 villages that had a scheduled castes population above 50% and so qualified for PMAGY.

6)Schemes: Pradhan Mantri GramSadak Yojana

Ministry: Ministry of Rural Development

Date of Launch: 25 December 2000

Sector: Rural Development

Provisions: The Pradhan Mantri Gram Sadak Yojana or PMGSY is a nationwide plan in India to provide good all-weather road connectivity to unconnected villages. This Centrally Sponsored Scheme was introduced in 2000 by the then Prime Minister of India ShriAtalBihari Vajpayee and Shri Prabhjot Singh. The Assam Tribune has reported that the scheme has started to change the lifestyle of many villagers as it has resulted in new roads and upgrades of certain inter-villageroutes in Manipur.

7) Schemes: Rajiv Gandhi VidyutikaranYojana

Ministry: Ministry of Power

Date of Launch: April 2005

Sector: Rural Electrification
Program for creation of Rural Electricity Infrastructure & Household Electrification for providing access to electricity to rural households.

Scheme for Provision of Urban Amenities in Rural Areas (PURA):

In the pilot phase, the private developer is given the flexibility to identify and select the Gram Panchayat for undertaking PURA projects based on their familiarity with the area or experience of working at the grassroots level. However, as the consent of the concerned Panchayats and no objection from the state governments is mandatory, the selection would reflect the concurrence of all the stakeholders. It is expected that a scheme like PURA wherein all related schemes for rural infrastructure are being converged for a synchronized delivery for 10 years in project mode shall maximize socio-economic impact.

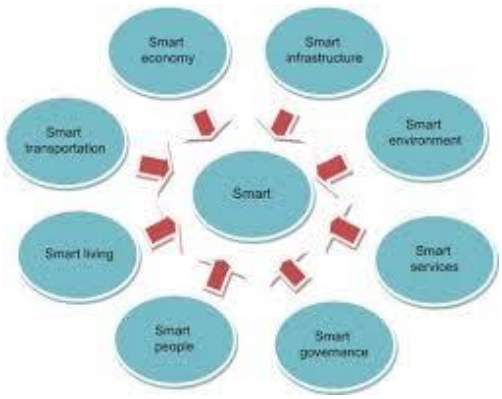
Funding for projects under the PURA scheme would come from four sources: MORD schemes, non-MORD schemes, private financing, and Capital Grant under PURA. Each PURA project cost and the eligible capital grant (subject to a maximum of 35% of project cost) shall be determined based on a Concept Plan and Detailed Project Report that would be apprised and approved by an inter-Ministerial Empowered Committee for the purpose.

Chapter: 3 Smart (Cities/Village) Concept as per your Idea and its Visit

3.1 Concept, definition

Concept:

In Smart Villages, access to sustainable energy services acts as a catalyst for Development – enabling the provision of good education and healthcare, access to clean water, the growth of productive enterprises to boost Incomes, and enhanced security, gender equality, and democratic engagement.



Definition:

The meaning of smart village is all the necessaries facilities are developed in the village and no need to moves in the city for any kind of requirement.

3.2 Vision-Goals, Standards, and Performance Measurement Indicators

Smart city development vision- Goals - activities :

Identify the transportation challenges and needs of the citizen and business community and demonstrate how advanced technologies can be used to address issues in safety, mobility, and climate change, now and into the future.

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

Support and encourage cities to take the evolutionary and revolutionary steps to integrate advanced technologies – including connected and automated vehicle technologies – into the management and operations of the city, consistent with the USDOT vision elements.

Demonstrate, quantify, and evaluate the impact of these advanced technologies, strategies, and applications towards improved safety, efficiency, and sustainable movement of people and goods.

3.3 Technlogical Options

1. Smart energy
2. Smart transportation
3. Smart data
4. Smart infrastructure
5. Smart mobility
6. Smart to devices

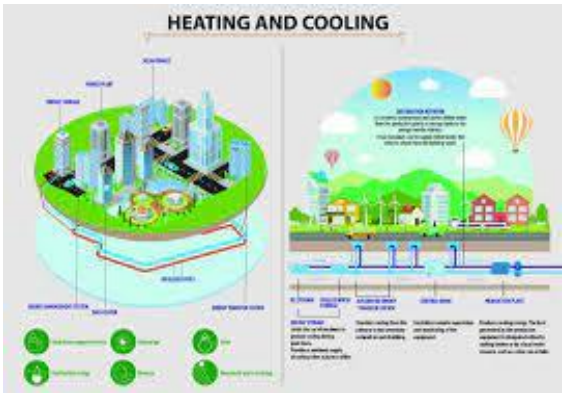
3.4 Road Map and Safe Guards for Smart Cities

- Study the Community: Before deciding to build a smart city, first, we need to know why. This can be done by defining the benefits of such an initiative. Study the community to know the Citizens, the business's needs – know the citizens and the community's unique

qualities, such as the age of the citizens, their education, hobbies, and attractions of the city.

- Develop a Smart City Policy: Develop a policy to drive the initiatives, where roles, responsibilities, objectives, and goals, can be defined. Create plans and strategies on how the goals will be achieved.

Figure 13: Road map



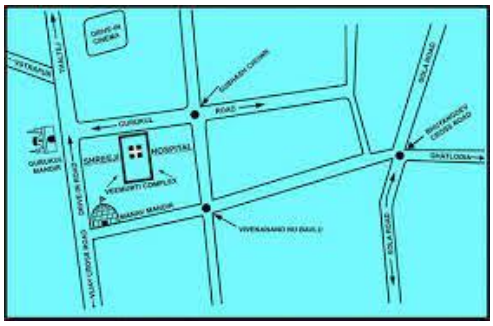
3.5 Smart Cities: Issues and Challenges

- Retrofitting existing legacy city infrastructure make it smart,
- Financing smart cities.
- Modern technology,
- Government collaborations and coordination,
- Reliability of services,
- Capacity building programs

3.6 Smart Infrastructure

Smart infrastructure can be defined as an infrastructure that integrates digital technology and (a) delivers the values of self-monitoring and accuracy in decision making; efficiency and cost savings; reliability; security, safety, and resilience; user interaction and empowerment; sustainability; redundancy minimization.

Figure 14: Smart Infrastructure



3.7 Cyber Security

Cybersecurity refers to the body of technologies, processes, and practices designed to protect networks, devices, programs, and data from attack, damage, or unauthorized access. Cybersecurity may also be referred to as information technology security.**Figure 15: Cyber Security**

3.8 Retrofitting- Redevelopment- Greenfield Development District Cooling

In the Southeast, air conditioners are almost crucial pieces of equipment for home comfort. However, it can be difficult to find the right air conditioner for your home, one that will provide enough cool air in the summer to cool your home without driving your energy costs through the roof.

When it comes down to selecting a new air conditioner for your home, there are a few things you should consider. First of all is efficiency. Get the most bang for your buck with an air conditioner

that won't cost a fortune to run. If you ‘re having trouble choosing an air conditioner for your home, contact us today we can help you weigh youroptions.

Figure 16: District Cooling & Heating

3.9 Strategic Options for Fast Development

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

Retrofitting will introduce planning in an existing built-up area to achieve smart city objectives, to make the existing area more efficient and livable. In retrofitting, an area consisting of more than 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare a strategy to become smart. Since existing structures are largely to remain intact in this model, it is expected that more intensive infrastructure service levels and a large number of smart applications will be packed into the new smart city.

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

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

3.11 Initiatives in village development by local self-government

Financial Systems. Constraints on government budgets and the rigidities of the present system of intergovernmental transfers prevent an adequate response of traditional arrangements to the challenge of urbanization. A new and more decentralized system of public and private financial intermediaries required. The establishment of the NHB represents an important step: an apex institution that will stimulate the creation of a network of mortgage financing. The NCU also calls for the creation of Urban Infrastructure Development banks to permit local governments to borrow for infrastructure.

3.12 Smart Initiatives by District Municipal Corporation :

- Duckweed based wastewater treatment with pisciculture
- Root zone treatment system
- Anaerobic Decentralized Waste Water Treatment System
- Study Technological Options at Household Level Management like
- Kitchen Garden with Piped Root Zone System, Kitchen Garden without Piped Root
- Zone System and Leach Pit
- Vermi composting
- Windrow Composting
- Thermophilic Composting

- MARC Method

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

- MyGov.in
- eSign Framework
- Swachh Bharat Mission mobile app
- National Scholarship Portal
- eHospital
- Digitize India Platform
- Bharat Net
- Wi-fi Hotspots
- Next Generation Network

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

Similar to Vishwakarma Yojana, Students of engineering colleges can be given the chance to visit foreign countries' smart villages and survey and study it properly as they study the smart villages of Gujarat. Then with the help of other government or private engineers, one can implement other countries' smart villages projects in Indian villages.

3.15 Electrical concept

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

Chapter: 4 Introduction About Bhutsad Village

4.1 Introduction

4.1.1 Introduction of Bhutsad Village

Bhutsad is a Village in Jalalpore Taluka in Navsari District of Gujarat State, India. It is located 7 km towards South from District headquarters Navsari. Bhutsad Pin code is 396450 and postal head office is Eru, district Navsari.

Table 3: Population data

Census Parameter	Census Data
Total Population	622
Total No of Houses	141

Female Population %	49.7 % (309)
Total Literacy rate %	75.9 % (472)
Female Literacy rate	36.0 % (224)
Scheduled Tribes Population %	50.5 % (314)
Scheduled Caste Population %	1.0 % (6)
Working Population %	45.7 %
Child (0 -6) Population by 2011	68
Girl Child (0 -6) Population % by 2011	50.0 % (34)

4.1.2 Justification/ need of the study

- Vishwakarma Yojana is one of the approaches to reduce urban city Pressure and lower the migration rate by developing a village with a 'rural soul' but with all urban amenities that a city may have.
- The developmental work in villages that could undertake as per the need of the village, in particular, includes Physical, Social, and Renewable Infrastructure Facilities.
- It is also proposed to frame "Vishwakarma Yojana" to provide the benefit of real work experience to engineering students of Gujarat Technological University and simultaneously apply their technical knowledge in the development of infrastructure in rural development.

4.1.3 Study Area

Bhutsad Village Gram Panchayat's name is Bhutsad. Bhutsad is a 10 km distance from Sub District HeadQuarter Jalalpore and it is a 7 km distance from District HeadQuarter Navsari. The nearest Statutory Town is Navsari in 7 km Distance. The total area is 217 hectares, the Non-Agricultural area is 36 hectares and the total irrigated area is 110 hectares.

4.1.4 Objective of the study

- Reduce migration of people from rural to urban due to lack of basic facilities
- Development of the villages with a rural soul and all other facilities.
- To study the existing growth, characteristics, and development of villages.
- To study the existing infrastructure facilities and their management issues phasing by villages.
- To analyze all feasibility parameters and relevant factors for the sustainable development of villages.
- To evolve a strategic planning proposal in the form of physical, social, and renewable infrastructure facilities for the development of villages, channelizing urban growth, and sustainingthe future.

4.1.5 Scope of the Study

- By analyzing the present conditions we can improve the basic amenities and facilities like agriculture facilities, milk cooperative facility, education facility.
- To improve the lifestyle of villagers by helping them to develop their skills by assisting them in implementing income-generating activities in close coordination and cooperation with national and international organizations.
- From the Gap analysis, development tactics for village development will be proposed and planning suggestions for physical infrastructure, social infrastructure, and renewable energy sources will be suggested for the village. This study will focus on the development of the village.

4.1.6 Methodology FrameWork for the development of your village

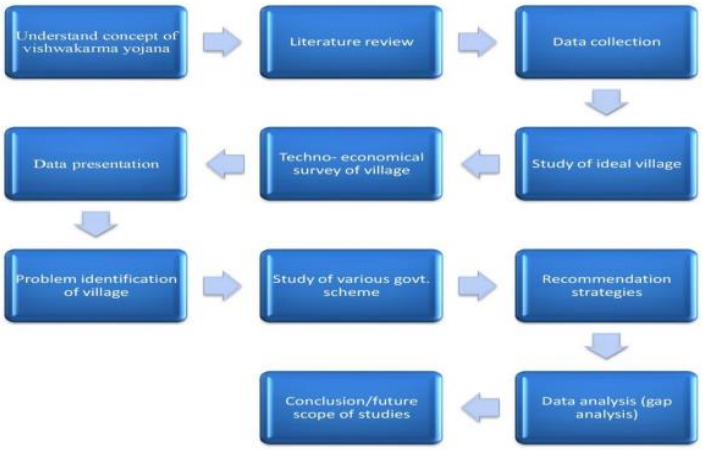


Figure 17: Methodology Framework

4.1.7 Available Methodology for development of related to Civil/Electrical

1. Concept
2. Objective
3. Literature review
4. Urban and rural area
5. Visit the ideal village
6. Data collection
7. Visit the allocated village
8. Data collection
9. Visit of smart village
10. Data collection
11. Techno-economic survey
12. Gap analysis
13. Sustainable design

4.2 Bhutsad Village Study Area Profile

4.2.1 Study Area Location

Table4: Area Location

Locality Name	Bhutsad
Taluka Name	Jalalpore
District	Navsari
State	Gujarat
Language	Gujarati and Hindi, Marathi
Time zone	IST (UTC+5:30)
Elevation / Altitude	14 meters. Above Sea level
Telephone Code / Std Code	02637

4.2.2 Base Location Map, Land Map, Gram Tal Map

Figure 18: Base location Map and Land map

4.2.3 Physical & Demographical Growth

Bhutsad Local Language is Gujarati. The village has a total population is 622 and the number of houses is 141. The female Population is 49.7%. The village literacy rate is 75.9% and the Female Literacy rate is 36.0%.

4.2.4 Economic Generation Profile / Banks

- The main occupation of people in the villageis dairy farming. All sectors are interrelated to agriculture and farming.
- In Bhutsad village out of the total population, 284 were engaged in work activities. 99.65 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 0.35 % were involved in Marginal activity providing a livelihood for less than 6 months. Of 284 workers engaged in Main Work, 45 were cultivators (owner or co-owner) while 173 were Agricultural laborers.

4.2.5 Actual Problem faced by Villagers and smart solution

- There is only one primary school in the village.
- The nearest hospital or clinic is far from the village.
- More than half the population of the village is uneducated.
- Public toilet facility is not available in the village so people do toilet at open places so we propose to do the design of the public toilet.

4.2.6 Social scenario

Physical Infrastructure

A. The main source of drinking water
The village hasa lake in the entry of the village.
B. Water Tank Facility
It has 2 water overhead tanks witha capacity of 40,000 liters.
C. Electricity Distribution
24 X 7 electricity supply in the village for domestic, agricultural, and commercial use. They also have street lights.

Social Infrastructure Facility

A. Health Facilities
There is no Primary health center (PHC) and no veterinary hospital.
B. Education Facilities
There is one Anganwadi, only primary school and no secondary school in the village.

4.2.7 Migration Reasons / Trends

Reasons of migration

People migrate for a number of reasons.

- Environmental Better climate, calamities, and natural disasters are examples of environmental causes or reasons.
- Economic–Moving to find work or moving to follow a particular career path is an example of economic cause or reason.
- Cultural–Religious freedom and education is an example of cultural cause or reason.
- Political–Civilwar or escaping from political persecution is an example of political cause or reason.
- Social – Moving for a better quality of life or moving closer to a family member or friend is an example of a social cause or reason.

Trends of migration

Urbanization in Indiabegan to accelerate after due to the country's adoption of a mixedeconomy, which gave rise to the development of the private sector. Urbanization is takingplace at a faster rate in India. Population residing in urban areas in India, according to1901 census, was 11.4%.This count increased to 28.53% according to 2001 census, andcrossing 30% as per 2011 census, standing at 31.16%. In 2017, the numbers increased to34%, according to The World

Bank. According to a survey by UN State of the WorldPopulation report in 2007, by 2030, 40.76% of country's population is expected to resideinurban.

4.3 Data Collection of Bhutsad Village

4.3.1. Methods for data collection

Data Collection of the village is the first and most important step of this project. The Data of this village is collected from the records kept by The Sarpanch, TalatiMantri, Aanganwadiworker, etc. Also,the information is obtained by communicating with villagers.

4.3.2 Primary survey details

Bhutsad is a Village in Jalalpore Taluka in Navsari District of Gujarat State, India. It is located 7 km towards South from District headquarters Navsari. Bhutsad Pin code is 396450 and postal head office is Eru, district Navsari.

4.3.3 Average size of the House

Figure 19: Katchha and Pucca house

4.3.4 No of Human being in One House

As per the sarpanch and our survey, there isan average of 5 persons per household in the village.

4.3.5 Which Material use locally

The construction of the houses was made of stone, cement, sand, bricks, and concrete. In this village, katchha houses are as equal as the pucca houses.

4.3.6 Geographical Detail

Bhutsad is a 10 km distance from Sub District HeadQuarter Jalalpore and it is a 7 km distance from District HeadQuarter Navsari. The nearest Statutory Town is Navsari in 7 km Distance. The total area is 217 hectares, the Non-Agricultural area is 36 hectares and the total irrigated area is 110 hectares.

4.3.7Demographical Details

The village has a total population is 622 and the number of houses is 141. The female Population is 49.7%. The village literacy rate is 75.9% and the Female Literacy rate is 36.0%.

4.3.8Occupational Details

People living in Bhutsad depend on multiple skills, total workers are 284 out of which men are 194 and women are 90. Total 45 Cultivators are dependent on agriculture farming out of 39 are cultivated by men and 6 are women. 173 people work in agricultural land as labor in Bhutsad, men are 97 and 76 are women.

4.3.9 Agricultural Detail

Paddy, Vegetables, and Banana are agricultural commodities that grow in this village. 8 hours of agricultural power supply in summer and 8 hours of agricultural power supply in winter are available in this village. The total irrigated area in this village is 110 hectares from canals 30 hectares and from Lakes or tanks, 20 hectares are the Sources of irrigation.

4.3.10 Physical Infrastructure Facilities -Manufacturing HUB /Ware Houses

In Bhutsad village there is no Manufacturing HUB and No ware houses. But there is bus station at the starting of the village. There are also primary school, anganwadi, Gram panchayat, Dudh mandali, overhead tank.

4.3.11Tourism development available in the village for attracting the tourist

There is a temple in the entry at the village and the front side of the temple garden and lake.Many people from other villages come to the temple.

4.4 Infrastructure Details

4.4.1 Drinking Water / Water Management Facilities

Figure 20: Lake

Figure 21: Hand Pump

Figure 22: Water tank

Treated Tap Water Supply all around the year and in summer also available. Hand Pump is another drinking water sources. Community Toilet Complex Available in this village. House to House wastes collection available. There are two overhead tanks of 40,000 liters capacity.

4.4.2 Drainage Network / Sanitation Facilities

Open Drainage System Available in this Village. Drain water is discharged directly into water bodies.

4.4.3 Transportation & Road Network

Figure 23: Village Road

Figure 24: Bus Stop

Public Bus service available in this village. The nearest Railway Station is at 5 - 10 km. Autos Available in this Village. Tractors Available in this Village. Animal Driven Carts are there in this Village. The nearest national highway is 5 - 10 km. The nearest State Highway is less than 5 km. District Road passes through this village. Pucca road, Kuccha Road, and Foot Path are other Roads and Transportation within the village.

4.4.4 Housing condition

Figure 25: katchha House

Figure 26: Pucca House

In Bhutsad village, Katchha and pucca house ratio are same.

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

Figure 27: School

Figure 28: Hall

Govt. Primary School is available in this Village. Private Engineering College and Govt Polytechnic College s are available in this village. Nearest Govt Disabled School, Private preprimary School, Govt Senior Secondary School, Govt Arts and Science Degree College, Private Medical College, and Govt ITA College are in Navsari. The nearest Private MBA college is in Surat. The nearest Govt Secondary School is in Eru.

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

Figure 29: Public Building

In these village D M Hall and Temple are main public building. There is also library in the village but it is not in woking mode.

4.4.7 Technology mobiles/ Wifi / Internet usage details

Most of the adults use mobile phones. There are no Wi-Fi towers in the village. Clear information regarding internet usage is not available. There are no Cyber Café in the Village.

4.4.8 Sports activities as Gram Panchayat

No such activities are done as gram panchayat in the village.

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

Figure 30: Public Garden

Figure 31: PlayGround

There is a garden in front of Temple and lake and playground near Aanganwadi.

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

There is no foot path development in the village. No smart toilet. No coin operated entry. No self cleansing.

4.5 Electrical Concept

4.5.1 Renewable Energy Source Planning particularly for villages

In the village there are many street light. But there are none of these are solar street light. So we have design solar street light.

4.5.2 Irrigation Facilities

There is a lake in the entrence of the village. It is very large. It is sufficient for the villagers for their different purpose as well as irrigation purpose.

4.5.3 Electricities facilities with area

Figure 32: Electrical Facilities in Bhutsad

4.6 Existing Institution like - Village Administration – Detail Profile

4.6.1 Bachat Mandali

There is no any Bachat Mandali in the village.

4.6.2 Dudh Mandali

The main occupation of the villagers is the dairy
Farming. Most of the people have their own Cow and buffaloes. So for the business there is one Dudh mandali in the village.

Figure 33: Dudh Mandali

4.6.3 Mahila Forum

There is no any mahilamandal in the village.

4.6.4 Planation for Air Pollution

Yes, In front of temple there is different type of plants.

4.6.5 Rain Water Harvesting-Waste water Recycling

There is no any such system like rain water harvesting or waste water recycling.

4.6.6 Agricultural Development

In Bhutsad village many area are the agricultural area. Farming is one the business that are in large amount.

Figure 34: Agriculture

Chapter: 5 Technical Options with Case Studies

5.1 Concept (Civil)

5.1.1 Advance Sustainable construction techniques

1. Prefabricating Materials in Controlled Environments

Constructing as much of a structure in a controlled environment as possible has improved the quality of buildings and resulted in less trash, says Spencer Finseth, principal of Minneapolis-based Greiner Construction.

Being able to cut materials precisely decreases waste and creates buildings that are strong enough to allow contractors to use wood framing as high as five stories, he says.

Mechanical contractors use Building Information Management (BIM) systems to cut sheet metal for duct work in a controlled environment instead of outside to avoid the shape-changing problems caused by cold or hot weather, according to Mike Smoczyk, director of professional development for Minneapolis-based Kraus-Anderson. That same duct work is delivered to a project "wrapped and sealed tightly and kept out of the elements" to avoid damage, he says. He estimates that prefabrication probably accounts for 15% of any project and likely more for hotels.

Roseville-based McGough Construction is prefabricating forms for use in creating the concrete superstructure of the $39 million, 57,000-sq.-ft. addition for the Ordway Center for Performing Arts addition in downtown St. Paul, according to Dan Brenteson, McGough's lean enterprise system director. McGough first creates 3D models then pre-builds forms at its White Bear Lake warehouse, a much better environment than being outside at a work site exposed to the elements and "in a constrained environment," he says.

The resulting forms are then transported — in this case to the Ordway site — where concrete is poured into them and the pieces are assembled in an Erector Set-style fashion. It's a common practice for McGough that saves time and improves quality because the planning and assembly of formwork were done in a warehouse with access to equipment not readily available on tight jobsites, such as the Ordway, Brenteson states.

2. Construction Waste Management

Reducing waste is becoming more achievable for contractors as haulers have grown more sophisticated in recent years. Where jobsites once had trash bins for different types of waste, they now need just one, in many cases, because haulers use pickers to separate materials.

"Through haulers, we can achieve 75% landfill avoidance through their process and we don't need to separate materials to do it," says Dale Forsberg, president of St. Louis Park-based Watson-Forsberg. "On a couple of sites, we've hit 95%."

For inner city projects with small footprints, having haulers handle materials in a single container makes all the difference because space is at a premium, Forsberg says. Some materials are recyclable on site — in particular, concrete that can be crushed and used for foundations or as aggregate beneath parking lots.

The three largest construction projects underway in the Twin Cities all have a recycling rate of more than 90%, according to Zachary Hansen, environmental health director, St. Paul-Ramsey County Public Health department, speaking at a recent conference sponsored by the Minneapolis-based Environmental Initiative. The projects include the Vikings Stadium in Minneapolis, the St. Paul Saints Ballpark and the Ford plant in St. Paul.

3. Managing the Site for Improved Environment

Stormwater pollution prevention has become a "big deal" to municipalities and the state and federal government, says Smoczyk at Kraus-Anderson. "Municipalities do not want a [construction] development that dumps a bunch of bad water into the storm sewer system and overflows it," he says.

Runoff is now contained by silt fencing surrounding an area. A number of "best practice" approaches can be used to treat water on site and avoid having it flow into the local sewer system, Smoczyk says. Kraus-Anderson is now making plans to avoid runoff during construction of its new office building in downtown Minneapolis.

Forsberg says worker safety has led to restrictions and the institution of simple ways to reduce pollution. There's no smoking on the site, for example. When workers enter a building, they travel over "walk-off mats" that remove dirt, lead and other potentially dangerous chemicals from their shoes. Contractors also bring recycling containers for food to decrease organic waste.

4. Lean Manufacturing to Reduce Energy

McGough's Brenteson says his company encourages rethinking construction approaches through lean thinking. "It's finding the wasteful activities we're doing and eliminating them," he explains.

One success involved a McGough employee who modified a brush that works in conjunction with snow blowers to reduce the amount of time required to clean metal floor decks in winter. The process begins with a brush-mounted snow blower — again, modified a bit by McGough — that takes off the majority of the snow. Then, workers used brushes mounted on broom handles to remove snow caught in the grooves of the metal decks.

Although a snow-shoveling brush might not seem like a big deal, it has made life easier for McGough's staff. "It saved a substantial amount of time and manpower and that's important when talking about waste and sustainability," says Brenteson.

McGough also uses tool sheds — all designed by tradespeople — that are organized the same way regardless of the work site. The system eliminates wasted time searching for the right drill

bit or wrench. Fewer tools are lost and have to be replaced using the system, and contractors work more efficiently since they can find what they need, says Brenteson. The company was so proud of both approaches it made YouTube videos — one on the snow brush and the other on tool sheds — to showcase them.

LEED doesn't give contractors points for lean construction techniques, but many contractors use them anyway. Ted Beckman of RJM Construction in Minneapolis, says his company sits down with foremen from various subcontractors to share schedules so "everyone knows what they're responsible for."

The materials are delivered "just in time" to avoid having rebar and other materials sitting outside well before installation. The just-in-time system brings supplies on or around the day they are needed, Beckman says.

"It saves time, eliminates theft on the jobsite, eliminates damage, eliminates wasted time moving things," he adds. "Those are lean practices but they are sustainable things, too, in a sense."

5. Material Selection
Architects and clients seeking LEED can achieve many points by selecting materials manufactured from recycled products and from local sources. The materials can be anything, from renewable products such as bamboo for floors, to wood from vendors approved by the Minneapolis-based Forest Stewardship Council.

LEED points are also available for installing water-saving dual-flush toilets and low-flow faucets and other features, says Smoczyk. Water reduction has become a major issue, even in the Land of 10,000 Lakes, he notes.

As buildings become greener, so do construction sites. Off-site fabrication, improved on-site maintenance, lean practices, landfill avoidance and green materials acquisition have begun to fundamentally, albeit slowly, transform the way buildings are constructed today.

5.1.2Soil Liquefaction

The soil is a mixture of soil particles that stay connected. These particles naturally rest upon each other due to gravity and form grids based on their properties. Each particle produces its contact force by the surrounding particle. These contact forces together hold all the individual soil particles in their place. Soil liquefaction occurs due to sudden and rapid load on the soil particle. The sudden water pressureleads to soil losing its cohesive strength. Once thesoil loses its cohesion, it gets softened,weak and loses its solid properties that are converted to liquid properties.

What is the importance of Soil Liquefaction?

Earthquakes or seismic events cause several disturbances in the ground which can harm or damage the structural stability which could turn fatal. Liquefaction causes a sudden movement shift that is out of sync with the rest of the structure. This might cause several structural damages to the property leading to casualties. Liquefaction in saturated soils generates a quicksand effect. This phenomenon occurs during liquefaction when the building or the foundation gets pulled into the diluted soil causing it to lean and eventually collapse. Construction of buildings near water bodies uses retaining walls which are heavily dependent on the strength and stiffness of the soil. Once the soil gets liquefied, the retaining wall collapses which could cause landslides.

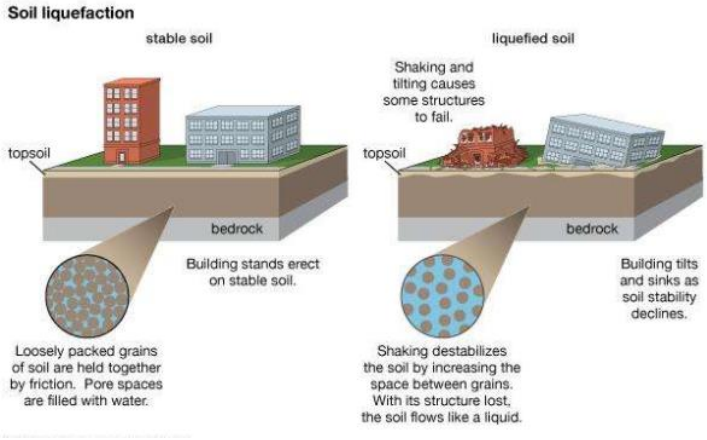


Figure 35: Soil Liquefaction

5.1.3 Sustainable Sanitation

The main objective of a sanitation system is to protect and promote human health by providing a clean environment and breaking the cycle of disease. To qualify as sustainable sanitation, a sanitation system has to be economically viable, socially acceptable, technically and institutionally appropriate, and protect the environment and natural resources. Most sanitation systems have been designed with these aspects in mind, but they fail far too often because some of the criteria are not met. There is probably no sustainable system. The concept of sustainability is more of a direction than a state to reach. Nevertheless, sanitation systems must be evaluated carefully about all dimensions of sustainability.

Figure 36: Sustainable Sanitation

5.1.4 Transport Infrastructure

Transport is vital to the well-functioning of economic activities and a key to ensuring social well-being and cohesion of populations. Transport ensures everyday mobility of people and is crucial to the production and distribution of goods. Adequate infrastructure is a fundamental precondition for transport systems. In their endeavour to facilitate transport, however, decision-makers in governments and international organizations face difficult challenges. These include the existence of physical barriers or hindrances, such as insufficient or inadequate transport infrastructures, bottlenecks and missing links, as well as lack of funds to remove them. Solving

these problems is not an easy task. It requires action on the part of the governments concerned, actions that are coordinated with other governments at international level.

The UNECE Governments have long-standing experience and expertise in the development of coherent international transport networks in Europe. They have created four main transport network agreements aimed at the development of coherent networks for road, rail, inland water and combined transport respectively. The UNECE transport network agreements include:

- The European Agreement on Main International Traffic Arteries **(AGR)**, done in 1975;
- The European Agreement on Main International Railway Lines **(AGC)**, done in 1985;
- The European Agreement on Important International Combined Transport Lines and Related Installations **(AGTC)**, done in 1991; and
- The European Agreement on Main Inland Waterways of International Importance **(AGN)**, done in 1996.

5.1.5 Vertical Farming

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

Figure 37: Vertical Farming

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

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

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

5.1.6. Corrosion Mechanism, Prevention & Repair Measures of RCC Structure

There is a 66 KV sub-station that supplies power to the village. The Sarpanch aims at getting Wi-Fi connectivity in the entire village so that the villagers can use unlimited internet once they purchase the modem from the panchayat office.

The panchayat in this village has made efforts to provide the best possible facilities to students. Air-conditioners and CCTV cameras are installed in the primary schools. Apart from schools, 25 CCTVs are installed at prime junctions of the village so that the litterbugs can be spotted and punished.

Mini-buses are used for transport purpose within the village. The panchayat has started a bus facility called the Atal Express for women which is used for the import of milk.

Figure 38: Corrosion

For communication purposes, 120 waterproof speakers have been installed, which are used by the Sarpanch to inform the people of new schemes and to make important announcements. The speakers are also used to play bhajans, shlokas,andslogans of Mahatma Gandhi.

To accomplish this, singular research bundles were recognized from the above expansive five approaches for repair, substitution and recovery. These were 1) Patch repairs and nascent anodes, 2) Impressed Current Cathodic Protection, 3) Galvanic Cathodic Protection, what's more, 4) Hydrophobic medications. The determination of the above research bundles depended on over a wide span of time use by the development industry to repair, renovate and restore RC structures.

Their commitments might be comprehensively arranged as I) Investigations on how particular medications and materials perform, ii) Investigations on the viability of existing techniques for estimations and creating options, iii) Changes to the current hypothesis of consumption commencement and capture furthermore iv) Changes to administration system methodologies. The key discoveries from each examination bundle can be condensed as takes after:

Macrocell movement seems, by all accounts, to be a result instead of a reason for beginning anode development in repaired solid structures, as has beforehand been exhibited;

ICCP has industrious defensive impacts even after the interference of the defensive current;

Discrete galvanic anodes introduced in the parent concrete encompassing the fix repair are an achievable contrasting option to galvanic anodes inserted inside the fix repairs of RC structures;

Silanes may have a lingering hydrophobic impact even following 20 long stretches of administration.

5.1.7. Sewage Treatmnent Plant

It includes physical, biological and sometimes chemical processes to remove pollutants. Its aim is to produce an environmentally safe sewage water, called effluent, and a solid waste, called sludge or biosolids, suitable for disposal or reuse. Reuse is often for agricultural purposes, but more recently, sludge is being used as a fuel source.

Water from the mains, used by manufacturing, farming, houses (toilets, baths, showers, kitchens, sinks), hospitals, commercial and industrial sites, is reduced in quality as a result of the introduction of contaminating constituents. Organic wastes, suspended solids, bacteria, nitrates, and phosphates are pollutants that must be removed.

To make wastewater acceptable for reuse or for returning to the environment, the concentration of contaminants must be reduced to a safe level, usually a standard set by the Environment Agency.

Sewage can be treated close to where it is created (in septic tanks and their associated drainfields or sewage treatment plants), or collected and transported via a network of pipes and pump stations to a municipal treatment plant. The former system is gaining popularity for many new ECO towns, as 60% of the cost of mains sewerage is in the pipework to transport it to a central location and it is not sustainable. It is called 'Decentralisation' of sewage treatment systems.

The job of designing and constructing sewage works falls to environmental engineers. They use a variety of engineered and natural systems to meet the required treatment level, using physical, chemical, biological, and sludge treatment methods. The result is cleaned sewage water and sludge, both of which should be suitable for discharge or reuse back into the environment. Sludge, however, is often inadvertently contaminated with many toxic organic and inorganic compounds and diseases and the debate is raging over the safety issues. Some pathogens, for example, 'Prion' diseases (CJD or 'Mad Cow Disease is a Prion disease) cannot be destroyed by the treatment process.

The features of wastewater treatment systems are determined by:

1. The nature of the municipal and industrial wastes that are conveyed to them by the sewers.
2. The amount of treatment required to keep the quality of the receiving streams and rivers.

Discharges from treatment plants are usually diluted in rivers, lakes, or estuaries. They also may, after sterilisation, be used for certain types of irrigation (such as golf courses), transported to lagoons where they are evaporated, or discharged through underground outfalls into the sea. However, sewage water outflows from treatment works must meet effluent standards set by the Environment Agency to avoid polluting the waters that receive them.

Sewage treatment plant processes fall into two basic types:

Anaerobic Sewage Treatment

Sewage is partly decomposed by anerobic bacteria in a tank without the introduction of air, containing oxygen. This leads to a reduction of Organic Matter into Methane, Hydrogen Sulphide, Carbon Dioxide etc. It is widely used to treat wastewater sludge and organic waste because it provides volume and mass reduction of the input material to a large extent.. The methane produced by large-scale municipal anerobic sludge treatment is currently being examined for use in homes and industry, for heating purposes. Septic tanks are an example of an anerobic process, but the amount of methane produced by a septic tank (it is only the SLUDGE at the bottom that produces methane) serving less than 100 people is miniscule. In addition to this, septic tank effluent still contains about 70% of the original pollutants and the process smells very badly, due to the Hydrogen Sulphide, if not vented correctly. The effluent produced by this process is highly polluting and cannot be discharged to any watercourse. It must be discharged into the Aerobic layer of the soil (within the top metre of the ground) for the aerobic soil bacteria to continue the sewage treatment via the aerobic process below.

Aerobic Sewage Treatment

In this process, aerobic bacteria digest the pollutants. To establish an aerobic bacterial colony you must provide air for the bacteria to breathe. In a sewage treatment plant, air is continuously supplied to the Biozone either by direct Surface Aeration using Impellers propelled by pumps which whisk the surface of the liquid with air, or by Submerged Diffused Aeration using blowers for air supply through bubble diffusers at the bottom of the tank. (The most modern aerobic sewage systems use natural air currents and do not require electricity, though these are only used for small scale sewage systems at the moment. Once again, the general public leads the way!) Aerobic conditions lead to an aerobic bacterial colony being established. These achieve almost complete oxidation and digestion of organic matter and organic pollutants to Carbon Dioxide, Water and Nitrogen, thus eliminating the odour and pollution problem above. The effluent produced by this process is non-polluting and can be discharged to a watercourse

Conventional sewage water treatment involves either two or three stages, called primary, secondary and tertiary treatment. Before these treatments, preliminary removal of rags, cloths, sanitary items, etc. is also carried out at municipal sewage works.

Primary Treatment

This is usually Anerobic. First, the solids are separated from the sewage. They settle out at the base of a primary settlement tank. The sludge is continuously being reduced in volume by the anerobic process, resulting in a vastly reduced total mass when compared to the original volume entering the system.

The primary settlement tank has the sludge removed when it is about 30% of the tank volume.

Secondary Treatment

This is Aerobic. The liquid from the Primary treatment contains dissolved and particulate biological matter. This is progressively converted into clean water by using indigenous, water-borne aerobic micro-organisms and bacteria which digest the pollutants. In most cases, this effluent is clean enough for discharge directly to rivers.

Tertiary Treatment

In some cases, the effluent resulting from secondary treatment is not clean enough for discharge. This may be because the stream it is being discharged into is very sensitive, has rare plants and animals or is already polluted by someone's septic tank. The Environment Agency may then require a very high standard of treatment with a view to the new discharge being CLEANER than the water in the stream and to, in effect, 'Clean it up a bit'. It is usually either Phosphorous or Ammoniacal Nitrogen or both that the E.A. want reduced. Tertiary treatment involves this process. If Phosphorous is the culprit, then a continuous dosing system to remove it is the tertiary treatment. If Ammoniacal Nitrogen is the problem, then the sewage treatment plant process must involve a nitrifying and then de-nitrification stage to convert the ammoniacal nitrogen to Nitrogen gas that harmlessly enters the atmosphere.

Case Study on Verical Farming

Intro to vertical farming

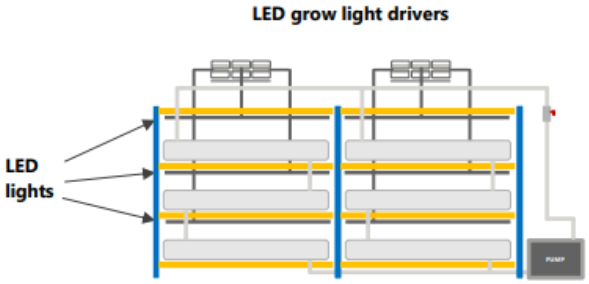
One of the original motivations behind vertical farming arose out of the idea that agricultural production is experiencing increased pressure to generate larger yields as the global population rises and demand for food increases. In recent years it has increasingly been driven in North America by a combination of advances in technology – which have decreased the cost of indoor production and made the concept feasible – and increasing demand for “free-from,” locally produced goods, among other factors. In the Alberta context, indoor vertical farming operations have begun to crop up in the regions surrounding Edmonton and Calgary, where the operations are supplying the local population centres with fresh leafy green vegetables.

Vertical farming can be broadly divided into two main categories, those comprising multiple levels/rows of growing platforms/units, and those where the operation is located on a vertical surface such as on rooftops (Beacham, Vickers & Monaghan, 2019). This assessment focuses on the design of the vertical growing operation itself rather than where it is located, other than to account for the cost of leasing the physical space to run the operation (whether that is an industrial warehouse or an empty lot). In theory, pre-fabricated units could be placed wherever the grower had suitable space, which may in fact be on the rooftop of a building; however, it does not change the economic assessment of the unit itself other than to account for the cost to lease the space.

Vertical Farming Models

Real world data has been provided by vertical farming equipment suppliers and used for the following vertical farming models. As the technology is just emerging, the level of data available is limited at this time. More importantly for the assessment, the limited number of suppliers means that data must be taken at facevalue from the suppliers. With the greenhouse industry, for example, there is enough publicly available research that allows for industry standards with regard to energy use per square metre or expected yields for certain plant varieties in a given location. With vertical farming this is not the case. Each equipment supplier has their own patented LED light technology and there is no way short of performing trials to independently verify the yield estimates provided by the manufacturer. Therefore, the vertical farming options used for this assessment rely completely on the variables provided by the equipment suppliers themselves. The names of the individual vertical farming technology providers have been kept anonymous at the request of the suppliers. Where diagrams and/or images are includes, they have been taken from other similar operations to demonstrate the type of technology, but the exact photos supplied to by the companies are not used in this assessment.

The warehouse vertical farm uses 6 LED grow lights (8 ft) per grow bed. Each grow light requires 1 driver (housed in an Extrusion) and located on top of the grow racks. LED drivers are electrical circuits used to control the forward voltage (Vf) of highpowered LED lights with temperature changes. The drivers work in unison with LED lights. As temperature increases, the forward voltage of the LED decreases, causing the LED to draw more current. The LED will continue to get hotter and draw more current until the LED burns itself out, this is also known as Thermal Runaway. The LED driver is a self-contained power supply which has outputs that are matched to the electrical characteristics of the LEDs. This helps avoid thermal runaway as the constant current LED driver compensates for the changes in the forward voltage while delivering a constant current to the LED. The LED lights are hung in rows of six above each grow bed with electrical cables running up to the drivers on top of the grow racks (Figure 2). The equipment manufacturer consulted for this representative vertical farm produces their own LED lights at a factory in China. The equipment supplier has been developing the lights for ten years and they make up a significant per cent of the overall cost of setting up a facility. The LED grow lights and drivers account for roughly half the total equipment cost.



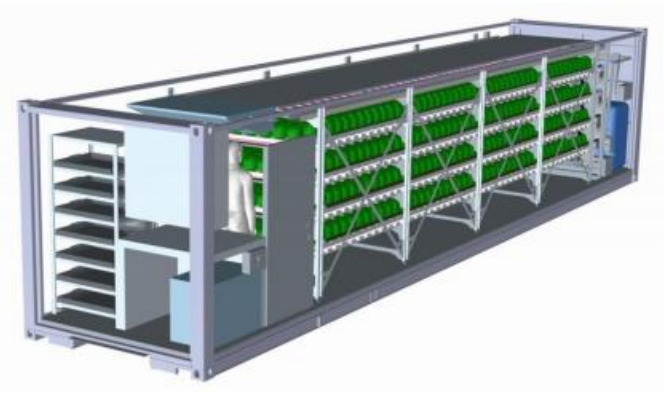
The LED lights for the warehouse vertical farming operation consumes approximately 616,000 kW of electricity per month. At a rate of $.10/kWh it costs the producer just under $740,000 in electricity per year to run the LED lights for the facility.

This system incorporates fewer LED light fixtures per square foot of growing area because the grow platforms rotate, i.e. they share the light. The lights are located at the top of the shipping container and the grow beds move along tracks that allow the plants to have timed access to light. The LED grow lights have drivers and other timing mechanisms that come pre-built in each container.

The LED lights for the 14-shipping container system consumes approximately 72,800 kW of power per month. At a rate of $.10/kWh it costs the producer just under $90,000 in electricity per year to operate the facility. This is in line with the electricity consumption per shipping container for the small-scale operations in this assessment.

Many companies are offering variations of this model. The basic layout of the operation is relatively straightforward. Slightly used insulated shipping containers are modified into turnkey vertical farms (or new shipping containers at an additional cost of between $5000 and $10,000 on top of the regular price). The system generally consists of a walkway down the center with shelves on either side (either PVC or steel) holding grow beds with LED lights suspended above. Somewhere within the unit (generally at the beginning near the doors) the water tanks, pumps, HVAC units, etc. are housed. There is also an allocated space for a cultivation area, i.e. where the plants are started prior to being transplanted to the larger grow beds.

Most of the turnkey system providers also supply a software and application package that is used to run the vertical farm. This allows the user to monitor the system. Some other key attributes of this style vertical farm, especially for the Canadian climate, are a separate “control room” at the entrance with a non-VerticalFarming Assessment Alberta Agriculture and Forestry File #081A18.1 P a g e | 22 structural wall, which serves as a cold-weather entryway that buffers the grow environment from cold weather outside upon entering.



Labour Cost for Large-Scale Warehouse Operation

Labour	# of Employees	Wage Rate($/hr)	EI, CPP, Benefits (%)	Hours per week	Weeks per year	Annual Cost	Monthly Cost
Manager	1	80	15.1%	40	48	176,766	14,730
Marketing assistant	1	28	15.1%	40	48	61,868	5,156
VP Finance	1	48	15.1%	40	48	106,060	8,838
VP Logistics	1	48	15.1%	40	48	106,060	8,838
Administrative	1	23	15.1%	40	48	50,820	4,235
Horticulturalists	4	48	15.1%	40	48	424,238	35,353
Customer service	1	20	15.1%	40	48	44,191	3,683
Labourer (minimal experience)	40	15	15.1%	40	48	1,325,745	110,479
Labourer (medium experience)	12	18	15.1%	40	48	464,011	38,668
Labourer (high experience level)	4	23	15.1%	40	48	198,862	16,572
Maintenance	1	25	15.1%	40	48	55,239	4,603
Drivers	2	30	15.1%	40	48	265,149	22,096
Packaging	4	15	15.1%	40	48	132,574	11,048
Training	1	25	15.1%	40	48	55,239	4,603
Warehouse Staff	4	18	15.1%	40	48	154,670	12,889
					Sum:	3,621,492	301,791

5.2 Concept (Electrical)

5.2.1 Programmable load shading

In today‘s world, there is a continuous need for automatic appliances with the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. The project is designed to operate an electrical load multiple number of times as per the program. It overcomes the difficulties of switching the load ON/OFF manually.

This proposed has an inbuilt real time clock (RTC) to keep tracking the time and thus to switch ON/OFF the load accordingly. Load shedding is what electric utilities do when there is a huge demand electricity for thatexceeds the supply. Thus in adistribution system it needs to be precisely controlled for specific period of time.

Figure 39: Programmable load shedding

Programmable load shedding time management system is a reliable circuit that takes over the manual task of switch ON/OFF the electrical devices with respect to time. It uses real time clock (RTC) interfaced to a microcontroller of 8051 family. While the set time equals to the real time, then microcontroller gives command to the corresponding relay to turn ON the load and then another command to switch OFF as per the program. Multiple ON/OFF time entry is the biggest advantage with this project.

Software Implementation:
Algorithm:
STEP 1: Start.
STEP 2: Initialize RTC.

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

Circuit Operation:

The programmable load shedding time management for utility department circuit consists of an 8592 microcontroller ic,16*2 LCD module,7805 voltage regulator ic,4*3 keypad,DS12887 RTC IC,relay,aCrystal oscillator. The 7805 voltage regulator converts the input voltage to 5V and is given to the Vcc (pin :40) of the 8952 microcontroller.
This voltage is necessary to enable the microcontroller .A DS12887 RTC interfaces with port0 of the microcontroller i.e. from pins 32 to 39.The retch shows the real time at every instant. Once the RTC is programmed, it will work continuously even though the power goes off in between. The keypad is interfaced with port2 of the microcontroller i.e. from pins21 to28.The keypad is used to set the real time, the time for load shedding time and the time duration. The 16*2 LCD is interfaced to port1of the microcontroller i.e. from pins 1 to 8.The crystal oscillator helps to provide the working frequency 11.059MHz for the microcontroller.

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

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

5.2.2 Railway Security System using IoT

The PM said, "I am particularly delighted that for the first time there is a concrete vision for technology up gradation & modernization of the Railways," The Rail Budget 2015 proposed all-embracing use of Information Technology and governance initiatives in Railway functioning, from SMS alert service for passengers, provision for Wi-Fi at Railway Stations, digitized mapping of rail land. Corporate India termed the budget, as 'Technology-Enabled Traveler-Centric.
Some of the technology initiatives that were announced:

- Open Wi-Fi would be made available at 400 railway stations across the country
- Digitized mapping of Rail land will be initiated to counter encroachment.
- An integrated customer portal is being put in place for customers to access various railway services at one place
- Railway helpline number 138 will become operational 24×7. Toll free number 182 will be created for security related complaints.
- SMS alert service would be introduced to inform passengers about train arrival and departure
- Mobile charging facility would be made available in all trains and stations. The facility will be extended to general coaches as well.
- CCTVs to be introduced in select trains and suburban trains for women safety • E-catering will be launched for select meals from an array of choices, ordering food through IRCTC websites at the time of booking tickets.

The great pressure that railways is facing due to the whopping wage bill and its severe criticism by experts can be eased once the handheld devices can enable management to optimally deploy staff for maintenance works. The assets will have sensors depicting their health and with use of intelligent monitoring systems, they will reach the right location at the right time. IR today is dependent heavily on supply chain partners. Lot of time and effort is wasted in pursuing the supplies, gaining access to information of vendor.

All this can be automated using IoT. The role of purchase department can be limited just to give the purchase order, the balance work can be handled by intelligent systems when the network has information on consignments, stock position etc. IoT is the future, and it has already arrived. On July 2014, it was envisaged that the Indian Railways will opt for an enterprise resource planning (ERP) solution, which will integrate freight, passenger, human resources and administrative operations across the country.

Features like real-time monitoring of trains, mobile based wake up call for passengers and destination arrival alerts, and station navigation information system would be taken forward. Thus the potential for the IT industry to leverage existing strengths in cloud, mobility and IoT (Internet of Things) for the Railways. In the Proposed Investment Plan (2015-2019), InformationTechnology/Research has been assigned Rs 5,000 crore. There will be an integration of train control and asset management applications.

According to Gartner, by the 2020, there will be 26 billion devices connected to the internet. Gartner further estimates that IoT
products and services will generate revenue exceeding $300 billion in 2020. IDC on the other hand has forecast that the worldwide market for IoT solutions will grow to $7.1 trillion in 2020. In a 2012 study by Beecham Research for Oracle, several verticals were identified that would benefit from machine to machine (M2M) device connectivity and create.

Figure 40: Railway

The IoT ecosystem. These were connected smartphones to cars to homes, commercial buildings, retail, industrial, IT facilities, etc.

A "thing" can join in IoT, only when it is tagged as 'smart'. For becoming 'smart", common things or objects, a few action are needed;

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

5.2.3 Management through Energy Harvesting Concept

The objective of the Power Management through Energy Harvesting Concept has been designed and implemented in the power management through energy harvesting concept which deals with the power saving and optimization.
The overall control is based on sensors of light and temperature. After installing the components, the process becomes automatic.

Operation:
Energy harvesting devices which convert ambient energy into electrical energy have attracted much interest in both the military and commercial sectors. Some systems convert motion, such as that of ocean waves, into electricity to be used by oceanographic monitoring sensors for autonomous operation. Future applications may include high power output devices (or arrays of such devices) deployed at remote locations to serve as reliable power stations for large systems. Another application is in wearable electronics, where energy harvesting devices can power or recharge cellphones, mobile computers, radio communication equipment, etc.

All of these devices must be sufficiently robust to endure long-term exposure to hostile environments and have a broad range of dynamic sensitivity to exploit the entire spectrum of wave motions.

Accumulating energy:

Energy can also be harvested to power small autonomous sensors such as those developed using MEMS technology. These systems are often very small and require little power, but their applications are limitedby the reliance on battery power. Scavenging energy from ambient vibrations, wind, heat or light could enable smart sensors to be functional indefinitely. Typical power densities available from energy harvesting devices are highly dependent upon the specific application (affecting the generator's size) and the design itself of the harvesting generator. In general, for motion powered devices, typical values are a few μW/cm³ for human body powered applications and hundreds of μW/cm³ for generators powered from machinery. Most energy scavenging devices for wearable electronics generate very little power.

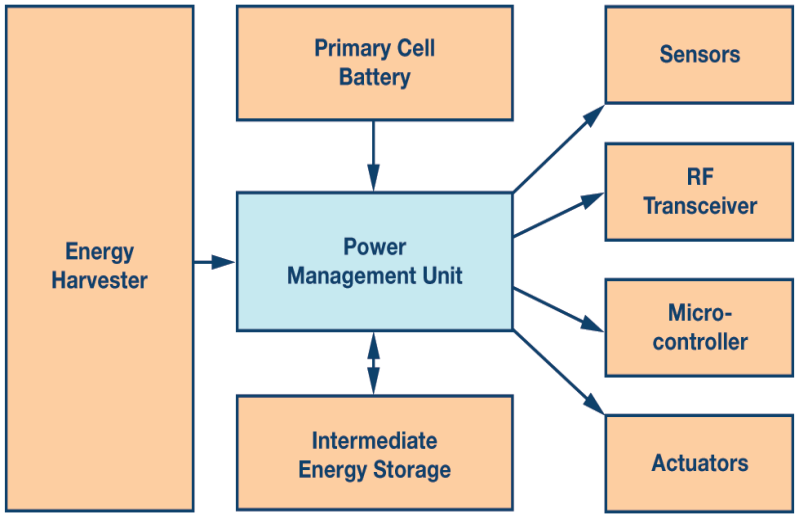


Figure 41: Power Management Unit

Storage of power:

In general, energy can be stored in many components like a capacitor, super capacitor, or battery. Capacitors are used when the application needs to provide huge energy spikes. Batteries leak less energy and are therefore used when the device needs to provide a steady flow of energy. Compared to batteries, super capacitors have virtually unlimited charge-discharge cycles and can therefore operate forever enabling a maintenance-free operation in IoT and wireless sensor devices. Use of the power: Current in low power energy harvesting is for independent sensor networks. In these applications an energy harvesting scheme puts power stored into a capacitor then boosted/regulated to a second storage capacitor or battery for the use in the microprocessor or in the data transmission. The power is usually used in a sensor application and the data stored or is transmitted possibly through a wireless method.

5.2.4 Moisture Monitoring System

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

Figure 42: Moisture Monitoring System

By If at the time of monitoring it comes to know that the moisture level of the soil is lower than recommended then it will raise an audio visual alert. This alert is then received by the care taker of the plant. When the care taker waters the plant the alarm goes off and the monitoring cycle continues.

In this system we use a timer IC to time the monitoring process. A moisture level sensor is used to detect the moisture level of the soil. An LED is used to give visual alarm and a Buzzer is used to give audio alarm to the care taker of the plant. Thus, in this project with the help of a simple combinational circuit and a sensor we can help save a plant by maintaining the moisture level of the soil of the plant, thus keeping the plant healthy.

5.2.5 Home Automation using IoT / Any other methodology

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

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

Figure 43: IOT

5.2.6 PC Based Electrical Load Control

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

Concept:

The PC based electrical load control system can be built with 8051 series Microcontroller, Level Shifter IC, DB Connector, Relays, Relay Driver, Transformer, Diodes, Capacitors, Resistors, LED, Crystal, Lamps, Keil compiler and Language: Embedded C or Assembly. Keil an ARM Company makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards, and emulatorsfor ARM7/ARM9/CortexM3, XC16x/C16x/ST10,251, and 8051 MCU families. Compilers are programs used to convert a High-Level Language to object code. Desktop compilers produce an output object code for the underlying microprocessor, but not for other microprocessors. i.e the programs written in one of the HLL like 'C' will compile the code to run on the system for a particular processor like x86.

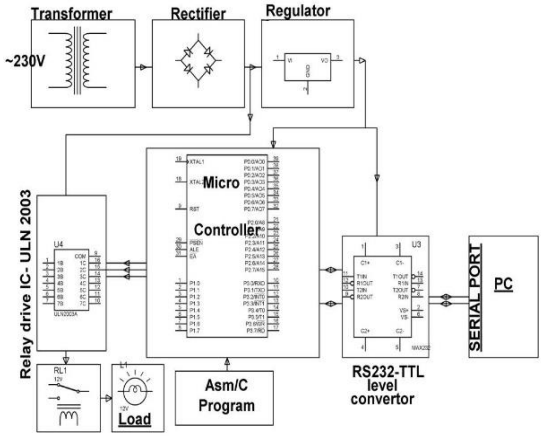


Figure 44: PC Based Electrical Load Control

5.2.7 Electrical Parameters Measurements

Table 5: Electrical Parameters Measurements

Electrical parameter	Measuring unit	Symbol	Description
Voltage	Volt	V or E	Unit of Electrical Potential V = I × R
Current	Ampere	I or i	Unit of Electrical Current I = V ÷ R
Resistance	Ohm	R or Ω	Unit of DC Resistance R = V ÷ I
Conductance	Siemen	G or ʊ	Reciprocal of Resistance G = 1 ÷ R
Capacitance	Farad	C	Unit of Capacitance C = Q ÷ V
Charge	Coulomb	Q	Unit of Electrical Charge Q = C × V
Inductance	Henry	L or H	Unit of Inductance VL = -L(di/dt)

Power	Watts	W	Unit of Power P = V × I or I 2 × R
Impedance	Ohm	Z	Unit of AC Resistance Z 2 = R 2 + X 2
Frequency	Hertz	Hz	Unit of Frequency *f* = 1 ÷ T

Table 6: Multiples and Sub-multiples

Prefix	Symbol	Multiplier	Power of Ten
Terra	T	1,000,000,000,000	10^{12}
Giga	G	1,000,000,000	10^{9}
Mega	M	1,000,000	10^{6}
kilo	K	1,000	10^{3}
none	None	1	10^{0}
Centi	C	1/100	10^{-2}
mille	M	1/1,000	10^{-3}
micro	µ	1/1,000,000	10^{-6}
Nano	N	1/1,000,000,000	10^{-9}
Pico	p	1/1,000,000,000,000	10^{-12}

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

- WH – The Watt-Hour, The amount of electrical energy consumed by a circuit over a period of time. Eg, a light bulb consumes one hundred watts of electrical power for one hour. It is commonly used in the form of: WH (watt-hours), kWh (Kilowatt-hour) which is 1,000 watt-hours or Mwah (Megawatt-hour) which is 1,000,000 watt-hours.
- DB – The Decibel, The decibel is a one tenth unit of the Bel (symbol B) and is used to represent gain either in voltage, current or power. It is a logarithmic unit expressed in dB and is commonly used to represent the ratio of input to output in amplifier, audio circuits or loudspeaker systems. For example, the dB ratio of an input voltage (VIN) to an output voltage (VOUT) is expressed as 20log10 (Vout/Vin).
- ω – Angular Frequency, Another unit which is mainly used in a.c. circuits to represent the Phasor Relationship between two or more waveforms is called Angular Frequency, symbol ω. This is a rotational unit of angular frequency $2\pi f$ with units in radians per second, rads/s.
- τ – Time Constant, The Time Constant of an impedance circuit or linear first-order system is the time it takes for the output to reach 63.7% of its maximum or minimumoutput value when subjected to a Step Response input. It is a measure of reaction time.

Chapter: 6. Swachh Bharat Abhiyan (Clean India)

6.1 Swatchhta needed in the allocated village -Existing Situation with the photograph

Figure 45: Village Condition

We go the village and tell the people about the swachhta awareness and tell that it is necessary for health.

Village Road are very dirty. Around the handpump there is no cement concrete. So water leaks. In village outside katchha house, there is no cleaning.

Objectives of SwatchBharat Abhiyan:

The objectives of the SwachhBharat Abhiyan include the following:

1.Construct individual, cluster, and community toilets.

2.Eliminate or reduce open defecation. Open defecation is one of the main causes of the deaths of thousands of children each year.

3.Construct latrines and work towards establishing an accountable mechanism of monitoring latrine use.

4.Create public awareness about the drawbacks of open defecation and the promotion of latrine use.

5.Recruitdedicated ground staff to bring about behavioral change and promotion of latrine use.

6.Change people ‘s mindset towards proper sanitation use.

7.Keep villages clean.

8.Ensure solid and liquid waste management through gram panchayats.

9.Lay water pipelines in all villages, ensuring water supply to all households by 2019.

Swachh Bharat Launched on 2 October 2014:

The Narendra Modi government launched the ―Swachh bharat‖ movement to solve the sanitation problem and waste management in India by ensuring hygiene across the country. Emphasizing ―clean India in his 2014 Independence Day speech, pm Modi said that this movement is associated with the economic activity of the country. The prime objective of the mission is to create sanitation facilities for all. It aims to provide every rural family with a toilet by 2019.

6.2 Guidelines - Implementation in allocated village with Photograph

In the village most of the part of the village is clean. There are some parts where katcha house not clean we tell them to clean.

6.3 Activities done by Students for allocated village with Photograph

We go to the village and meet the sarpanch and tell about swachhta abhiyan and also told that to tell villagers to clen house and village. Not to throw garbage on the road only throw to the dustbin.

Chapter: 7 Village Condition Due to Covid-19

7.1 Taken step in Bhutsad village

Figure 46: School

Figure 47: PlayGround

In the corona situation, as per government guideline school and colleges are closed till the last update. The infected patients are 3 in Bhutsad village. So they closed the main gate of Bhutsad village till the last patient recovered.

At that time sarpanch declared guideline to the villagers and say that all occupation like shops, farming , Private business and etc. remain closed till the next guidelines.

In corona situation , many peoples are suffered from poverty due to lockdown.

In these village the students of primary school suffered from internet due to not having smartphone.

Impact of covid -19 on village

The nation-wide lockdown imposed in India from March 25 to May 31, 2020 following the breakout of the Covid-19 pandemic affected rural India in diverse ways. This was only to be expected given the great variation in production systems and socio-economic conditions in villages across agro-ecological zones.

This note analyses the impact of the lockdown which brought almost all economic and public activity in India to a halt on a select group of villages based on a rapid assessment survey conducted by the Foundation for Agrarian Studies (FAS) in April 2020. The survey was conducted through telephone interviews of 52 informants from 21 villages across 10 States of India. The FAS had already conducted detailed socio-economic surveys of 19 of the 21 villages under its India-wide programme of village studies (Project on Agrarian Relations in India)

during the last decade. In addition, interviews were conducted in two villages, Adat and Chittilappilly, in Thrissur district, Kerala.

7.2 Activity done by student for Bhutsad village

Figure 48: with sarpanch

We meet the sarpanch of the Bhutsad village and talkabout the condition of Bhutsad village due to covid19 pandemic. Sarpanch told us that they closed the gate of Bhutsad village during corona. They also said that they apply guideline to the village and strictly follow the guidelines.

We told the sarpanch that they should wear mask when they leave home for any work whatever long or short, large or small.

7.3 Any other step taken bythe student /villagers

During the covid19 pandemic the people of the village use to wear mask, wash hand regularly and the main point is social distancing.

Shopkeeper of the village shutdown shop till the next guideline. Villagers strictly follow the guideline given by government.

We go to the sarpanch and tell them to tell the people that tha vaccination is started in all over india. We also tell that vaccine is compulsory to control and remove corona. There is no side effect of the vaccine. There are many type of vaccine.

Chapter: 8 Sustainable Design Planning Proposal

8.1 Design Proposals

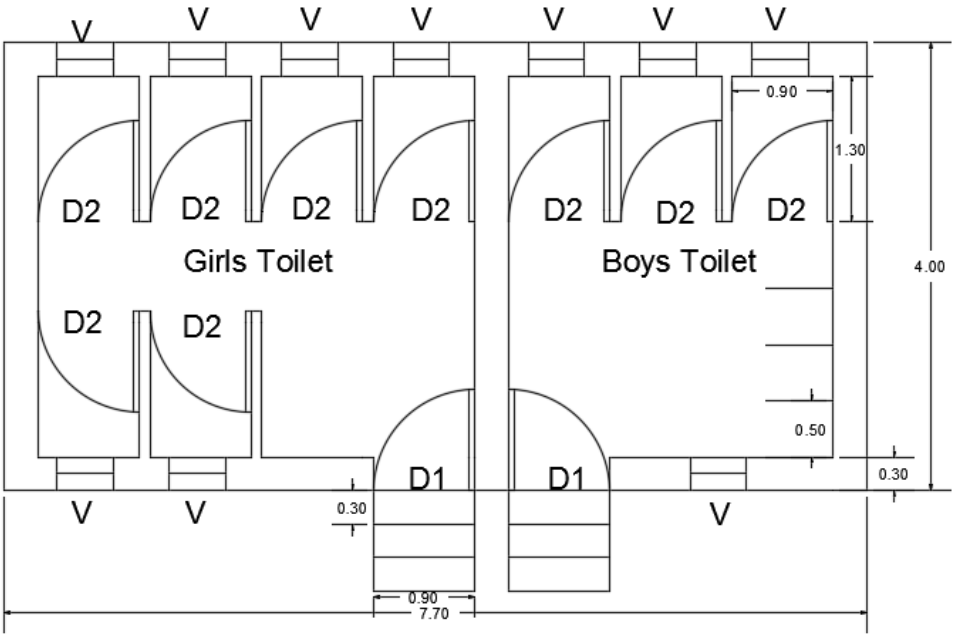
1. Public Toilet
2. Library
3. Post office
4. Medical
5. Rain Water Harvesting

8.1.1 Sustainable Design

There is only one primary school inside the village because of that many children are dropout of school after finishing their primary education .so we proposed a secondary school which will help a student to get educated in their village and don't have to move or traveled far from the village.

Figure 49: Primary School

8.1.2 Public Toilet



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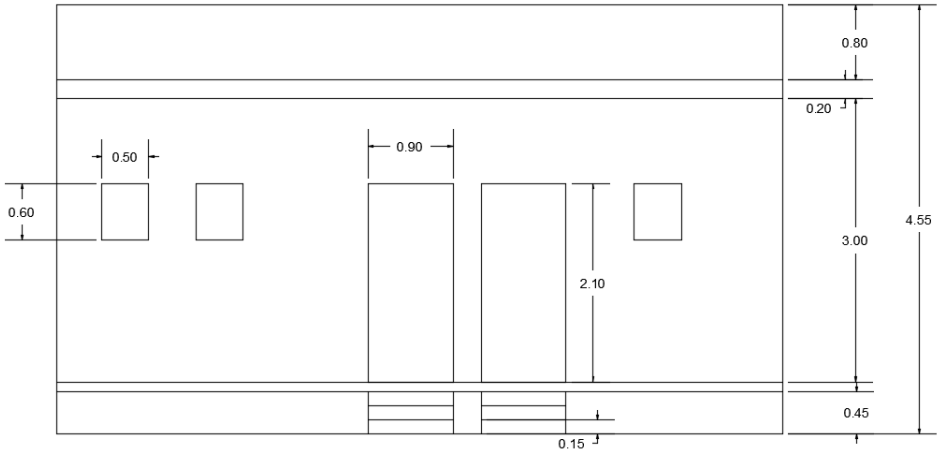

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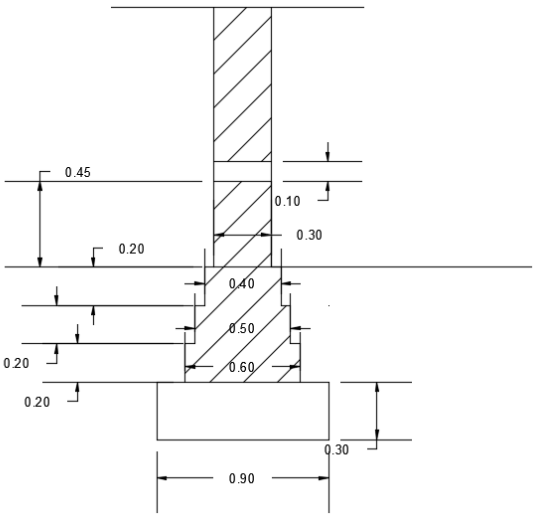


SECTION

Figure 50: Public Toilet

Table 7: Measurement Sheet of Public Toilet

Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	25	0.9	0.9	20.25	**20.25 m3**
2	**P.C.C. in Foundation**	1	25	0.9	0.3	6.75	**6.75 m3**
3	**Brick work in foundation**	-	-	-	-	7.616	**7.616 m3**

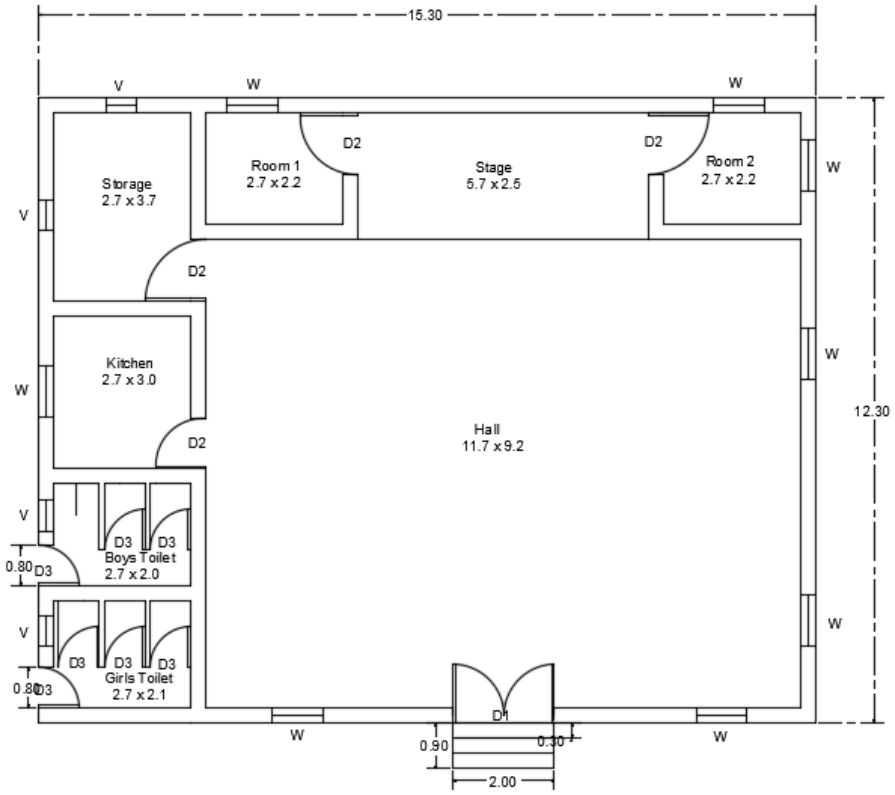
4	**Brick work upto plinth**	1	25.6	0.3	0.45	3.456	**3.456m3**
5	**Earth filling in plinth**	1	6.8	3.4	0.55	12.716	**12.716 m3**
6	**P.C.C in Plinth**	1	25.6	0.3	0.1	0.768	**0.768 m3**
7	**Brickwork in Stair**	-	-	-	-	0.243	**0.243 m3**
8	**Brick work in super structure**	1	25.6	0.3	3	23.04	
	Deduction	-	-	-	-	-2.034	
	Deduction for lintel	-	-	-	-	-0.666	
							20.34 m3
9	**R.C.C Lintel**	-	-	-	-	0.666	**0.666 m3**
10	**R.C.C Slab**	1	7.7	4	0.2	6.16	**6.16 m3**
11	**Parapet wall**	1	25.6	0.3	0.8	6.144	**6.144 m3**
12	**Plaster work inside**	-	-	-	-	183.62	
	Deduction	-	-	-	-	-23.555	
							160.065 m2
13	**Plaster Work Outside**	-	-	-	-	106.47	
	Deduction	-	-	-	-	-3.8925	
	Deduction for stair	-	-	-	-	-0.2025	
							102.375 m2
14	**Flooring**	1	6.8	3.4	-	23.12	
	Deduction For Door	11	0.9	0.3	-	-2.97	
							20.15 m2

Table 8: Abstract Sheet of Public Toilet

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	20.25	m3	162	**3280.5**
2	**P.C.C. in Foundation**	6.75	m3	4000	**27000**
3	**Brick work in foumndation**	7.616	m3	7100	**54073.6**
4	**Brick work upto plinth**	3.456	m3	7100	**24537.6**
5	**Earth filling in plinth**	12.716	m3	80	**1017.28**
6	**PCC In Plinth**	0.768	m3	4000	**3072**
7	**Brick work in Stair**	0.243	m3	7100	**1725.3**
8	**Brick work in superstructure**	20.34	m3	7100	**144414**
9	**R.C.C. Lintel**	0.666	m3	9000	**5994**
10	**R.C.C. Slab**	6.16	m3	9000	**55440**
11	**Parapet Wall**	6.144	m3	7100	**43622.4**
12	**Plaster work inside**	160.065	m2	1100	**176071.5**
13	**Plaster Work Outside**	102.375	m2	1100	**112612.5**

14	**Flooring**	20.15	m2	700	**14105**
				Total	**536966**

8.1.3 CommunityHall



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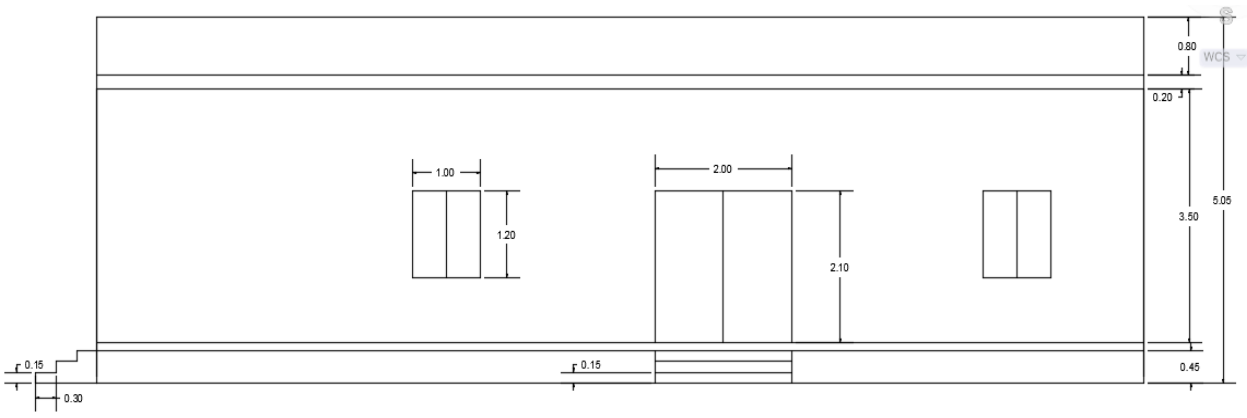

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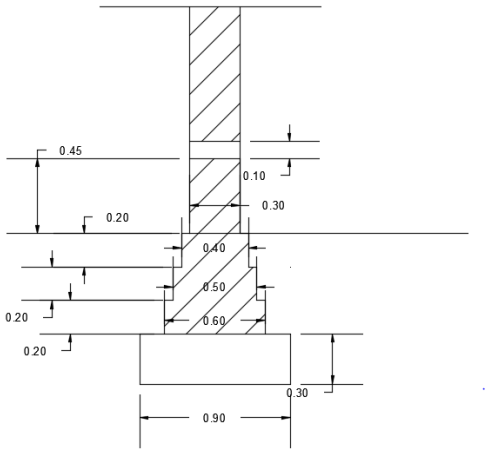


SECTION

Figure 51: Community Hall

Table 9: Measurement Sheet of Community Hall

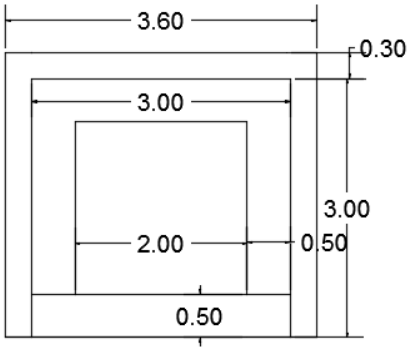
Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	12.75	0.9	0.9	10.33	**69.336 m3**
2	**P.C.C. in Foundation**	1	12.75	0.9	0.3	3.44	**23.112 m3**
3	**Brick work in foumndation**						**26.376 m3**
4	**Brick work upto plinth**	1	89.2	0.3	0.45	12.042	**12.042 m3**
5	**Earth filling in plinth**					73.32	**73.32 m3**
6	**PCC In Plinth**	1	89.2	0.3	0.1	2.676	**2.676 m3**
7	**Brick work in Stair**					0.216	
						54	
							0.756 m3
8	**Brick work in superstructure**	1	89.2	0.3	3.5	93.66	
	Deduction					-11.124	
	Deduction for Lintel					-0.9	
							81.636 m3
9	**R.C.C. Lintel**					0.9	**0.9 m3**
10	**R.C.C. Slab**	1	15.3	12.3	0.2	37.638	**37.638 m3**
11	**Parapet Wall**	1	8902	0.3	0.8	21.408	**21.408 m3**
12	**Plaster work inside**					664.02	
	Deduction					-24.24	
							639.78 m2

13	**Plaster Work Outside**					278.76	
	Deduction					-9.3	
	Deduction for stair					-0.63	
							268.83 m2
14	**Flooring**	1	6.8	3.4		162.93	
	Deduction For Door	11	0.9	0.3		-2.52	
							160.41 m2

Table 10: Astract Sheet of Communityhall

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	69.336	m3	162	**11232.43**
2	**P.C.C. in Foundation**	23.112	m3	4000	**92448**
3	**Brick work in foumndation**	26.376	m3	7100	**187269.6**
4	**Brick work upto plinth**	12.042	m3	7100	**85498.2**
5	**Earth filling in plinth**	73.32	m3	80	**5865.6**
6	**PCC In Plinth**	2.676	m3	4000	**10704**
7	**Brick work in Stair**	0.756	m3	7100	**5367.6**
8	**Brick work in superstructure**	81.636	m3	7100	**579615.6**
9	**R.C.C. Lintel**	0.9	m3	9000	**8100**
10	**R.C.C. Slab**	37.638	m3	9000	**338742**
11	**Parapet Wall**	21.408	m3	7100	**151996.8**
12	**Plaster work inside**	639.78	m2	1100	**703758**
13	**Plaster Work Outside**	268.83	m2	1100	**295713**
14	**Flooring**	160.41	m2	700	**112287**
				Total	**2588597**

8.1.4 Medical Store



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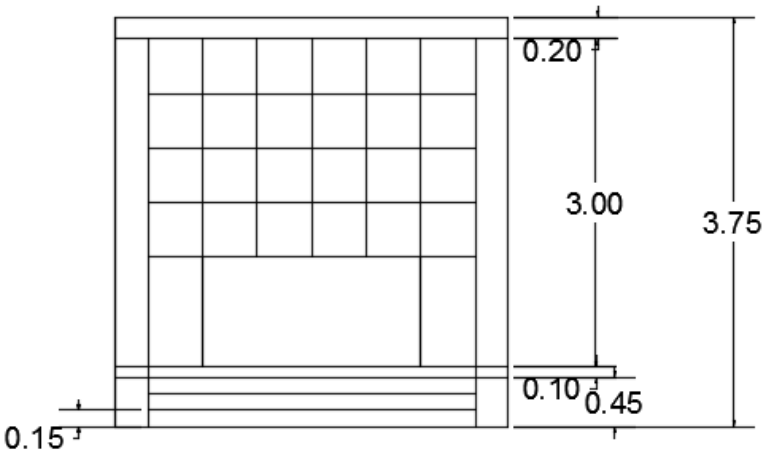

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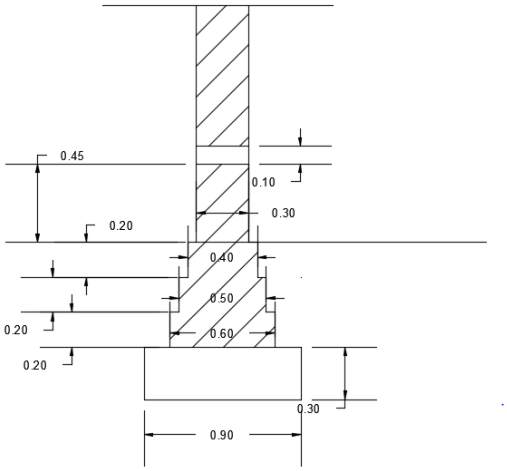


SECTION

Figure 52: Medical Store

Table 11: Measurement Sheet of Medical Store

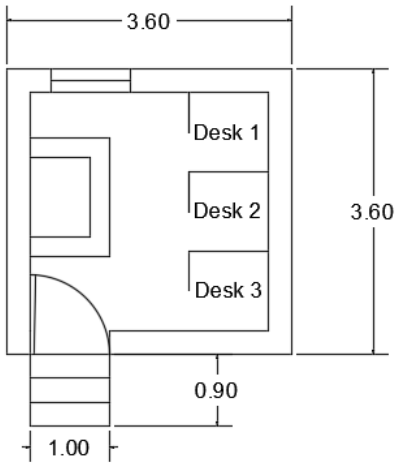
Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	12.75	0.9	0.9	10.33	**10.33 m3**
2	**P.C.C. in Foundation**	1	12.75	0.9	0.3	3.44	**3.44 m3**
3	**Brick work in foundation**	-	-	-	-	-	**3.88 m3**
4	**Brick work upto plinth**	1	13.05	0.3	0.45	1.762	**1.76 m3**
5	**Earth filling in plinth**	1	3	3	0.45	4.05	**4.05 m3**
6	**PCC In Plinth**	1	13.05	0.3	0.1	0.3915	**0.4 m3**

7	**Brick work in Stair**	-	-	-	-	-	**0.97 m3**
8	**Brick work in superstructure**	1	9.45	0.3	3	8.505	**8.51 m3**
9	**R.C.C. Slab**	1	3.6	3.45	0.2	2.484	**2.484 m3**
10	**Plaster work inside**	4	3	3	-	36	**36 m3**
11	**Plaster Work Outside**	-	-	-	-	38.25	**38.25 m3**
12	**Flooring**	1	3	3	-	9	**9 m3**

Table 12: Astract Sheet of Medical Store

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	10.33	m3	162	**1673.46**
2	**P.C.C. in Foundation**	3.44	m3	4000	**13760**
3	**Brick work in foumndation**	3.88	m3	7100	**27548**
4	**Brick work upto plinth**	1.76	m3	7100	**12496**
5	**Earth filling in plinth**	4.05	m3	80	**324**
6	**PCC In Plinth**	0.4	m3	4000	**1600**
7	**Brick work in Stair**	0.97	m3	7100	**6887**
8	**Brick work in superstructure**	8.51	m3	7100	**60421**
9	**R.C.C. Slab**	2.484	m3	9000	**22356**
10	**Plaster work inside**	36	m2	1100	**39600**
11	**Plaster Work Outside**	38.25	m2	1100	**42075**
12	**Flooring**	9	m2	700	**6300**
				Total	**235041**

8.1.5 Cyber Café



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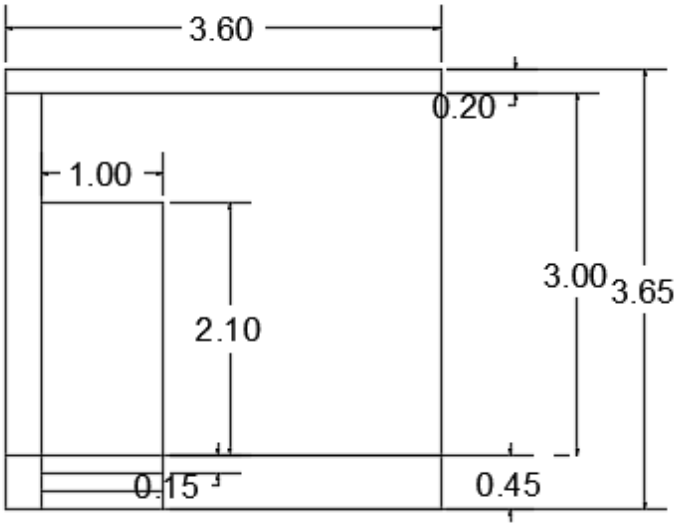

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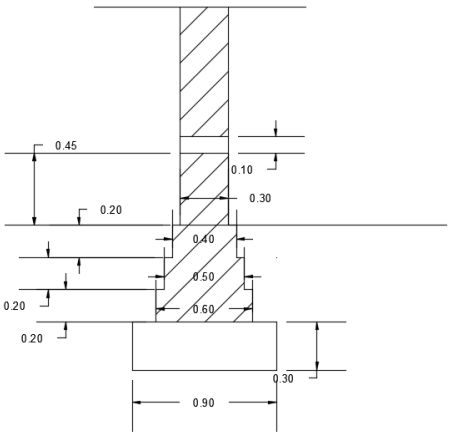


SECTION

Figure 53: Cyber Cafe

Table13: Measurement Sheet of Cyber Cafe

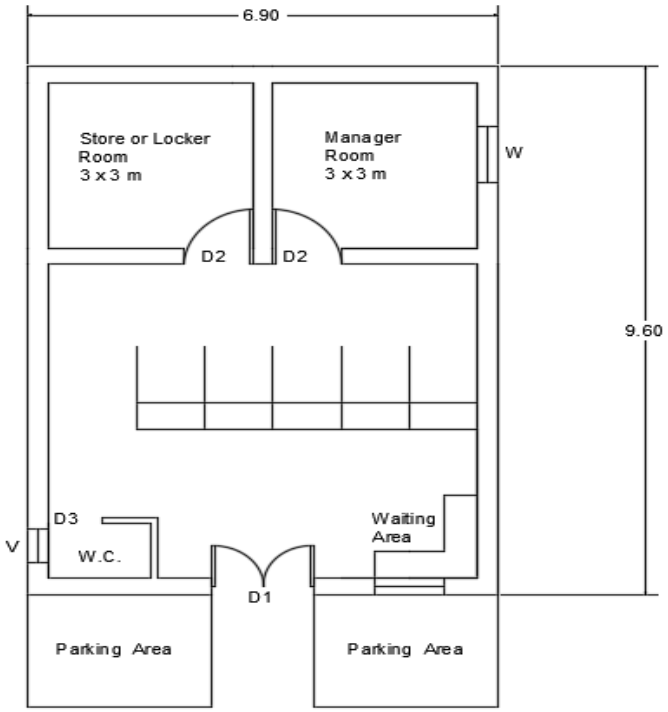
Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	12.75	0.9	0.9	10.33	**10.33 m3**
2	**P.C.C. in Foundation**	1	12.75	0.9	0.3	3.44	**3.44 m3**
3	**Brick work in foundation**	-	-	-	-	3.88	**3.88 m3**
4	**Brick work upto plinth**	1	13.05	0.3	0.45	1.76	**1.76 m3**

5	**Earth filling in plinth**	1	3	3	0.45	1.05	**4.05 m3**
6	**PCC In Plinth**	1	13.05	0.3	0.1	0.93	**0.93 m3**
7	**Brick work in Stair**	-	-	-	-	0.27	**0.27 m3**
8	**Brick work in superstructure**	1	13.05	0.3	3	11.75	
	Deduction	1	1	0.3	2.1	-0.63	
		1	1	0.3	1.2	-0.36	
	Deduction for lintel	1	1.3	0.3	0.1	-0.039	
							10.72 m3
9	**R.C.C. Lintel**	1	1.3	0.3	0.1	0.039	**0.039 m3**
10	**R.C.C. Slab**	1	3.6	3.6	0.2	2.6	**2.6 m3**
11	**Plaster work inside**	-	-	-	-	45	
	Deduction	-	-	-	-	-1.65	
							43.55 m2
12	**Plaster Work Outside**	-	-	-	-	54	
	Deduction	-	-	-	-	-1.875	
							52.125 m2
13	**Flooring**	1	3	3	-	9	**9 m3**

Table 14: Astract Sheet of Cyber Cafe

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	10.33	m3	162	**1673.46**
2	**P.C.C. in Foundation**	3.44	m3	4000	**13760**
3	**Brick work in foumndation**	3.88	m3	7100	**27548**
4	**Brick work upto plinth**	1.76	m3	7100	**12496**
5	**Earth filling in plinth**	4.05	m3	80	**324**
6	**PCC In Plinth**	0.93	m3	4000	**3720**
7	**Brick work in Stair**	0.27	m3	7100	**1917**
8	**Brick work in superstructure**	10.72	m3	7100	**76112**
9	**R.C.C. Lintel**	0.039	m3	9000	**351**
10	**R.C.C. Slab**	2.6	m3	9000	**23400**
11	**Plaster work inside**	43.55	m2	1100	**47905**
12	**Plaster Work Outside**	52.125	m2	1100	**57337.5**
13	**Flooring**	9	m2	700	**6300**
				Total	**272844**

8.1.6 Post Office



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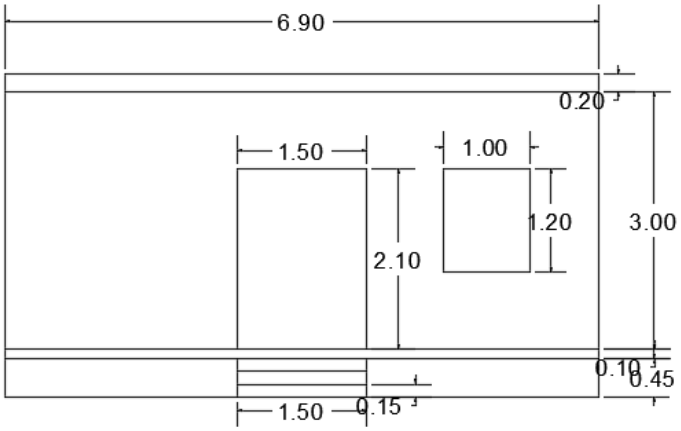

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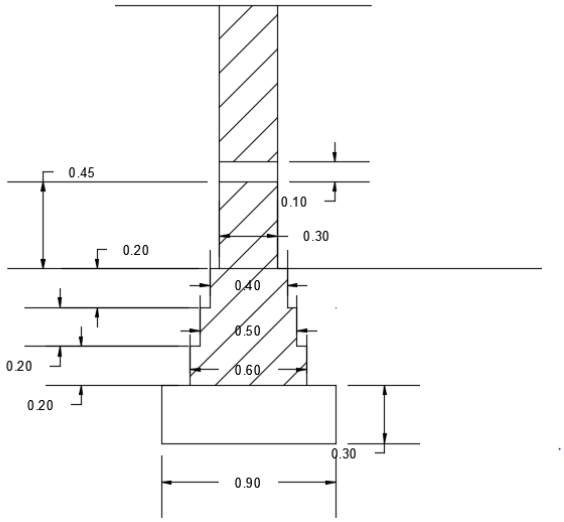

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Figure 54:Post Office

Table 15: Measurement Sheet ofPost Office

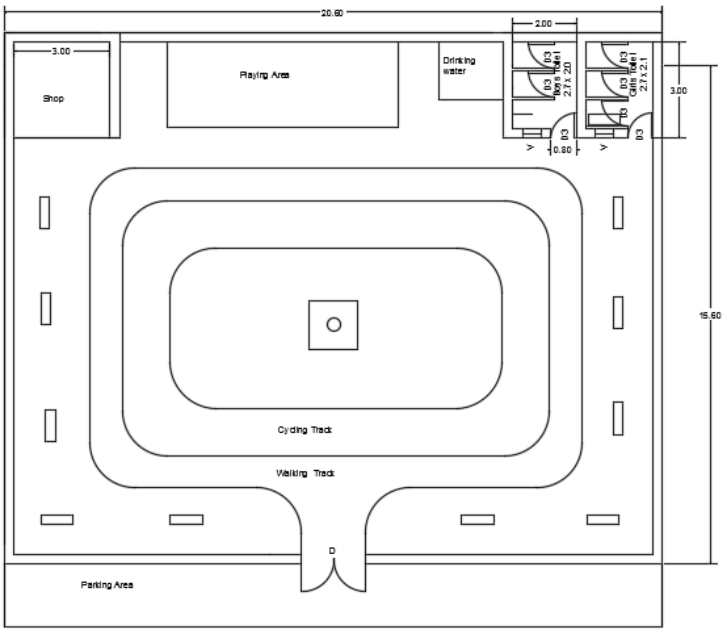
Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	39.9	0.9	0.9	32.32	**32.32 m3**
2	**P.C.C. in Foundation**	1	39.9	0.9	0.3	10.77	**10.77 m3**
3	**Brick work in foundation**	-	-	-	-	12.2	**12.2 m3**
4	**Brick work upto plinth**	1	41.1	0.3	0.45	5.55	**5.55 m3**
5	**Earth filling in plinth**	-	-	-	-	24.26	**24.26 m3**
6	**PCC In Plinth**	1	41.1	0.3	0.1	1.23	**1.23 m3**
7	**Brick work in Stair**					0.41	**0.41 m3**
8	**Brick work in superstructure**	1	41.1	0.3	3	37	
	Deduction	-	-	-	-	-2.145	
	Deduction for Lintel	-	-	-	-	-0.093	
							34.76 m3
9	**R.C.C. Lintel**	-	-	-	-	0.104	**0.104 m3**
10	**R.C.C. Slab**	1	6.6	9.3	0.2	12.28	**12.28 m3**
11	**Plaster work inside**	-	-	-	-	212.91	
	Deduction	-	-	-	-	-8.81	
							204.1 m2
12	**Plaster Work Outside**	-	-	-	-	123.75	
	Deduction	-	-	-	-	-3.27	

							120.48 m2
13	**Flooring**	-	-	-	-	53.91	**53.91 m3**

Table 16: Astract Sheet of Post Office

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	32.32	m3	162	**5235.84**
2	**P.C.C. in Foundation**	10.77	m3	4000	**43080**
3	**Brick work in foumndation**	12.2	m3	7100	**86620**
4	**Brick work upto plinth**	5.55	m3	7100	**39405**
5	**Earth filling in plinth**	24.26	m3	80	**1940.8**
6	**PCC In Plinth**	1.23	m3	7100	**4920**
7	**Brick work in Stair**	0.41	m3	7100	**2911**
8	**Brick work in superstructure**	34.76	m3	9000	**246796**
9	**R.C.C. Lintel**	0.104	m3	9000	**936**
10	**R.C.C. Slab**	12.28	m3	7100	**110520**
11	**Plaster work inside**	204.1	m2	1100	**224510**
12	**Plaster Work Outside**	120.48	m2	1100	**132528**
13	**Flooring**	53.91	m2	700	**37737**
				Total	**937140**

8.1.7 Garden



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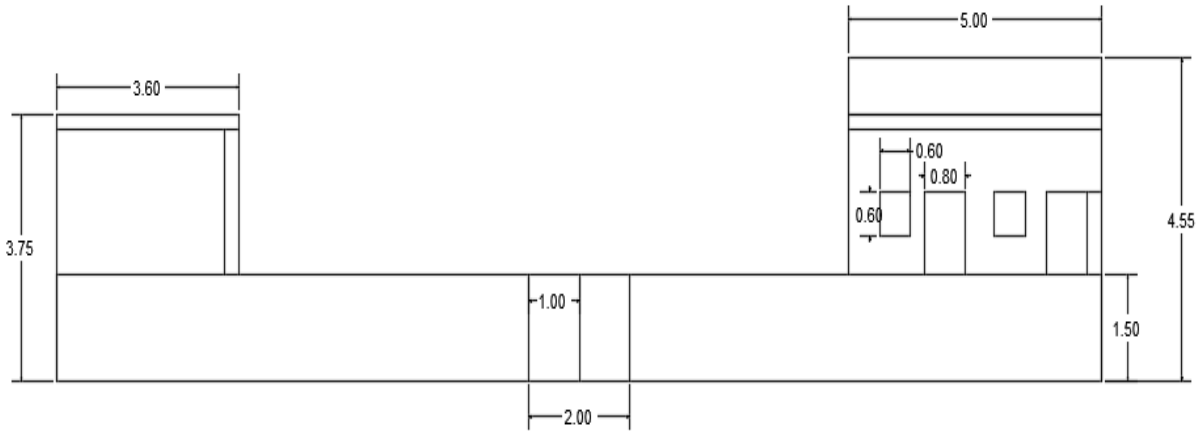

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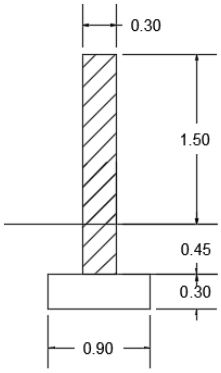

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Figure 55: Garden

Table 17: Measurement Sheet of Garden

Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	86.75	0.9	0.75	58.56	
		1	12.75	0.9	0.9	10.33	
		1	25	0.9	0.9	20.25	
							89.14 m3
2	**P.C.C. in Foundation**	1	87.05	0.9	0.3	23.42	**23.112 m3**
		1	12.75	0.9	0.3	3.44	
		1	25	0.9	0.3	6.75	
							33.61 m3

3	**Brick work in foundation**	1	87.05	0.3	0.45	11.75	
		-	-	-	-	7.616	
		-	-	-	-	3.88	
							23.25 m3
4	**Brick work upto plinth**	1	25.6	0.3	0.45	3.456	
		1	13.05	0.3	0.45	1.762	
							5.22 m3
5	**Earth filling in plinth**	1	6.8	3.4	0.55	12.716	
		1	3	3	0.45	4.05	
							16.77 m3
6	**PCC In Plinth**	1	25.6	0.3	0.1	0.768	
		1	13.05	0.3	0.1	0.3915	
							1.16 m3
7	**Brick work in Stair**	-	-	-	-	0.243	
		-	-	-	-	0.97	
							1.213 m3
8	**Brick work in superstructure**	-	-	-	-	34.35	
	Deduction	-	-	-	-	-0.9	
		1	25.6	0.3	3	23.04	
	Deduction	-	-	-	-	-2.034	
	Deduction for Lintel	-	-	-	-	-0.666	
		1	9.45	0.3	3	8.505	
							62.304 m3
9	**R.C.C. Lintel**	-	-	-	-	0.67	**0.67 m3**
10	**R.C.C. Slab**	1	7.7	4	0.2	6.16	
		1	3.6	3.45	0.2	2.484	
							8.64 m3
11	**Parapet Wall**	1	25.66	0.3	0.8	6.144	**6.144 m3**
12	**Plaster work inside**	-	-	-	-	113	
	Deduction	-	-	-	-	-1.5	
		-	-	-	-	183.62	
	Deduction	-	-	-	-	-23.555	
		4	3	3	-	36	
							307.57 m2
13	**Plaster Work Outside**	-	-	-	-	117.8	
	Deduction	-	-	-	-	-1.5	
		-	-	-	-	106.47	
	Deduction	-	-	-	-	-3.8925	
	Deduction for stair	-	-	-	-	-0.2025	
		-	-	-	-	38.25	

							256.93 m2
14	**Flooring**	1	6.8	3.4	-	23.12	
	Deduction For Door	11	0.9	0.3	-	-2.97	
		1	3	3	-	9	
							2.92 m2

Table 18: Astract Sheet of Garden

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	89.14	m3	162	**14440.68**
2	**P.C.C. in Foundation**	33.61	m3	4000	**134440**
3	**Brick work in foumndation**	23.25	m3	7100	**165075**
4	**Brick work upto plinth**	5.22	m3	7100	**37062**
5	**Earth filling in plinth**	16.77	m3	80	**1341.6**
6	**PCC In Plinth**	1.16	m3	4000	**4640**
7	**Brick work in Stair**	1.213	m3	7100	**8612.3**
8	**Brick work in superstructure**	62.3	m3	7100	**442330**
9	**R.C.C. Lintel**	0.67	m3	9000	**6030**
10	**R.C.C. Slab**	8.64	m3	9000	**77760**
11	**Parapet Wall**	6.144	m3	7100	**43622.4**
12	**Plaster work inside**	307.57	m2	1100	**338327**
13	**Plaster Work Outside**	256.93	m2	1100	**282623**
14	**Flooring**	2.92	m2	700	**2044**
				Total	**1558348**

8.1.8 Design of pump Electrical Design – 1

Executive Summary

Bhutsad is the village of the Navsari district of the state of Gujarat. There is a severe shortage of Drinking water and Livelihood water in this taluka despite having anaverage rainfall of 1760 mm to 3000 mm annually.Also, the available water sources far away from the village, and the way to reach there is not easy. This makes it difficult for villagers to carry this water home. Also, since the water is not able to reach fields due to elevation differences, there is no source of livelihood in the village.

If the solar water pumping system is made available in these villages, the drinking water crisis will be solved, and irrigating the fields will provide a source of livelihood. In this report, we have first described the theoretical process of designing each component needed in a solar pumping system. Then we formulated a solar pumping design process. This was applied to the drinking water and irrigation requirements of the village.

Solar powered water pumps can deliver drinking water as well as water for livestockor irrigation purposes. Solar water pumps may be especially useful in small scale or community based irrigation, as large scale irrigation requires large volumes of water that in turn require a large solar PV array. As the water may only be required during some parts of the year, a large PV array would provide excess energy that is not necessarily required, thus making the system inefficient.

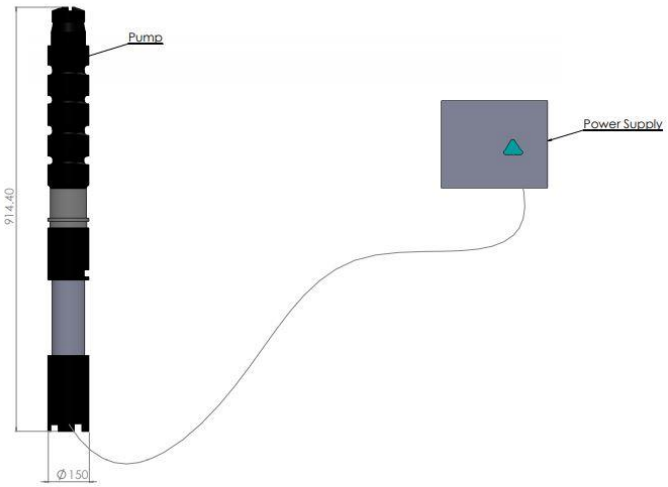


Figure 56: Pump

The use of solar power to pump water has a lot of advantages and is useful in many situations such as: for reasons of cost efficiency in the case of the resources for the water located over a wide distanced area; higher costs of other regular alternative methods such as the use of fuel; the lack and expense of power line infrastructure over long distance. The fact that DC power is used in solar water pumps as opposed to AC powered devices gives the advantage of the solar pumps being able to function under circumstances of imperfect sunlight conditions.

AC power on the other hand needs relatively unchanging voltage as well as frequency to run smoothly. This DC use in solar water pumps allows the device to operate on varying voltage and current. Furthermore pumps that use AC power need sufficient power to transport large amount of water in a short time. Solar pumps however does it differently where the solar pumps transport smaller amounts of water for a longer period and would obviously require less energy than AC powered means.

Although there are other ways of pumping water in remote regions, for example windmills, gas pumps etc. They are however expensive due to various factors such as installation costs or maintaining the structure, fuel costs, having the right location aspects and so on.
Solar water pumps are able to operate in a lot of different areas particularly in sunny areas, and can provide farms, farm lands and farm animal's steady water access. In a lot of places, solar 17 water pumps are proven to be the most optimal choice.

Solar pumps are not only needed in case of farms but also for homes such as places located in the woods such as cabins. These places may have a power system that the solar powered water pumps can work along with or tap into. Provision of water to livestock allows for the protection of limited bodies of water such as ponds. Also with solar power advancement that allows the movement of more water we can now have irrigation solutions on a small scale.

Solar PV water pumping systems are used for irrigation and drinking water in India. The majority of the pumps are fitted with a 200 watt - 3,000 watt motor that receives energy from a 1,800 Wp PV array. The larger systems can deliver about 140,000 liters of water/day from a total head of 10 meters. By 30 September 2006, a total of 7,068 solar PV water pumping systems have been installed.

Solar Energy Based Water Lifting And Pumping Systems For Small Irrigation Projects

Among the solar technologies useful in agriculture are water lifting and pumping with solar photovoltaic systems. Water pumping by solar power is a concept which has won widespread interest since the early seventies.

Figure 57: Solar Based Water Pump

Solar energy can be utilized to operate pumps, utilizing either the thermal or light part of solar radiation. With a solar pump, energy is not available on demand, and the daily variation in solar power generation necessitates the storage of a surplus of water pumped on sunny days for use on cloudy days.

In view of the fluctuating water demand of any irrigation scheme, solar energy needs to be reserved in the form of either electricity in batteries or lifted water in a storage tank. The suitability of solar power for lifting water to irrigate plants is undeniable because of the complementarity between solar irradiance and water requirements of crops. The more intensively the sun is shining the higher is the power to supply irrigation water while on the other hand on rainy days irrigation is neither possible nor needed.

Small scale irrigation is one of the most potential applications of solar power. The main advantage is that solar radiation is intense when the need for irrigation is high. Further, solar power is available at the point of use, making the farmer independent of fuel supplies or electrical transmission lines.

The solar pumps have the potential to revolutionize small scale irrigation in the developing countries in the near future. The technical feasibility of solar (photo voltaic) pumps have been established.The major limiting factor has been the high cost and the lack of familiarity of the technology which require concerted effort in training of technicians and large scale introduction in a region with adequate technical support.However with the incentives and initiatives undertaken by MNES/State Govt the scheme may be propagated in rural areas for small irrigation system in far flung rural areas where electrification is a costly proposition.

Introduction

Why pumping is required?

In the villages, people have to travel a lot of distance to get water. During the monsoons, the farm of thevillagers would be irrigated by rainwater and farming could be done. Whereas during the summers allthe wells dry up, so even getting drinking water would be difficult so agriculture can be neglected insummers.

Table 19: Comparison of the various pumping system

System	Advantages	Disadvantages
PV Powered System	• Low maintenance • Reliable long life • No fuel and no fumes • Easy to install • Low recurrent costs	• The relatively high initial cost • Low output in cloudy weather
Diesel-powered pump	• Moderate capital cost • Easy to install • Can be portable • Extensive experience • Available	• Needs maintenance and replacement • Site visits necessary • Noise, fume, dirt problems

Why the solar pumping system is required for villagers?

Many of the villages do not have even have a grid near them for the distribution of electricity in the village for using electrical pumps for solar systems. Due to this, we have to think about an alternative to supplyingthe power required for the pumping system. From all the energy sources solar seemed the most reliable renewable energy system in India in those villages. We could also use a diesel pumping system, but the operating cost of the system would be a lot. We want to provide a one-time solution to the water scarcity in those villages.
Thus, a solar pumping system would be very helpful in villages mainly during summers. As it helps villagers to grow the crop in their fields and also would reduce migration of villagers to cities in summers for living.

Various types of the pump of various companies

- **Crompton**

Figure 58: Crompton

Features

1. Motor

- 2 in Wide voltage
- Winding wire - High-quality insulation
- Shaft - Stainless steel
- Thrust Bearing - High-Quality Carbon Vs Steel Combination
- All Fasteners - Stainless Steel
- Motor - Water filled, Easy to Rewind

2. Pump

- All Pump Parts – Stainless Steel

- 40% Higher Efficiency
- Wear & Abrasion Resistance
- Hexagonal Pump Shaft – Higher Strength Against Radial Load
- In-built Strainer – Prevent Sand & Particles Entry
- Negligible Maintenance Cost
- Excellent Aesthetics

3. Standard Specification

- Range : 2.2 kw to 5,5kw (2,0 HP to 7.5HP)
- Speed : 3000 (Syn.)
- Total Head Range: Upto 405 Meters
- Discharge Range: Upto 180 RPM

- **Kirloskar**

Features

- Huge savings in electrical consumption.
- Capability to withstand wide voltage fluctuations.
- Operates equally well with Genset, a great help during power cuts.
- Water lubricated bearings for years of service.
- Design of non-returnable valve reduces friction.
- Dynamically balanced rotating parts.
- Non-overloading power characteristics protect the motor.

Figure 59: Kirloskar

Table 20:Material of construction

Parts	Ks 6*/7*/8*	KS 6*/7*/8*
Impeller	Bronze Gr LTB2 /	Bronze Gr LTB2
	20% Glass Filled Noryl	
Diffusers	20% Glass Filled Noryl	
Pump Bowl		High Graded Cast iron
Motor Casing	Stainless Steel	Stainless Steel
Pump Shaft	Stainless Steel	Stainless Steel

Motor Shaft	Stainless Steel	Stainless Steel

Applications

- Continuous water supply for farming applications & irrigation projects
- Fire Fighting application

Range

- Head: 5-306 meters
- Discharge: 2400-60 LPM
- Motor rating: 2.2 kw-33kw (3.0-45.0HP)
- Bore well size: 150mm (6") 200mm (8")
- Voltage range: 200V-440V

- **Eagle**

Key Features: -

- High operational fluency
- Require less maintenance.
- Smooth functioning.
- Accepts Cotton buffing and wire brush wheels.
- Accurately designed.
- Reliable performance.
- Long service life.
- Sturdy cast iron base with rubber mounts.
- Adjustable machined Aluminum tool rests for accurate grinding.
- Submersible pump set oil-filled.

Figure 60: Eagle

Table 21: Specification of Eagle

Types of product	Borewell Submersible Pump Set
Stages	20
Motor Type	Oil Filled
Phase	Single-phase
Voltage	220V
Frequency	50-60 Hz
Power	2 HP

- **HR Solar Panel**

Figure 61: HR Solar Panel

Table 22: Specification of HR solar Panel

Maximum Power	300 watt
Voltage At Maximum Power (Vmpp)	37.82 V
Current At Maximum Power (Impp)	8 A
Open Circuit Voltage (Voc)	44 V
Short Circuit Current (ISC)	8.9 A

Table 23: Thermal Rating

Temprature coefficient of Pmax	670*540*35mm
Temperature coefficient of Voc	4.5 kg
Temperature coefficient of ISC	Polycrystalline

- **Photowatt**

Figure 62: Photowatt

Table 24: Specification of Photowatt

Electrical Characteristics	
Power Rating (W)	300
Open Circuit Voltage Voc (V)	56.9%
Short Circuit Voltage Isc (A)	10.86
Voltage At Maximum Power Vmp (V)	56
Current at Maximum Power Imp (A)	9
Panel Efficiency	40%

Various Types of Inverter of Various Companies

- Microtek Inverter

Figure 63: Microtek Inverter

Table 25: Specification Microtek Inverter

Brand	Microtek
Model Number	Microtek 3KW
Max. Input Power/Number of MPPT	3000W/1MPPT
Max. Input Voltage / Start-up i/p Voltage/Rated i/p Voltage	500V/120V/360V

- **Luminous Inverter**

Features

- Key features are:
- MPPT charge controller to extract up to 30% more power from Panels
- Inbuilt isolation transformer to protect from grid surges and noise Charging from both mains and solar
- Selectable source priority: Choose source priority from solar, battery, and grid
- Compliance with IEC standards for safety, reliability, and quality

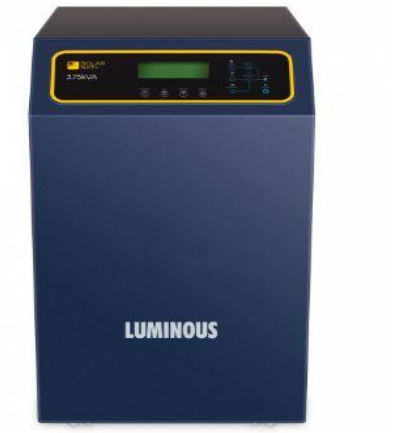


Figure 64: Luminous Inverter

Table 26: Specification of Luminous Inverter

Specification	
Model	NXT+3.75 kVA
Range Name	PCU
VA Rating	3.75 kVA
Maximum Power Voltage	65-130 V
Net weight	50kg
Dimensions (L*B*H)	30.0*50.4*51.5 CM

Specifications

300 watt solar panel made of Taiwan high efficiency and quality solar cells (156*156mm 60pieces)
Made by Taiwan high quality poly crystalline cells
Peak power Output WP (W): 300Wp
Best voltage Vmp (V):29.4V
Best electric current Imp (A):8.5A
Short Circuit electric current Isc (A):8.9A
Open Circuit Voltage Voc (V):44 V
Dimension (mm):670*540*35mm
Impact Resistance Hail impact Test: 227g steel ball down from 1m height
Maximum system voltage:e1000V
Quality guarantee: nominal power keep more than 90% in 10 year and 80% in 25 years

Faster Installation

- Large surface area requires fewer interconnects and structural members
- All module-to-module wiring is built right into the module
- Multi-Contact Plug-n-Play connectors mean source-circuit wiring takes just minutes
- Unique mounting systems available for commercial roofs eliminate need for traditional mounting rails, heavy ballast, and roof penetrations

More Reliability

- Bypass diode protection for every 18 solar cells in series, thus minimizing power loss, and mitigating overheating/safety problems
- Advanced encapsulation system ensures steady long-term module performance by eliminating degradation associated with traditional EVA-encapsulated modules
- Moisture impermeable glass on both sides of the module protects against tears, perforations, fire, electrical conductivity, delamination and moisture
- Patented no-lead, high-reliability soldering system guarantees long life and ensures against environmental harm should the module break or be discarded

Higher Quality

- Each of the module's 216 individual semi-crystalline silicon cells is inspected and power matched to ensure consistent performance between modules
- Every module is tested utilizing a calibrated solar simulator to ensure that the electrical ratings are within the specified tolerance for power, voltage, and current
- Module-to-module wiring loss is factored into the module's labeled electrical ratings by testing through the module's cable/connector assemblies.

Cell Temperature coefficients

- Power TK (Pp) - 0.47 % / °C
- Open-circuit voltage TK (Voc) - 0.38 % / °C
- Short-circuit current TK (Isc) + 0.10 % / °C

Limits

- Maximum system voltage 600 VDC U.S.
- Operating module temperature -40 to +90° C
- UL certified design load 50 PSF
- Equivalent wind resistance Wind speed of 120 mph (192 km/h)

Component

A photovoltaic solar-powered pump has four parts:

Solar panel
The control unit (Power Controller)

Pump

Water Reservoir

Battery

Solar panel

Solar panel refers to a panel designed to absorb the sun's rays as a source of energy for generating electricity or heating. PV panels are made up of a series of solar cells. Each solar cell has two or more specially prepared layers of semiconductor material that produce

DC electricity when exposed to sunlight. A single, typical solar cell can generate approximately 3 watts of energy in full sunlight. PV panels may be arranged in arrays and connected by electrical wiring to deliver power to a pump.

Controller

A charge controller may be used to power DC equipment with solar panels. The charge controller provides a regulated DC output and stores excess energy in a battery as well as monitoring the battery voltage to prevent under/overcharging. More expensive units will also perform maximum power point tracking. An inverter can be connected to the output of a charge controller to drive AC loads.

Pump

A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps. Pumps operate by some mechanism (typically reciprocating or rotary) and consume energy to perform mechanical work by moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, come in many sizes, from microscopic for use in medical applications to large industrial pumps.

Water Reservoir

A water storage tank is an essential component especially in the case of drinking water. A tank can be used to store enough water during peak solar energy to meet water needs in the event of cloudy weather or maintenance issues with the power system. A tank can also be used for irrigation but currently not considering this, Ideally, the tank should be sized to store at least a day's water supply.
Tank capacity = water requirement per day.

Battery

An electric battery is a device consisting of one or more electrochemical cells that convert stored chemical energy into electrical energy. Each cell contains a positive terminal, or cathode, and a negative terminal or anode. Electrolytes allow ions to move between the electrodes and terminals, which allows current to flow out of the battery to perform work. Secondary (rechargeable batteries) can be discharged and recharged multiple times; the original composition of the electrodes can be restored by reverse current. Examples include the lead-acid batteries used in vehicles and lithium-ion batteries used for portable electronics.

Figure 65: Battery

Water source

Water Source – Well

The following items need to be determined:

● the water Level

● Seasonal variation
● the water quality

System Layout

We need to determine the layout of the entire system, including the locations and elevations of the following components:

● Water source
● Pump
● PV panels
● Storage tanks
● Points of use
● Pipeline routes

Water Storage

A water storage tank is an essential component especially in the case of drinking water. A tank can be used to store enough water during peak solar energy to meet water needs in the event of cloudy weather or maintenance issues with the power system. A tank can also be used for irrigation but currently not considering this, Ideally, the tank should be sized to store at least a day's water supply. Tank capacity = water requirement per day.

Required water

The average water requirement per person is as below

- Bathing: 55 liters
- Toilet flushing: 30 liters
- Washing of Clothes: 20 liters
- Washing utensils: 10 liters
- Cooking: 5 liters
- Drinking: 5 liters

The total water requirement per day per person is 125 L/day So to calculate the water requirement of a village multiplies this with the population.

Pipe Diameter Selection

The velocity of the water to be supplied and frictional losses in the pipe depend on pipe diameter. Hence the diameter of the pipe has to be chosen such that losses are minimum and water has to supply at a reasonable rate. Frictional losses are inversely proportional to that diameter of the pipe i.e., as the pipe diameter decreases frictional losses increase. Hence, we have to avoid the flow diameters of the pipe. Water velocity also depends on the diameter of the pipe. As the diameter of the pipe increases the velocity of the water decreases since the water delivery rate should remain constant. Hence high diameters of the pipe should be avoided. From the above two opposing factors, we can find an optimum diameter for the pipe. Generally,the pipe diameter is chosen such that the velocity of the water= 1 m/s. This ensures reasonable frictional losses too.

Pump to pipe connection

Case 1: Pipe diameter greater than pump outlet diameter

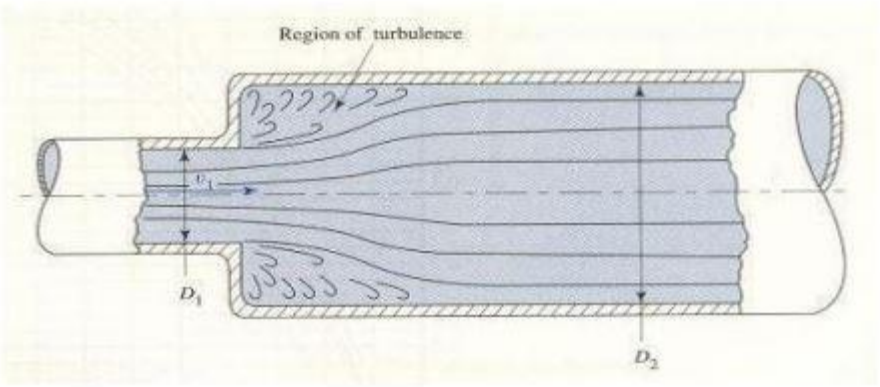


Figure 66: Pump diameter greater than the pump outlet diameter

In this case, there will be a sudden expansion and the losses due to that is given by:

H= (K*V1^2)/2g

Where K = [1-(D1/D2) ^2] ^2

D1 is the pump outlet and D2 is the pipe diameter.

By using this formula, we can find out the loss due to the expansion. We should try to keep the diameter of the pipe as close to the pump outlet diameter as possible to reduce losses. If both are equal then the loss will be zero.

Case 2: Pipe diameter less than pump outlet diameter

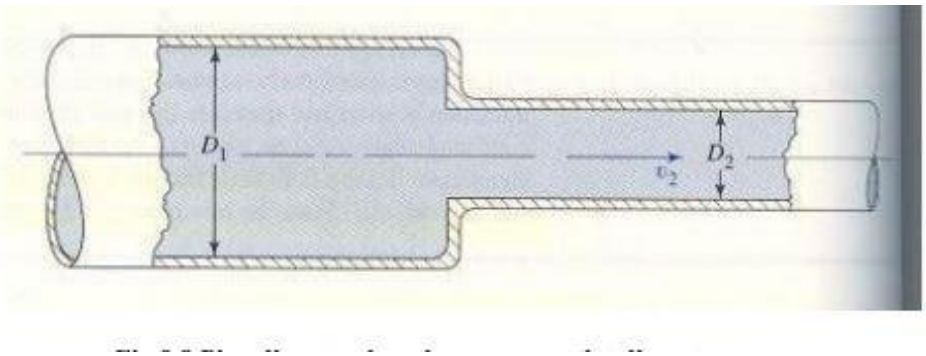


Figure 67: Pipe Diameter less than pump outlet diameter

In this case, there will be a sudden contraction and the losses due to that is given by:

H= (K*V2^2)/2g

Design Flow Rate for the Pump

The pump's design flow rate is based on the operations estimated daily water needs to be divided by the pumping time.

Flow rate = Daily water need (m3/day) / Pumping time (hours)

Total water requirement =water required to person* total population=125 litres * 622
= 77,750 litres

According to the requirement of the villager, we plan for the 6-water tank in the village
= 77,750/2
= 38,875 litres

Flow rate = Daily water need (m3/day) / Pumping time (hours)
=38,875/8*60*60
=1.34 LPS
Flow rate comes to be around 1.34 litre per second assuming 8 hours of pumping time.

Total Dynamic Head (TDH) for the Pump

Total Dynamic Head (TDH) is the total equivalent height that fluid is to be pumped, taking into account friction losses in the pipe. Mathematically speaking,

TDH = Static Head + Friction Losses

Where: Static Head: Maximum height till which water is to be pumped

Friction losses: Losses that occur in (straight section, valves, bends, etc.)

Deciding pump power requirement

1. The static head between Source and the tank was calculated.

2. The total distance of the pipeline was calculated.

3. Diameter is chosen (from the list of standard sizes provided in the appendix ...) in such a waythat the velocity of the water is 1 m/sec.

4. An estimate of the number of 900 bends and valves is taken

5. The efficiency of the pump is taken to be 60%

6. Pipe material is chosen from a list of available pipes

7. Minor loss coefficients of 90-degree bends and valves have been entered which is a constant for all type of pipes

8. Density and Dynamic viscosity of the water has been entered

9. Assuming pump operating time to be 5 hours, water requirement in liters per sec is

Water requirement in liters per second = Q/T*60*60
Where T= Pump operating time in a day

Q= litres/days
Q = 38,875 /8*60*60
Q = 1.34LPS

10. Velocity of the water is calculated by this formula

Velocity = LPS10^{-3}*4 / π*D^2

1 = 1.31*10^{-3}*4 / 3.14*D^2

D = 4.1 cm

11. Reynolds number is calculated using the velocity and diameter of the pipe.

$$\frac{\text{Water density*V*D}}{\text{Dynamic viscosity}}$$

1000*1*0.041/0.89 = 46.06

12.Frictional Factor is calculated using the following formula

Factor (f) = 64/Re if R e< 21

= 64/46.

Frictional Factor (f) = 1.38

Frictional head= f*L*V2/2gD

1.38*22*$(1)^2$/2*9.8*0.041

Frictional head = 37.77M ≈ 38 M

Head loss (Bends and valves) = Nv*ξv*V^2/2g + Nb*ξb*V^2/2g

Where, Nb,Nv is the number of bends and valves and

ξv, ξb is minor loss coefficient of bends and valves respectively

2*0.3*$(1)^2$/2*9.8 + 1*0.05*$(1)^2$/2*9.8

0.0306 + 2.551*10^{-3}

Head loss (Bends and valves) = 0.0331

13. After obtaining all the Head losses we can finally find out the total head required Total Head=Static Head+ Frictional Head + Head loss due to Bends and valves

22+38+0.0331

Total Head = 60.03 ≈ 60M

14. Power = Ph(kW) = q ρ h / 100*ή

1.34*10^{-3}*1000*52/100*0.6

Power (in watts) = 1.16133 kW

= 1.34 hp

Where,

Ph(kW) = hydraulic power (kW)

q = flow capacity (m^3/sec)

ρ = density of fluid (kg/m3)h = differential head (m)

Designing of MCC panel

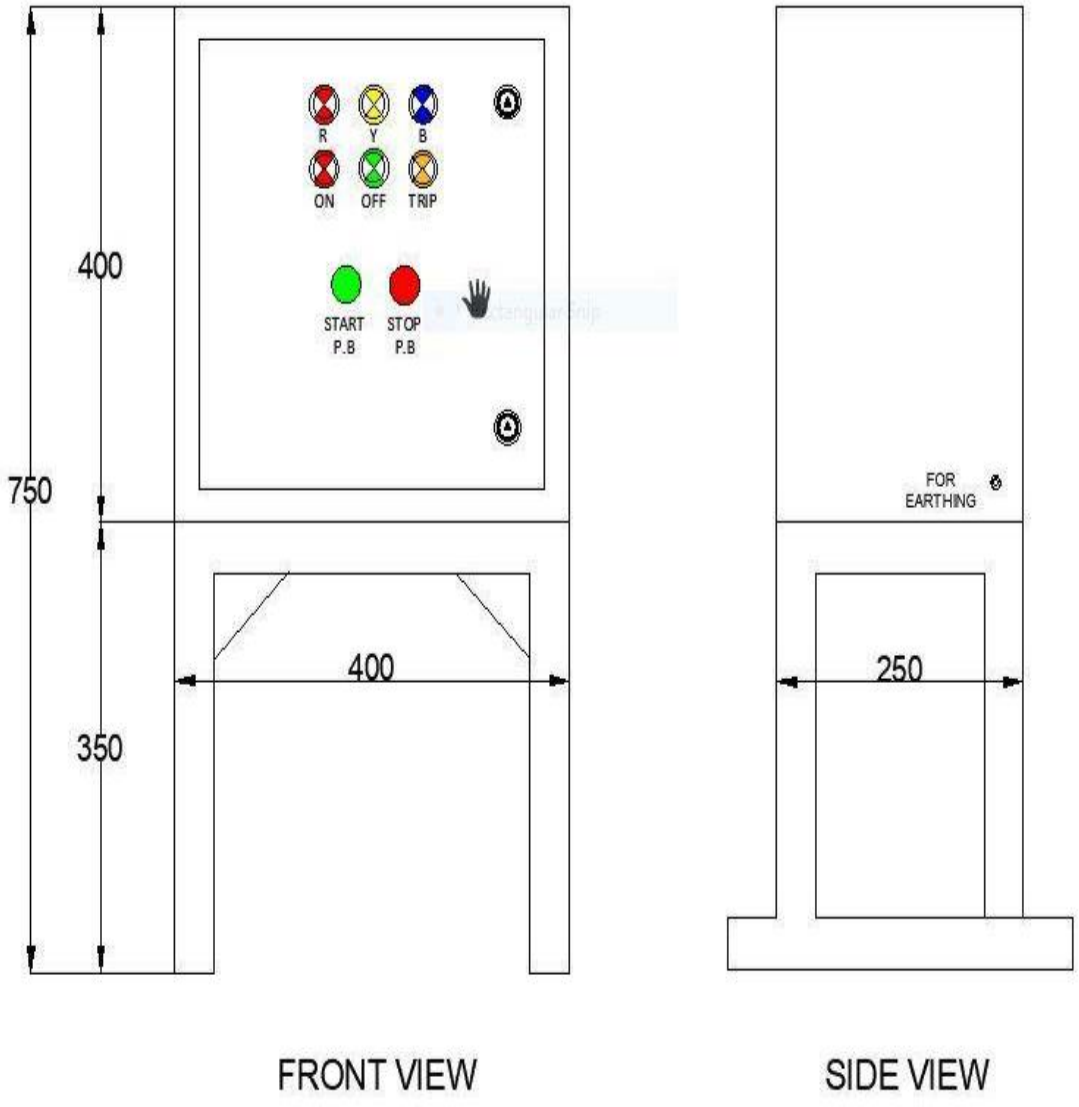


Figure 68: 1.5 kW Dol Starter panel

Parts of the control panel

- MPCB with O/L & S/C protection
- Power contactor
- On indication(rad)
- Off indication (Green)
- Start PB (Green)
- Stop PB (Red)

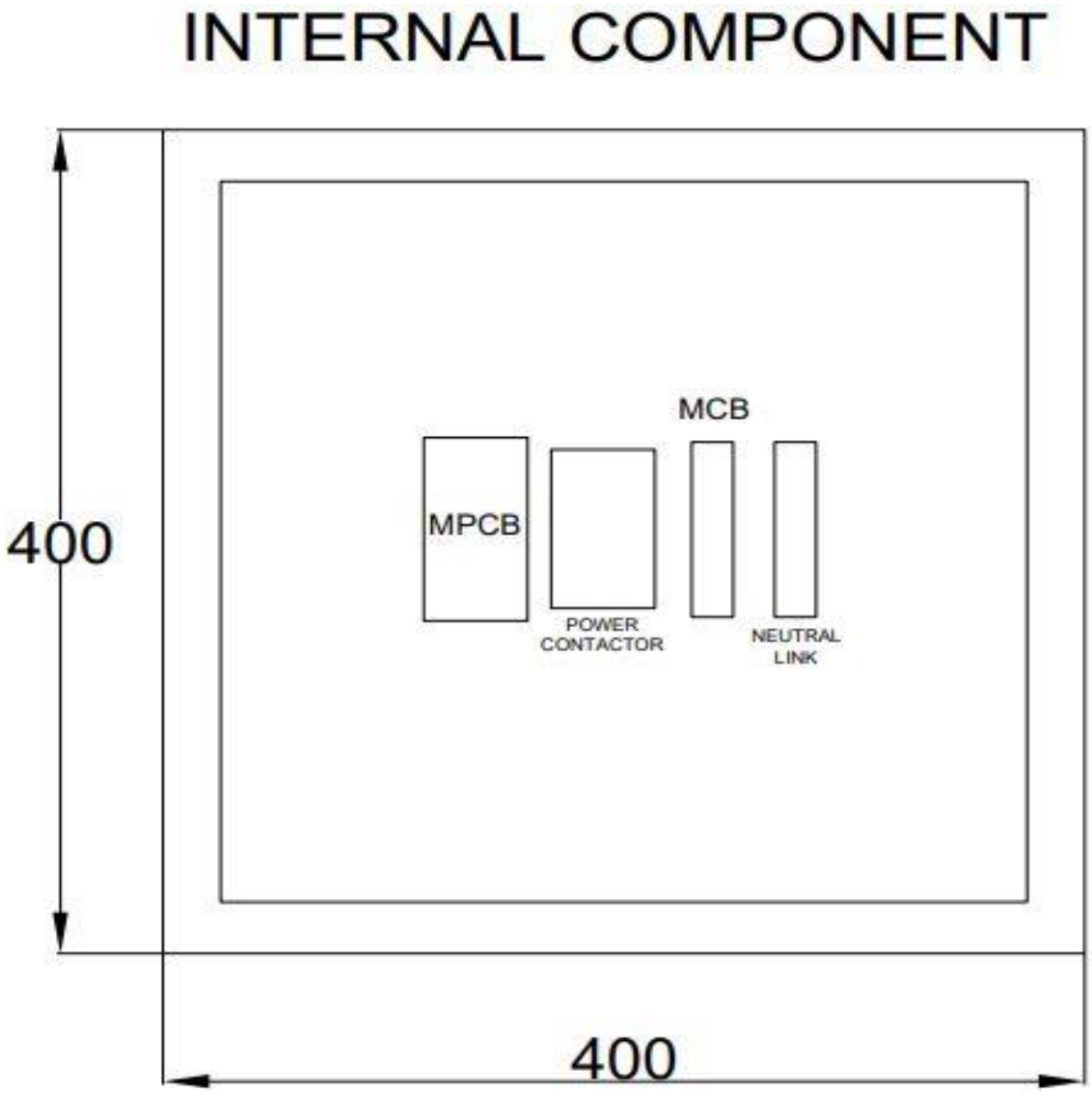


Figure 69: Internal Component of MCC Panel

1. This is used for start and stop the panel.
2. This is the design of its internal component .
3. This type is also use for domestic purpose .

8.1.9 Electrical Design-2

INTRODUCTION

- In 21st century there were lots of inventions, development, globalization and so on,but in that time there were pollutions, global warming and so on are also be formed,because of this there is no safe drinking water for world's population.
- The reason for this is the lack of water quality monitoring system and which creates serious issues.
- To take preventive actions for quality maintenance we got an idea that a system should be implemented to monitor the quality of water in easy way, so it can easily analyze some of the critical and important factors of water.
- Various environmental parameters such as temperature, pH, oxygen density, turbidity and so on from water can be collected by these systems using different sensors.
- The development owns technology provides us approach to real time data acquisition, transmission and processing.
- In general the user can get real time water quality data from faraway, but in this system there are several nodes and a base stations where each node contains a group of sensors and the nodes are distributed in different water bodies.
- By those sensors in water the collected date is sent to base station via WSN channel. Basically a PC with Graphic User Interface (GUI) for user is used as a base station. To analyze the water quality data and when water quality detected is below preset level, Alarm is automatically raised.

SYSTEM ARCHITECTURE

- Water is essential resource of life for each living organism on the earth. In examining quality of water, oxygen level plays important role in water.
- Health issues of human, plant and living organisms on the earth depends on water quality.
- Rain, rivers and lakes are the main sources of water. Rain water running over the lands contains many useful as well as harmful contents, may be soluble or insoluble. Salt and particles in soil decides the acidity of water.
- An insoluble particle mixed in the water degrades usefulness of water for particular application, where traditional measure of water quality is transparency.
- To measure the oxygen level, acidity, and turbidity of drinking water as well as water that may be used for agriculture and industrial process is the main aim.
- Water quality measurement parameters by remote access and by using wireless communication facilitates quality control, record keeping and analysis using simulation software at base station.
- The parameters that are analyzed and control to improve water qualities are oxygen level, pH and turbidity. The objectives of idea implementation are as follows.

- Measurement of pH, Oxygen level and Turbidity of water using sensors at remote place.
- To avail local power supply to sensor nodes using solar energy.
- To collect data from various sensor nodes and send it to base station by wireless channel
- To simulate and analyze quality parameters for quality control. (Graphical and numerical record using VB & MATLAB).
- To publish the corresponding record over web for public information and further assessment of water resource.

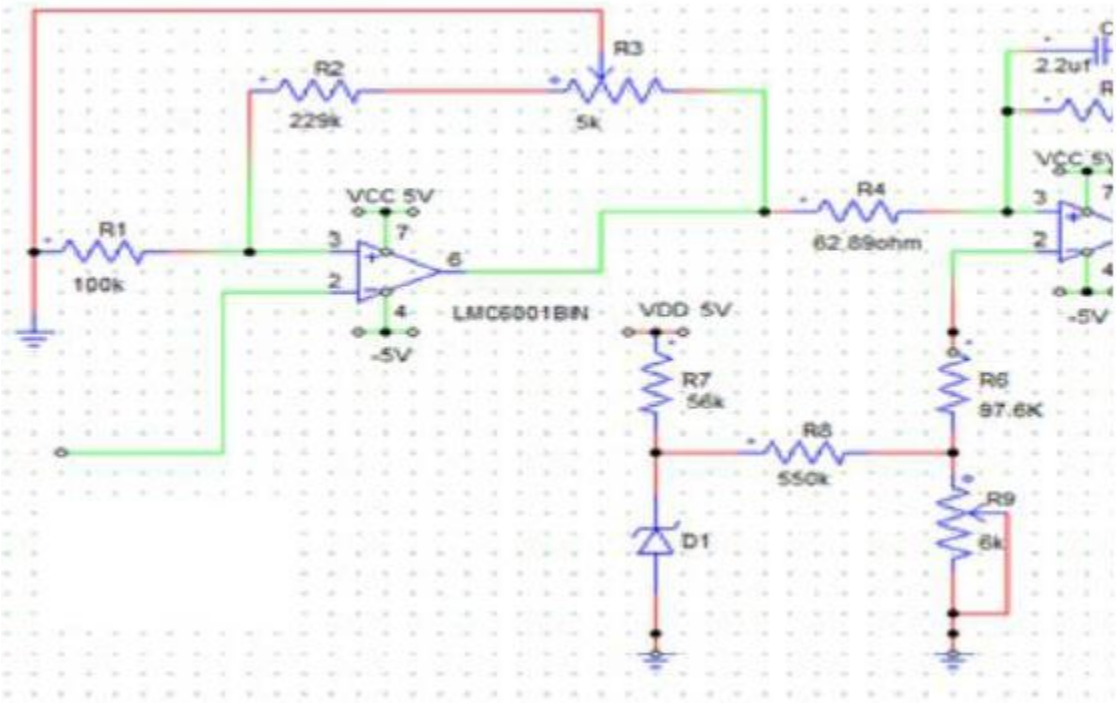


Fig 70: Circuit diagram of IH20 sensor interfacing.

- A wireless technology like Zigbee works on standard IEEE 802.15.4 protocol & operates on unlicensed bands worldwide at the frequencies 2.400-2.484GHz, 902-928MHz and 868.0 -868.6MHz. Low cost, low power (3.3V), and up to 65000 nodes with an AES encryption standard for communication are the main advantages of Zigbee. Figure shows interfacing of Zigbee with controller board.
- The output voltage and power of the solar panel used is 13.5V, 1.5W. Since the sunlight changes day and night, a battery with 12V output is needed to store and maintain the output voltage of the solar power module. When the sunlight is strong and solar panel outputs higher than 12V, the regulator turns on, thus solar panel powers remaining blocks and battery is in charging mode. When the sunlight become poor, the regulator turns off & the whole sensor node is powered by 12V battery. Solar Charging controller 12 V/DC, 6 A [M149] is used as a regulator to convert 13.5V into regulated 12V DC. Figure 6 below shows the detailed diagram of solar power module.

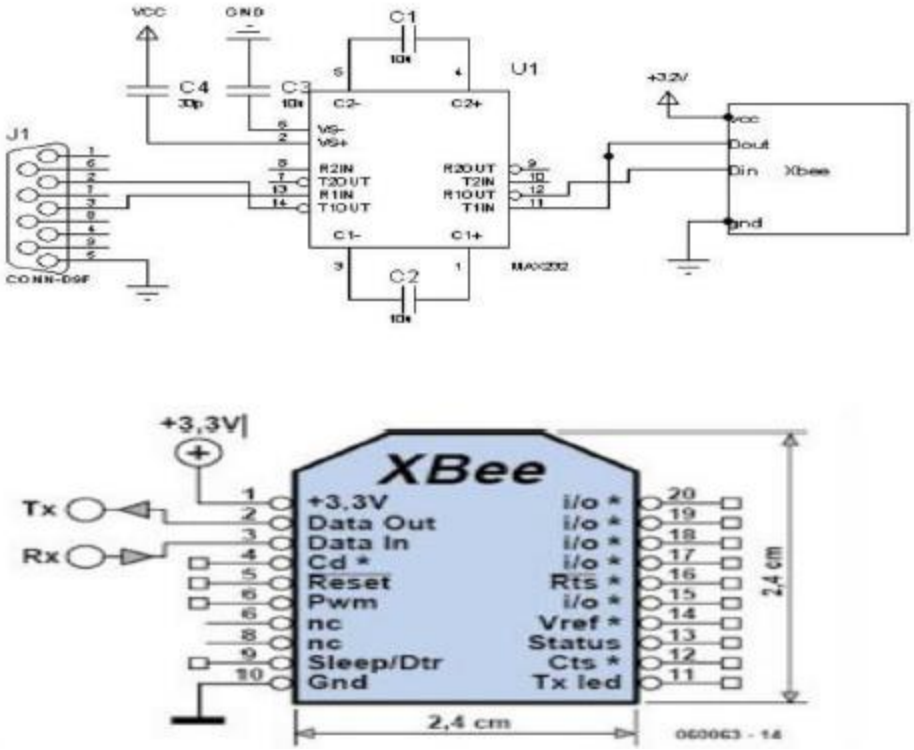


Fig 71: Interfacing of zigbee with MC

SOFTWARE DESIGN

- Software design approach for water monitoring system is based on three parts, first is ARM programming, GUI design in VB and MATLAB simulation of results obtained from base module. Detailed flowchart for the working of whole system as well as software design is shown in figure this system we used MATLAB graphical representation for measuring the various levels of water quality like Ph, turbidity, oxygen level. Our proposed flowchart representation is explained as follows.
- ARM programming is done in Kiel uVision4 IDE software. GUI on PC to display collected data is designed using VB 6.0. For comparative day wise graphical analysis of data collected from sensor nodes is done in MATLAB.

APPLICATON & FUTURE SCOPE

- This system checks quality of water at the places where generally it inconvenient to take frequent tests manually.

8.1.10 Electrical Design -3

Simulation of solar water pump system

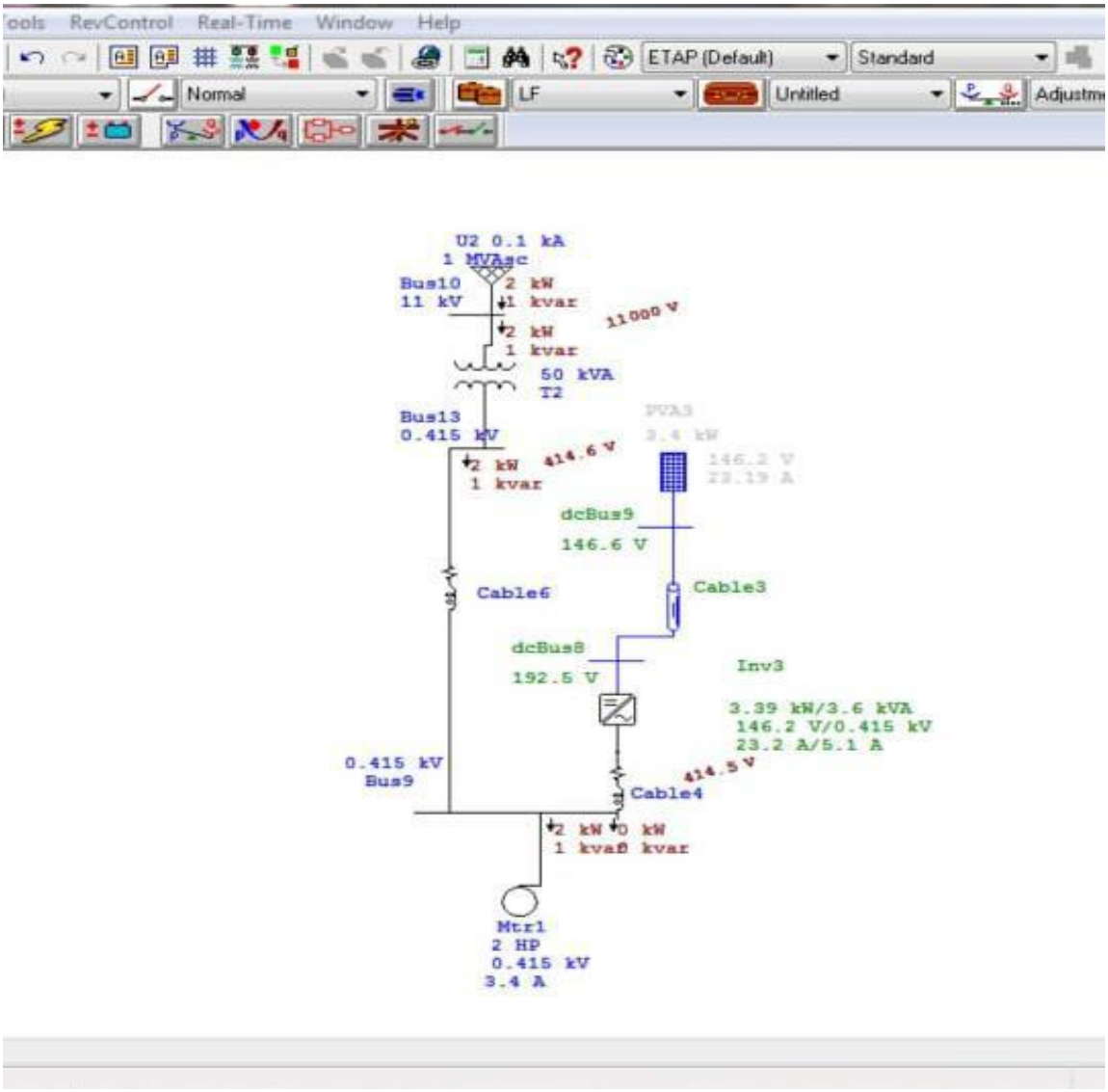


Figure 72: Without solar panel and inverter

When solar panel is off, power comes from grid. So cost is high , to low the cost attached the solar.

With solar panel and inverter

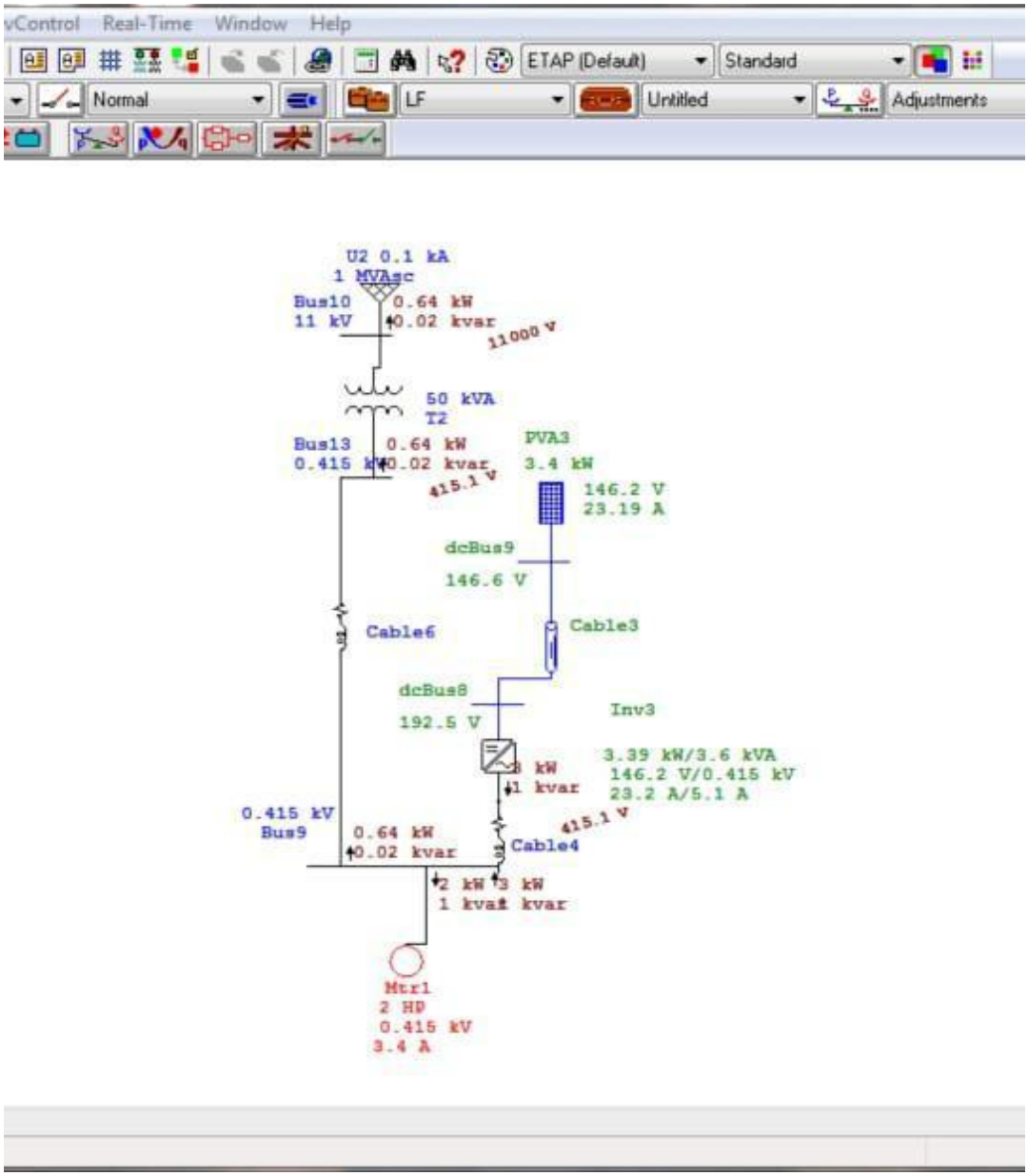


Figure 73: With solar panel and inverter

In these system power comes from solar, so rating of grid is low. Thus cost automatically low.

Solar Cell

Figure 74: Solar cells

The solar cell operates on the principle of the photovoltaic effect - the creation of charge carrier with in a material by the absorption of energy from the incident solar radiation. The efficiency of solar cells in converting incident solar energy into electrical energy depends on the illumination spectrum intensity, materials of construction and design of the cell, atmospherictemperature and dustiness of the sky. Solar cell used in running DC electric motors have efficiencies ranging from 10 to 12 percent.

Silicon is the most commonly used material for making solar cells. Other materials include cadmium sulfide and gallium arsenate. The fabrication of the solar cell involves a large number of processes. Wafer form, followed by junction formation, contact fabrication and anti-reflection coating on the active surface of the cell. The outer surface of the panel is protected by a special tempered glass which provides high transmittance of sunlight.

Solar Array

A solar cell behaves like a low voltage battery whose charge is continuously replenished at a rate proportional to the incident solar radiation. Connecting such cells into series parallel configuration results in photovoltaic modules or solar arrays with high current and voltages. The power developed by a solar array ranges from 80 to 120 watts per square meter of the panel. The photovoltaic power can be utilized to operate conventional electrical appliances, including DC electric motors. The solar array is mounted on a simple frame which has provision for adjusting the array manually against the position of the sun.

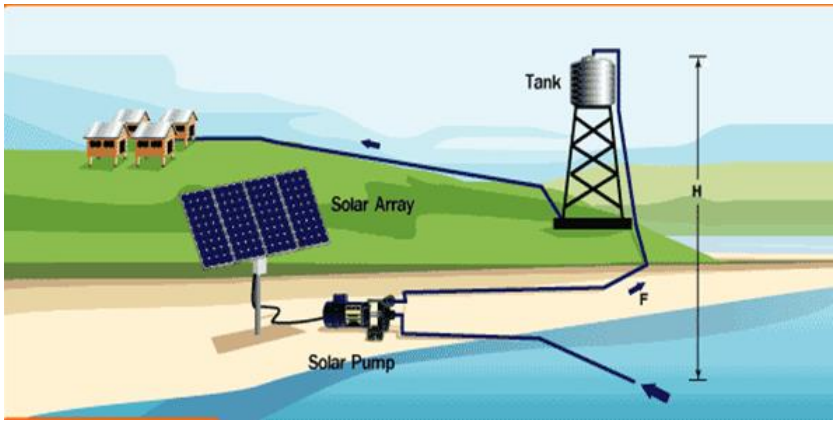


Figure75: Solar Array

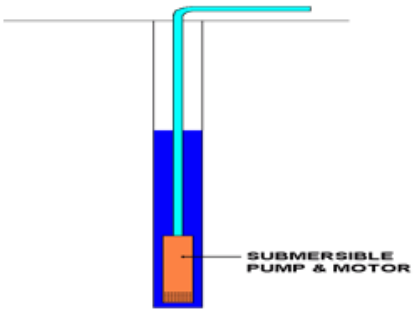
Possible Water Sources

The SPV based pumpsets are low head high discharge and may be productively used at sites where water is available at relatively shallow level. The possible water sources for the SPV systems are Diggies; pen dug wells, tanks, farm ponds and surface water from canals and rivers.

Submersible Pumps

Submersible pumps are installed completely underwater, including the motor. The pump consists of an electric motor and pump combined in a single unit. Typically the pump will be shaped like

a long cylinder so that it can fit down inside of a well casing. Although most submersible pumps are designed to be installed in a well, many can also be laid on their side on the bottom of a lake or stream. Another common installation method for lakes and rivers is to mount the submersible pump underwater to the side of a pier pile (post). Submersible pumps don't need to be primed since they are already under water. They also tend to be more efficient because they only push the water, they don't need to suck water into them. Most submersible pumps must be installed in a special sleeve if they are not installed in a well, and sometimes they need a sleeve even when installed in a well. The sleeve forces water coming into the pump to flow over the surface of the pump motor to keep the motor cool. Without the sleeve the pump will burn up. Because the power cord runs down to the pump through the water it is very important that it be protected from accidental damage. You wouldn't want a boat tangled up in the cord or a snapping turtle or alligator to bite through it.



A Submersible Pump

Figure 76: Sumersible Pump

Maintenance OfSpv System

The supplier provides annual maintenance contract to the beneficiary at Rs. 1950/- after initial guarantee period of 1 1/2 years. The solar panel is expected to provide about 20 years of satisfactory service under normal conditions, even though the cell itself may last much longer. The only maintenance requirement is occasional washing of the surface to maintain maximum optical transmission through the glass. The panel has to be protected from breakage by external agencies. Some manufacturers cover the cell/array with unbreakable glass. The motor and the pump require the usual periodic maintenance like cleaning, lubrication and replacement of worn parts.

Advantages OfSpv Pumping System

Cost effective: The life cycle and the cost to ultimate beneficairy make the SPV systems cost effective as compared to conventional systems. IN addition the farmer is saved from the capital investment he has to make for drawing lines from the grid to his field/farms.The govt. may save huge resources which otherwise may be uneconomical to network every agriculture field under the state electricity grid.

Reliable: The SPV is more reliable, consistent and predictable power option as compared to conventional power system in rural areas.

Free fuel: Sunlight, the fuel source of SPV system is a widely available, inexhaustible, and reliable and free energy source.Hence the SPV system has no monthly fuel bills.

Low maintenance: The system operates on little servicing and no refueling, making them popular for remote rural areas, hence the operation and maintenance is very low. The suppliers provide maintenance at a very low annual maintenance contract rates.

Local generation of power: The SPV system make use of local resource-sunlight. This provides greater energy security and control of access to energy.

Easy transportation: As SPV systems are modular in nature they can easily be transported in pieces/components and are easily expandable to enhance the capacity

Energy Conservation: Solar energy is clearly one of the most effective energy conservation programs and provides a means for decentrailized PV-generated power in rural areas. Solar pump is energy efficient and a decentralized system avoids any unnecessary expenditure on T & D networks

Water conservation: The SPV sets are highly economical when combined with water conservation techniques such as drip irrigation & night time distribution of (day time pumped & stored) water. The SPV system leads to optimum exploitation of scarce ground water.

Environmental friendly : The use of sunlight as a source of fuel leads to clean, eco-friendly and decentralized generation of energy which saves the fossil fuel, controls deforestation and prevents environmental pollution.

Benefits To Farmers

Farmer gets a high value, high discharge pumping system for a one time amount that is less than a third of the actual price and may be maintained at nominal cost annually.

- No fuel costs & minimal maintenance costs.
- More economical than diesel pump sets in the long run.
- Where no pumping system exists at present SPV based pumping system,
- Enables cultivation of an extra crop
- Helps in providing the critical protective irrigation in water scarce areas.
- Saves time and labour
- Improves agriculture productivity
- Improves general quality of life with higher levels of income
- Incremental income enables easy repayment loan taken for installing system.

Extension Services

Adequate extension services are made available by agencies/suppliers in the scheme area. The beneficiaries may adopt modern cultivation practices and adopt crop diversification with an emphasis on cash crop/high remuneration crops. The guidance may be availed from local agriculture extension departments of the state government.

Structure

1.We have to design a structure so that it would be unaffected by the wind loading.

2. We also have to take care of the mounting posts of the solar panels so that they are not affected by unnecessary extra loads, and also to minimize eccentric and axial loads.

3. The design should be of low weight and also should provide high stability to the system.

4. Also, the design should be in such a way, where manual seasonal tracking can be done.

Maintenance

1. We have to clean solar panels at least one time a day as this increases the efficiency of the panel.

2. We can either use an automated system for operating pumps or operate it manually during working hours.
3. If there is an operational fault in the system then we have to stop the system and check the fault.
4. Regularly we have to do the maintenance of the pump for its proper functionality.

Safety

1. We are attaching panels to a solid frame structure where it is held securely.
2. The fence around the solar PV system is a must.
3. There should be a control room, where an inverter, operating system, and batteries can be placed so that it can be locked.

Cost

Table 27: Cost

Component	Name	Rating	Cost of 1n in rupees	Total number of components	Total Cost in rupees
Solar Panel	Photo watt	300 W	9500	24	228000
Inverter	Luminous	3 Kw	31500	2	63,000
MCC Panel	Rem electro Mach pvt.ltd	IP 42	8000	2	16000
Submersible Pump	Crompton 100W14RG2	2 HP	21,393	2	42,786
Other Cost	-	-	-	-	20.000
					Total Cost: 3,69,786

Introduction of solar street light

Solar Street Light: -

This system is designed for outdoor application in un-electrified remote rural areas. This system is an ideal application for campus and village street lighting. The system is provided with battery storage backup sufficient to operate the light for 10-11 hours daily. The system is provided with an automatic ON/OFF time switch for dusk to dawn operation and overcharge / deep discharge prevention cut-off with LED indicators. The solar street light system Comprise of

- 74 Wp Solar PV Module
- 12 V, 75 Ah Tubular plate battery with battery box
- Charge Controller cum inverter (20-35 kHz)

- 11Watt CFL Lamp with fixtures
- 4meter mild steel lamp post above ground level with weatherproof paint and mounting hardware.

The SPV modules are reported to have a service life of 15-20 years. Tubular Batteries provided with the solar street lighting system require lower maintenance; have a longer life and give better performance as compared to pasted plate batteries used earlier. The systems electronic provide for over-charge and over-discharge cut-off essential for preventing battery and Luminaries damages.

The designer solar light is a solar-powered LED lighting solution that can be used at any location where there is no mains power supply. Thanks to its timeless , prize winning design, the is excellent for lighting modern urban space as well as protected monumental structures. The ingenious operating system guarantees flawless function for several nights even during the worst weather. According to EN13201, the is superlative for the illumination classes S5 and S6; that is to say, for side streets with minimal traffic, squares, parking places, etc.

Benefits

Lower Operation Cost: It is less expensive to operate a solar-powered street light than a traditional street light.

Compact Design:

Our design and technology implementation have been driven by our desire to eliminate the need for bulky external battery boxes and external solar panels and achieve All in One Solar Powered Street Light.

Reduced Damage/Theft:

By locating directly on the light fixture and placing the battery within, the risk of damage, theft, or tampering is greatly reduced. There are no wires in the street pole, which means that the wire itself (which exists in regular street lights) can't be stolen and sold for scrap.

Ruggedized Technology:

Require less maintenance and reduced parts replacement due to initially incorporating higher quality components. Insect Swarms: The solar-powered street light uses LED lighting which does not produce Infrared light, and therefore will not attract insects.

Improved Safety:

The solar-powered street light does not require connection to an electrical grid. It is safer and easier to install. In the event of a power outage, the light remains on. This reduces the chance of accidents and the constant light deters theft/vandalism.

Anywhere/anytime:

The solar-powered street light can be used in any location. Since no electrical grid is required, it can be installed on buildings, in parking lots, in remote locations simply by hanging it on a pole.

Table 28: Photovoltaics

Photovoltaics	
Module	Monocrystaline silicium cells
Open circuit voltage Voc	22.5V
max. voltage Umpp	18V
Short circuit current Isc	5.57A
max. current Imp	5.0A
max. power Pmax	90W
Tolerance Pmpp	0 to +3%
Dimensions module	1070×397mm
Level of effectiveness of solar cells (moulded)	>17.8%

Table 29: Illuminant

Illuminant	
LED max. output	60W
LED max. light flux	6600-7200lm
Colour temperature	5.600k to 6.500k
Autonomous time with full battery max.	36h
LED life	>50,000h
State-of-the-art LED	Insect-neutral light

Overview of solar LED Street light

Figure 77: LED Street light

Basic components

The system consists of: (1) Solar cell
(2) LED lamps
(3) Light pole
(4) Control box (charger, controller, battery)

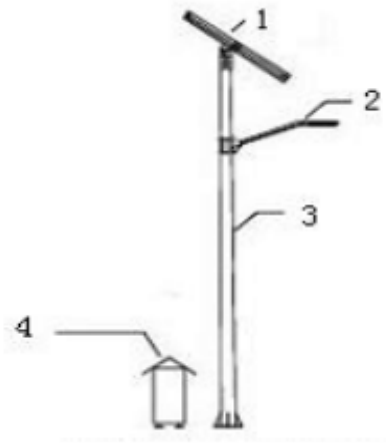


Figure 78: Structures of solar LED street lighting

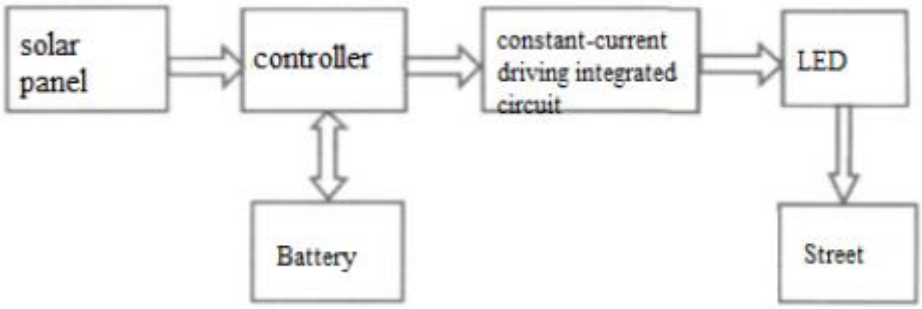


Figure 79: Diagram of solar street light

According to the principle of photovoltaic effect, the solar panels receive solar radiation during the day time and then convert it into electrical energy through the charge and discharge controller, which is lastly stored in the battery. When the light intensity reduces to about 10 lx during the night and the open-circuit voltage of the solar panels reaches a certain value, the controller has detected voltage value and then works the Battery offers the energy to the LED light to drive the LED emits visible light at a certain direction. Battery discharges after a certain ideal time, the charge and discharge controller will act again to end the discharging of the battery to prepare next charging or discharging again.

Chapter: 9 Future Development of the Village

We will Planning and designing the building required as per norms in the village. Then after we will estimate and calculating the total cost of the building.

We will use a centrifugal pump for the same well under the same outdoor conditions. We will compare the daily flow rate given by two types of the pump (Helical pump and Centrifugal pump) during the sunny daylight hours. In India research on solar is in the infant stage, there is a need to adopt programs on technological development for its research, commercialization, and awareness in society. Also, this sector has the potential to provide employability and business chances.

Studies on power quality analyzer or digital wattmeter can be taken up to measure accurate power at the inverter side to ensure better functioning of Solar water pump.

To further enhance the daily pumping rates tracking arrays can be implemented. This system demonstrates the feasibility and application of using solar PV to provide energy for the pumping requirements.

A green structure can be implemented in the future, where a green structure is an environmentally sustainable building, designed, constructed, and operated to minimize the total environmental impacts. The carbon footprint of a home can be minimized through practices like reduced energy consumption, water conservation, and waste recycling.

We will provide library in the village because existing library in the village is totally closed and no one care about it.

We will provide Rain water harvesting system. So that they can used very carefully in agriculture or other work.

We will also design supermarket in the village, so that they are not going to the city for the vegetables and fruits .

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

As per the problem observed in rural areas, preventive and renewable measures are suggested. Implementation of improvement will reduce the problem in the area and improve the standard of living of village people. This can be resulted in improving the social and economic effect of rural areas on the economy of the country and it may result in more efficient use of infrastructure.

Here, for Bhutsad village we identify the problem from Gap analysis, and from that, we suggest some building planning and design and Solar water pumping System in the village also give a proposal of Solar street light.

In Bhutsad Village Requirement building like public toilet , community hall , Garden etc is not existing . By this design we provide basic amenities to the village.

We visited smart village in Valsad and know about problem about Bhutsad village.

By visiting the village we can implement the latest technology for the occupation of the village.

By Designing these amenities will be helpful to the people to the latest environment and grow bit more fast than previous.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.

These will help to the villagers by providing health facilities as they are healthy day by day.

The 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. This can cause reduce the load on urban areas as well as pollution in both sector can be minimized gradually.

Chapter:11 References referred for the Project

Articles

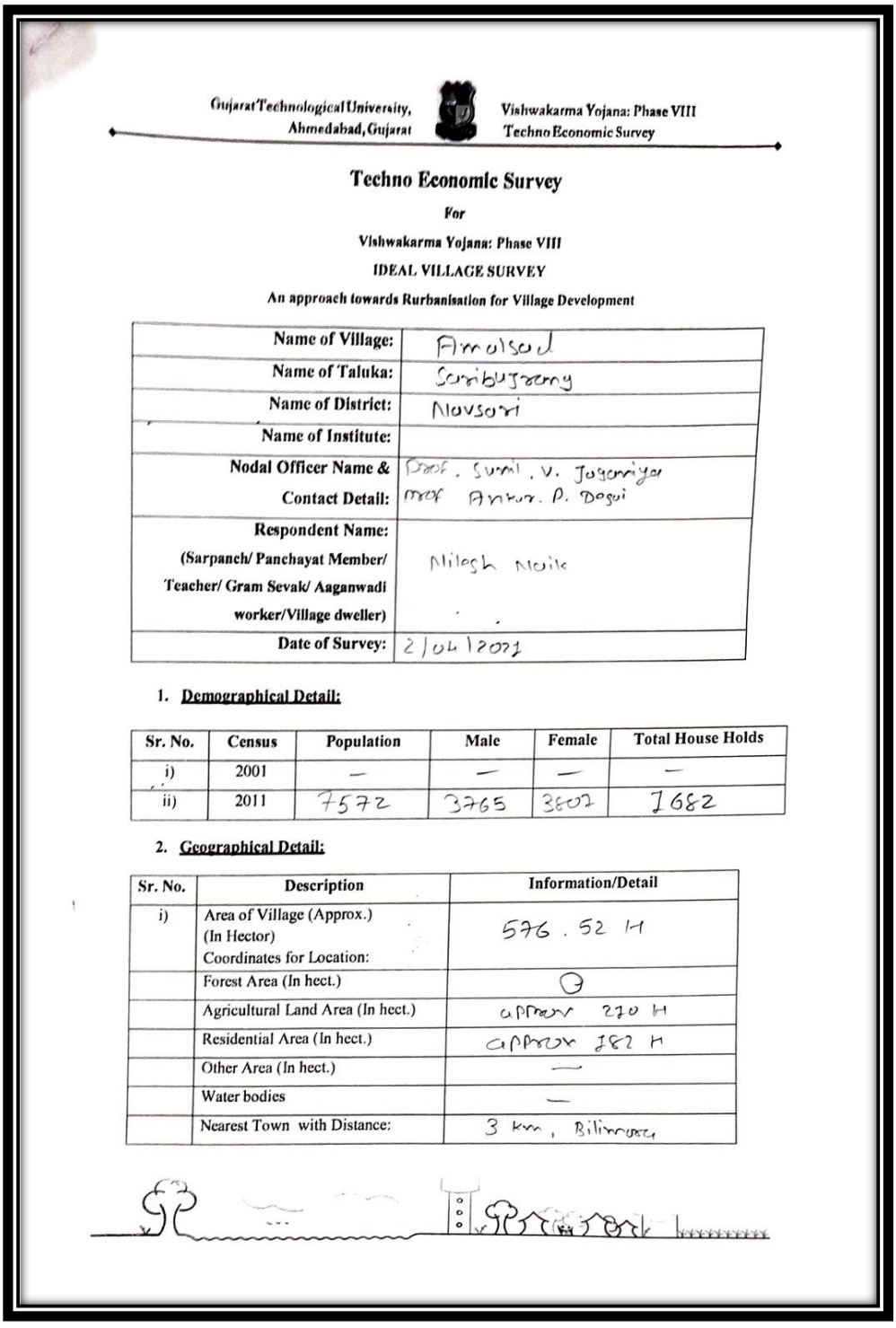
1. Y.S.P. Thorat “Rural Credit in India: Issues and Concerns”.
2. Mr. Shirish S. Garud “Rural electrification: Challenges and the way ahead”.
3. Nidhi Sharma “Rural electrification: Challenges and the way ahead”.
4. Albert Seidel, Dietmar “Design of solar Water pumping system in Rural”
5. Vimal Chand, “Solar PV water pumping system - A comprehensive review”

Web site

1. www.onefivenine.com
2. property.todaypricerates.com
3. www.mpez.co.in
4. www.census2011.co.in
5. www.quora.com
6. villageinfo.in
7. http://gg.gg/solar_pv_pumping1 (Research Article)
8. http://gg.gg/solar_pv_pumping2 (Research Article)
9. https://www.sugarprocesstech.com/pump-power-calculation/
10. http://gg.gg/nig5n
11. https://www.sciencedirect.com/
12. https://www.youtube.com/watch?v=bDG8u7Rqw_k

Chapter: 12 Annexure Attachment

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



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

Name of Village:	Amalsad
Name of Taluka:	Saribujrang
Name of District:	Navsari
Name of Institute:	
Nodal Officer Name & Contact Detail:	Prof. Sunil. V. Jaganiya Prof Ankur. P. Dagli
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Nilesh Naik
Date of Survey:	2/04/2021

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	—	—	—	—
ii)	2011	7572	3765	3807	1682

2. **Geographical Detail:**

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	576.52 H
	Forest Area (In hect.)	0
	Agricultural Land Area (In hect.)	approx 270 H
	Residential Area (In hect.)	approx 182 H
	Other Area (In hect.)	—
	Water bodies	—
	Nearest Town with Distance:	3 km, Bilimora

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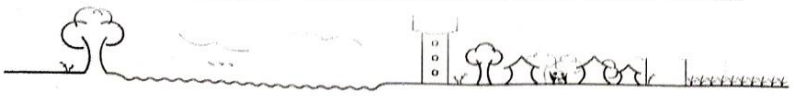
3. Occupational Details:

Name of Three Major Occupation groups in Village	1. Self business 2. Labour 3. Agriculture

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		✓ ✓ ✓ ✓ ✓	 ✓ 	 2 2 Lake
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	✓		
	Underground Sump	Capacity:			
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	Pucca			
	Whether drain water is discharged directly in to Water bodies/ Sewer plants	under body	✓		
Suggestions if any:					



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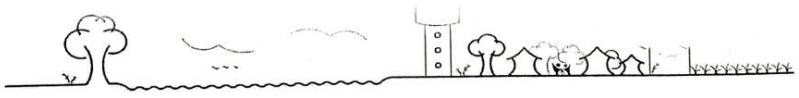
E.	Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM				
	Village approach road		✓		
	Main road		✓		
	Internal streets		✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH-48	✓		
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	Yes		✓	1 km
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes	✓		3 km
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	✓		Auto
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes	✓		DGVCL 24hrs
	Power supply for Domestic Use	Yes	✓		24hrs
	Power supply for Agricultural Use	Yes	✓		8hrs
	Power supply for Commercial Use	Yes	✓		8hrs
	Road/ Street Lights	Yes	✓		7hrs L.E.D



	Electrification in Government Buildings/ Schools/ Hospitals		✓		
	Renewable Energy Source Facilities (Y/ N)		✓		
	LED Facilities		✓		
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes	✓		
	Location Condition	Excellent	✓		
	Community Toilet (With bath/ without bath facilities)	1	✓		
	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)	Lake	✓		
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	80%	✓		Pucca

5. Social Infrastructural Facilities:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks

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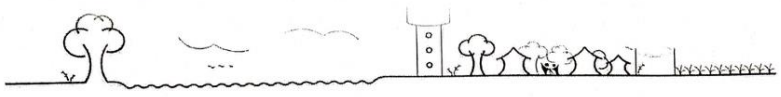
K.	Health Facilities:				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:		✓		
	Private Clinic/Private Hospital/ Nursing Home		✓		
	If any of the above Facility is not available in village than approx. distance from village: .....kms.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

L.	Education Facilities:				
	Aaganwadi/ Play group		✓		2
	Primary School		✓		3
	Secondary school			✓	
	Higher sec. School			✓	—
	ITI college/ vocational Training Center			✓	
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities			✓	
	If any of the above Facility is not available in village than approx. distance from village: ..3....kms. Bilimora				
Suggestions if any:					

M.	Socio- Culture Facilities				
	Community Hall (With or without TV) Location:		✓		with T.V



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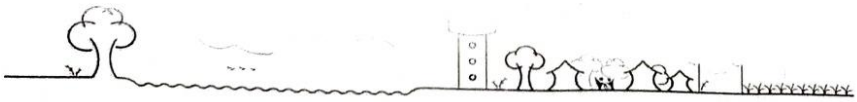
	Condition:	Excellent			
	Public Library (With daily newspaper supply. Y/N) Location: Condition:	yes good	✓		
	Public Garden Location: Condition:	yes good	✓		
	Village Pond Location: Condition:	yes good	✓		
	Recreation Center Location: Condition:	NO		✓	
	Cinema/ Video Hall Location: Condition:	NO		✓	
	Assembly Polling Station Location: Condition:	NO		✓	
	Birth & Death Registration Office Location: Condition:	yes good	✓		
If any of the above Facility is not available in village than approx. distance from village: ....3....kms. bilimora.					
Suggestions if any:					
N.	**Other Facilities**				
	Post-office	yes	✓		
	Telecommunication Network/ STD booth	yes	✓		



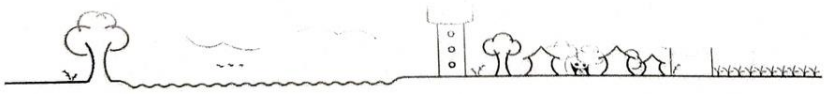
	General Market		✓		
	Shops (Public Distribution System)		✓		
	Panchayat Building		✓		
	Pharmacy/Medical Shop		✓		
	Bank & ATM Facility		✓		
	Agriculture Co-operative Society		✓		
	Milk Co-operative Soc.		✓		
	Small Scale Industries		✓		
	Internet Cafes/ Common Service Center/Wi Fi		✓		
	Other Facility				
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				
P.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	yes yes yes	✓ ✓ ✓		
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)	Panchayat Building	
2.	Additional Information/ Requirement		

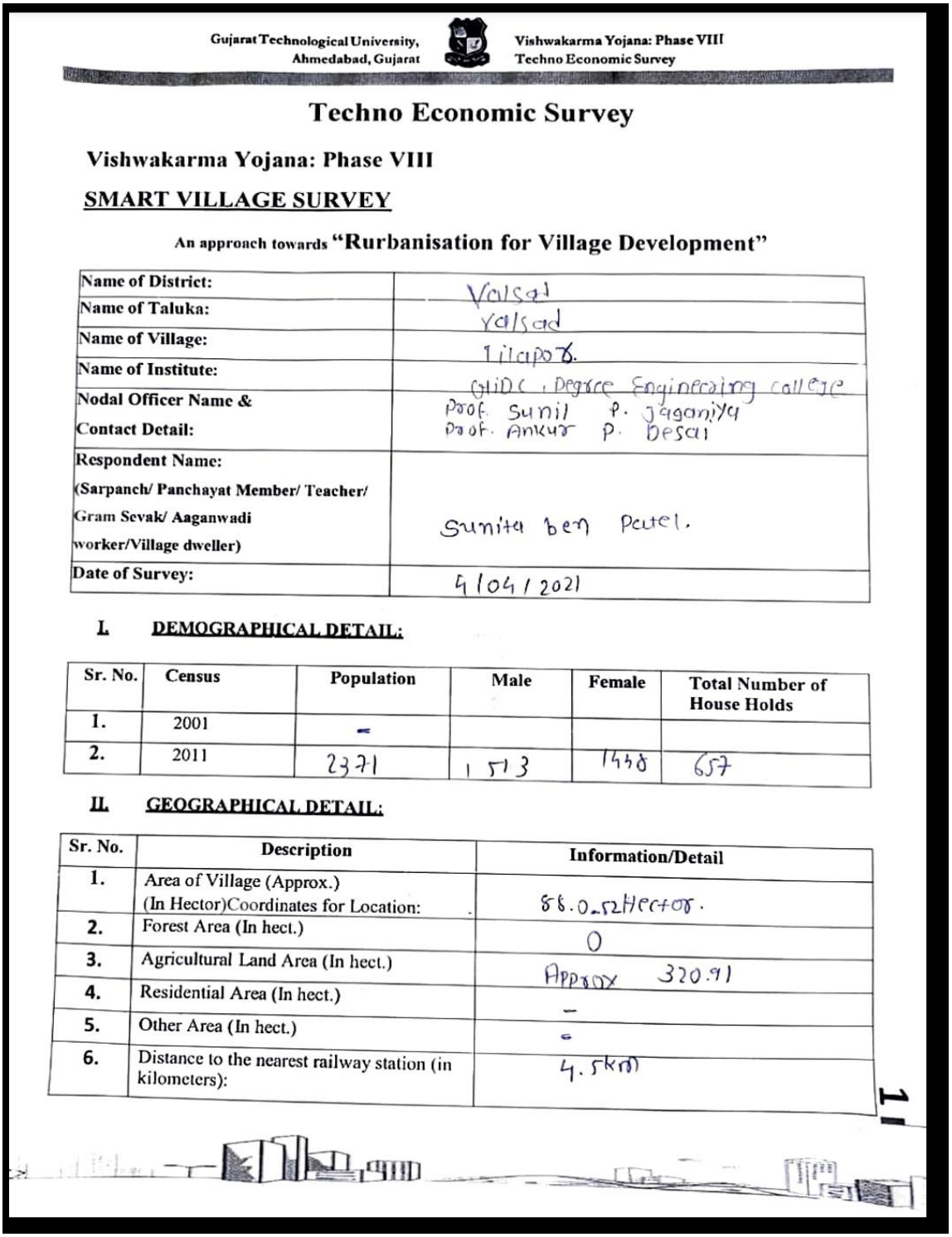
9. Smart Village Proposal Design

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	NO Design		

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

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

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



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

Name of District:	Valsad
Name of Taluka:	Valsad
Name of Village:	Tilapore.
Name of Institute:	GHDC, Degree Engineering college
Nodal Officer Name & Contact Detail:	Prof. Sunil P. Jaganiya Prof. Ankur P. Desai
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Sunita ben Patel.
Date of Survey:	4/04/2021

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	-			
2.	2011	2371	1513	1448	657

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	88.052Hector.
2.	Forest Area (In hect.)	0
3.	Agricultural Land Area (In hect.)	Approx 320.91
4.	Residential Area (In hect.)	-
5.	Other Area (In hect.)	-
6.	Distance to the nearest railway station (in kilometers):	4.5km

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

7.	Name of Nearest Town with Distance:	5.7 km
8.	Distance to the nearest bus station (in kilometers):	4.0 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. Self business 2. Labour 3. Agriculture
Major crops grown in the village:	1. Sugarcane 2. - 3. -

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
1.	**PIPED WATER**				
	Piped Into Dwelling		✓	✓	
	Piped To Yard/Plot				
	Public Tap/Standpipe		✓		
	Tube Well Or Bore Well		✓		
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:	40000			
	Underground Sump	Capacity:	–			
Suggestions if any:						
C.	**The Type of Drainage Facility**					
	A. UNDERGROUND DRAINAGE		✓			
	1					
	2		✓			
	B. OPEN WITH OUTLET		✓			
	C. OPEN WITHOUT OUTLET					
Suggestions if any:						
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**					
	Village approach road		✓			
	Main road			✓		
	Internal streets		✓			
	Nearest NH/SH/MDR/ODR Dist. in kms.		10 Kms			
Suggestions if any:						
E.	**Transport Facility**					
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)			✓		
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)		✓			
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)		✓			
Suggestions if any:						
F.	**Electricity Distribution**					
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)		✓			

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Power supply for Domestic Use		✓		
	Power supply for Agricultural Use		✓		
	Power supply for Commercial Use		✓		
	Road/ Street Lights		✓		
	Electrification in Government Buildings/ Schools/ Hospitals		✓		
	Renewable Energy Source Facilities (Y/ N)		✓		
	LED Facilities		✓		

Suggestions if any:

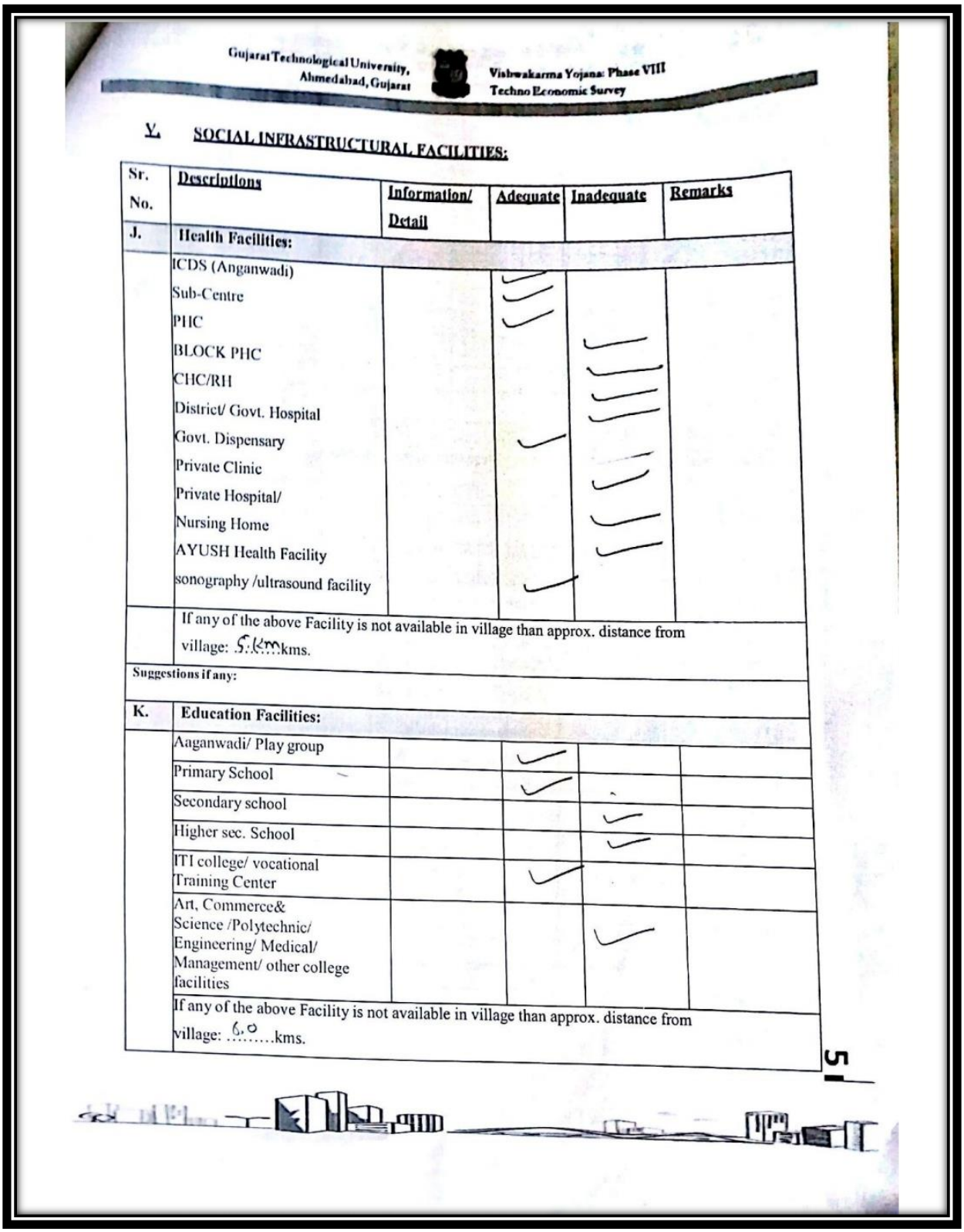
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.			✓	
	Location Condition			✓	
	Community Toilet (With bath/ without bath facilities)		✓		
	Solid & liquid waste Disposal system available		✓		
	Any facility for Waste collection from road		NO.		

Suggestions if any:

II.	**Main Source of Irrigation Facility:**				
	TANK/POND			✓	
	STREAM/RIVER			✓	
	CANAL		✓		
	WELL		✓		
	TUBE WELL		✓		
	OTHER (SPECIFY)		✓		

Suggestions if any:

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



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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 Facility			✓	
	sonography /ultrasound facility		✓		
	If any of the above Facility is not available in village than approx. distance from village: 5 kms.				
	Suggestions if any:				
K.	**Education Facilities:**				
	Aaganwadi/ Play group		✓		
	Primary School		✓		
	Secondary school			✓	
	Higher sec. School			✓	
	ITI college/ vocational Training Center		✓		
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities			✓	
	If any of the above Facility is not available in village than approx. distance from village: 6.0 kms.				

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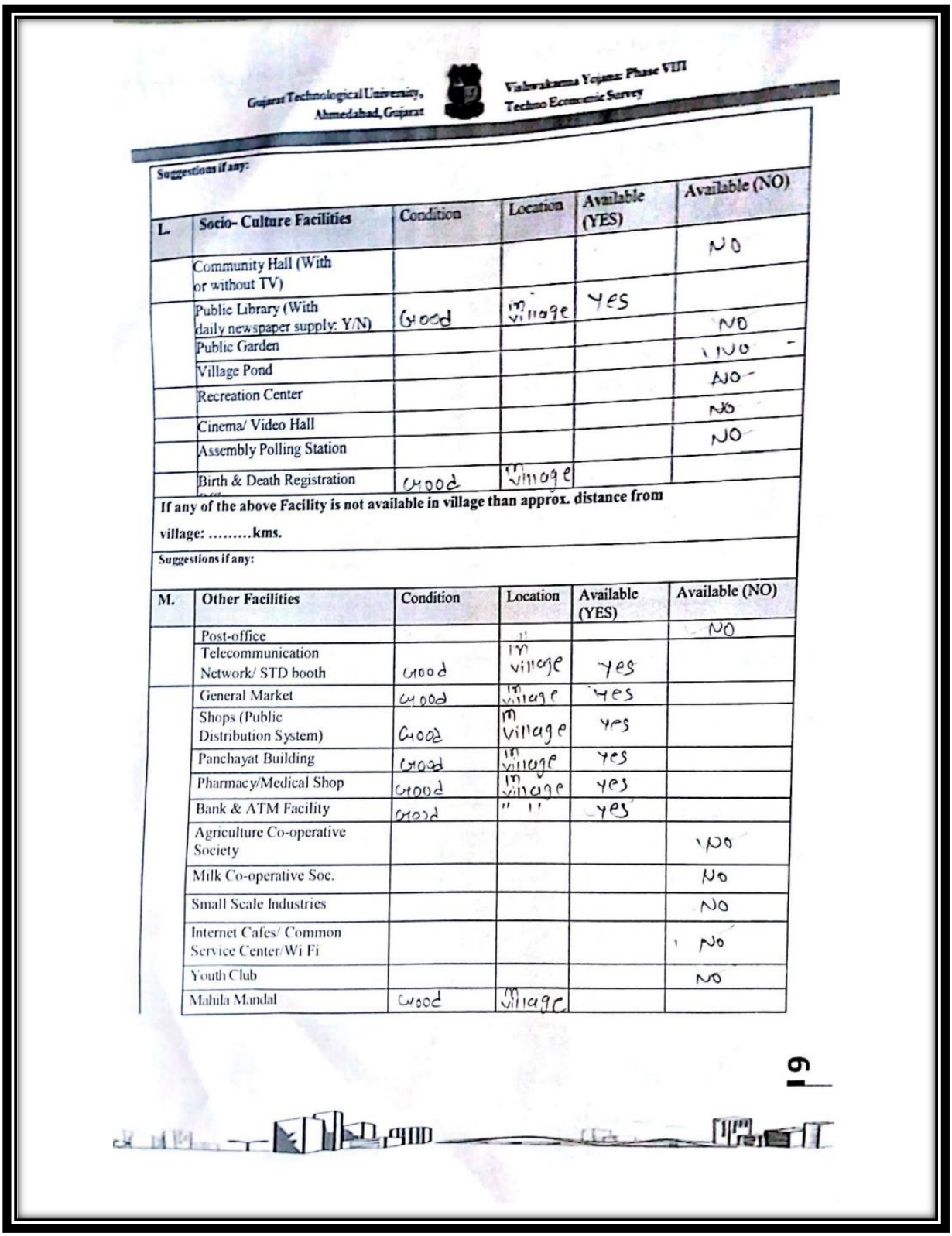

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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)	Good	In village	Yes	
	Public Garden				NO
	Village Pond				NO
	Recreation Center				NO
	Cinema/ Video Hall				NO
	Assembly Polling Station				NO
	Birth & Death Registration	Good	In village		

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				NO
	Telecommunication Network/ STD booth	Good	In village	Yes	
	General Market	Good	In village	Yes	
	Shops (Public Distribution System)	Good	In village	Yes	
	Panchayat Building	Good	In village	Yes	
	Pharmacy/Medical Shop	Good	In village	Yes	
	Bank & ATM Facility	Good	" "	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	Good	In village		

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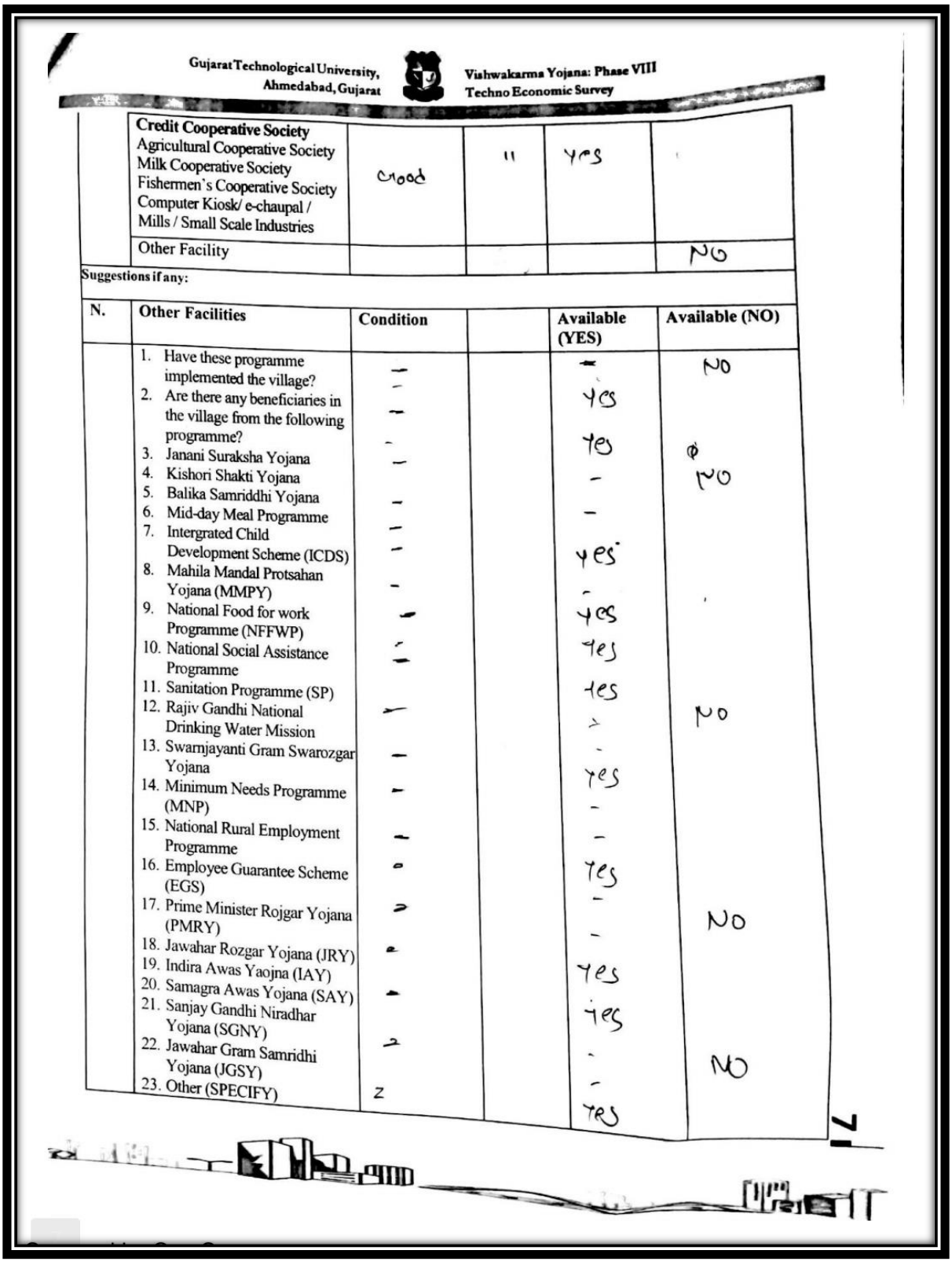

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Credit Cooperative Society Agricultural Cooperative Society Milk Cooperative Society Fishermen's Cooperative Society Computer Kiosk/ e-chaupal / Mills / Small Scale Industries	Good	11	Yes	
	Other Facility				NO

Suggestions if any:

N.	Other Facilities	Condition		Available (YES)	Available (NO)
	1. Have these programme implemented the village?	-		-	NO
	2. Are there any beneficiaries in the village from the following programme?	-		Yes	
	3. Janani Suraksha Yojana	-		Yes	ϕ
	4. Kishori Shakti Yojana	-		-	NO
	5. Balika Samriddhi Yojana	-		-	
	6. Mid-day Meal Programme	-		-	
	7. Intergrated Child Development Scheme (ICDS)	-		Yes	
	8. Mahila Mandal Protsahan Yojana (MMPY)	-		-	
	9. National Food for work Programme (NFFWP)	-		Yes	
	10. National Social Assistance Programme	-		Yes	
	11. Sanitation Programme (SP)			Yes	
	12. Rajiv Gandhi National Drinking Water Mission	-		-	NO
	13. Swarnjayanti Gram Swarozgar Yojana	-		-	
	14. Minimum Needs Programme (MNP)	-		Yes	
	15. National Rural Employment Programme	-		-	
	16. Employee Guarantee Scheme (EGS)	0		Yes	
	17. Prime Minister Rojgar Yojana (PMRY)	2		-	NO
	18. Jawahar Rozgar Yojana (JRY)	2		-	
	19. Indira Awas Yaojna (IAY)	-		Yes	
	20. Samagra Awas Yojana (SAY)	-		Yes	
	21. Sanjay Gandhi Niradhar Yojana (SGNY)	2		-	
	22. Jawahar Gram Samridhi Yojana (JGSY)	Z		-	NO
	23. Other (SPECIFY)			Yes	

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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 NO			- -
3.	Any Other			✓	-

VII. DATA COLLECTION FROM VILLAGE

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Village Base Map Available: Hard Copy/Soft Copy	YES			Not available at Panchayat
2.	Recent Projects going on for Development of Village	PHC			New project
3.	Any NGO working for village development	NO			-
4.	Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS CYCLONE DROUGHT LANDSLIDES AVALANCHE OTHER (SPECIFY)	NO			-

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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

IX. Smart Village / Heritage Details

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

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

S. A Patel
સરપંચશ્રી,
લીલાપોર ગ્રામ પંચાયત,
તા. જી. વલસાડ.

ગ્રામ પંચાયત લીલાપોર તા. જી. વલસાડ

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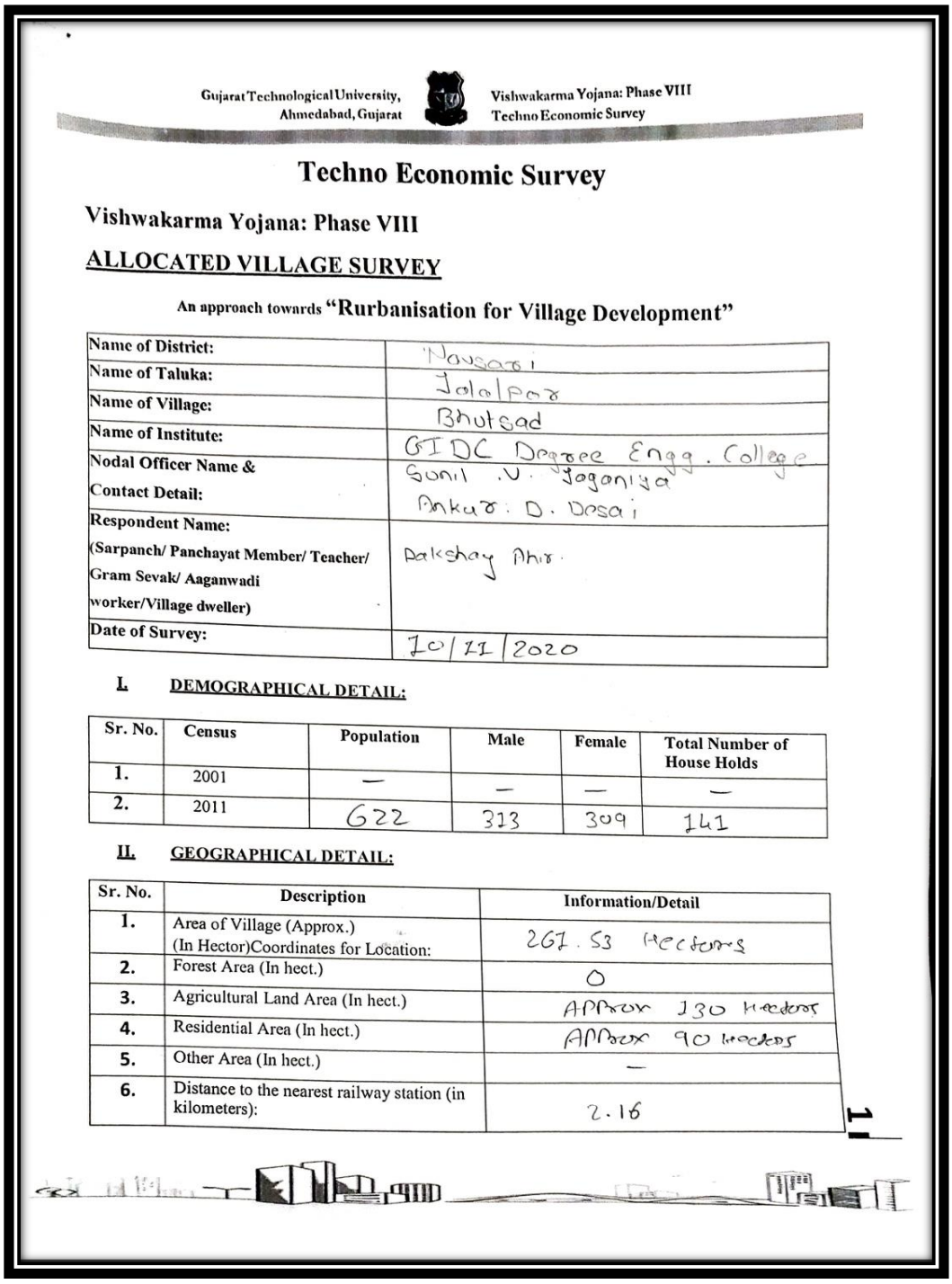
12.3 Survey form of Allocated Village Scanned copy attachment in the report for Part-I :



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

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

Name of District:	Navsari
Name of Taluka:	Jalalpor
Name of Village:	Bhutsad
Name of Institute:	GIDC Degree Engg. College
Nodal Officer Name & Contact Detail:	Sunil .V. Jaganiya Ankur. D. Desai
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Dakshay Bhir.
Date of Survey:	10/11/2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	—	—	—	—
2.	2011	622	313	309	141

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	267.53 Hectors
2.	Forest Area (In hect.)	0
3.	Agricultural Land Area (In hect.)	Approx 130 Hectors
4.	Residential Area (In hect.)	Approx 90 Hectors
5.	Other Area (In hect.)	—
6.	Distance to the nearest railway station (in kilometers):	2.16

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Techno Economic Survey

7.	Name of Nearest Town with Distance:	mundir gam
8.	Distance to the nearest bus station (in kilometers):	Navsari city. 3.5 km
9.	Whether village is connected to all road for the any facility or town or City?	

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1. Dairy Farming 2. Agriculture 3. Own bussiness

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

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

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Gujarat Technological University, Ahmedabad, Gujarat

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Techno Economic Survey

	Other(Specify)Lake/ Pond	yes	✓		Lake
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	✓		
	Underground Sump	Capacity:			
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1	Yes	✓		
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road		✓		Pucca
	Main road		✓		pucca
	Internal streets		✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH-48	✓		
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No		✓	Navsari. 1.9 km.
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	No		✓	
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	✓		Private.
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes	✓		Govt. >6hrs.

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	Power supply for Domestic Use	Yes	✓		24 hrs.
	Power supply for Agricultural Use	Yes	✓		6 hrs.
	Power supply for Commercial Use	Yes	✓		8 hrs.
	Road/ Street Lights	Yes	✓		
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	✓		
	Renewable Energy Source Facilities (Y/ N)	NO		✓	
	LED Facilities	Yes	✓		Private sector

Suggestions if any:

G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	NO		✓	–
	Location Condition	–			–
	Community Toilet (With bath/ without bath facilities)	NO		✓	–
	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	Yes	✓		–
	STREAM/RIVER	NO		✓	–
	CANAL	NO		✓	–
	WELL	NO		✓	–
	TUBE WELL.	NO		✓	–
	OTHER (SPECIFY)				

Suggestions if any:

I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	60% - K 40% - P	✓		–

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Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	yes	✓		1
	Sub-Centre	No		✓	-
	PHC	NO		✓	-
	BLOCK PHC	No		✓	-
	CHC/RH	NO		✓	-
	District/ Govt. Hospital	No		✓	-
	Govt. Dispensary	NO		✓	-
	Private Clinic	NO		✓	-
	Private Hospital/	NO		✓	-
	Nursing Home	No		✓	-
	AYUSH Health Facility	NO		✓	-
	sonography /ultrasound facility	NO		✓	-
	If any of the above Facility is not available in village than approx. distance from village: ..3..7.kms. Eru				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group	yes	✓		1
	Primary School	yes	✓		1
	Secondary school	NO			-
	Higher sec. School	NO			-
	ITI college/ vocational Training Center	No			-
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	No			-

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If any of the above Facility is not available in village than approx. distance from village: 3.7 kms. Ext.

Suggestions if any:

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

If any of the above Facility is not available in village than approx. distance from village: 3.7 kms. Ext.

Suggestions if any:

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

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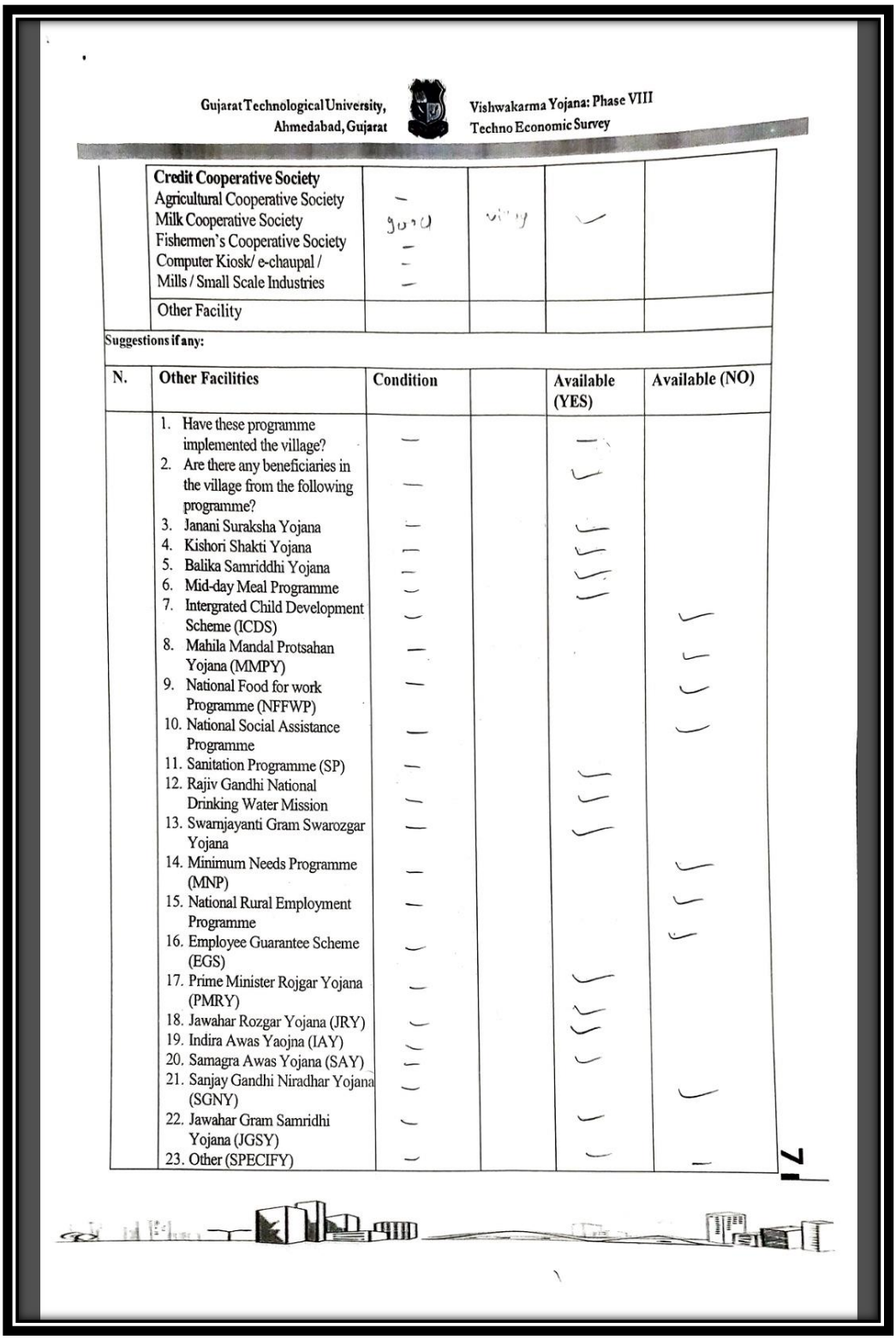


Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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

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 NO		~ ~	— —
3.	Any Other	—			—

VII. DATA COLLECTION FROM VILLAGE

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Village Base Map Available: Hard Copy/Soft Copy	YES	~		-
2.	Recent Projects going on for Development of Village	BLOCKS ROAD			NEW PROJECT
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			

8

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Repair & Maintenance of Existing Public Infrastructure facilities,	—	
	School Building	yes	—
	Health Center	NO	—
	Panchayat Building	NO	—
	Public Toilets & any other	NO	—
2.	Additional Information/ Requirement	NO	—
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?	yes	2 times due to Covid-19

IX. Smart Village / Heritage Details

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	IS THEIR ANY THING FOR THE VILLAGE ENHANCEMENT POSSIBLE ?	Rain water Harv., Public Toilet Comm-Hall	—

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

B. Ayar
ઉપસરપંચ
ગ્રામ પંચાયત ભુતસાડ
તા. જલાલપોર, જી. નવસારી

16

12.4 Gap Analysis of the Allocated Village

Table 30: Village Gap Analysis

VILLAGE GAP ANALYSIS				
Village Facilities	Planning Commission/UDPFI Norms	Village name	Bhutsad	
		Population: 622		
		Existing	Required As Per Norms	Gap
Social Infrastructure Facilities				
Education				
Anganwadi	Each Or per 2500 Population	1	1	0
Primary School	Each per 2500 population	1	1	0
Secondary School	per 7500 population	0	0	0
Higher Secondary School	per 15000 population	0	0	0
Collage	per 125000 population	0	0	0
Tech.Training Institute	per 100000 population	0	0	0
Agriculture Research Center	per 100000 population	0	0	0
Skill Development Center	per 100000 population	0	0	0
Health Facility				
Govt/Panchayat Dispensary orSub PHC or Health Center	Each Village	1	1	0
Primary Health & Child Health Center	per 20000 population	0	0	0
Child Welfare & Maternity Home	per 10000 population	0	0	0
Multispecialty Hospital	per 100000 population	0	0	0

Public Latrines	1 for 50 families	0	1	-1
	Physical Infrastructure Facilities			
Transportation		Adequate	Inadequate	
Pucca Village Approach Road	Each Village	1	1	0
Bus/Auto Approach Road	All Village Connected by PT (St bus or auto)	1	0	1
Drinking water (minimum 70ipcd)		Adequate	Inadequate	
Over Head Tank	1/3 of Total Demand	2	0	
U/G Sump	2/3 of Total Demand	3	0	
Drainage Network-open		Adequate	Inadequate	
Drainage Network-cover		Yes	No	
Waste Management System		Adequate	Inadequate	
Socio-Cultural Infrastructure Facilities				
Community Hall	Per 10000 Population	0	0	0
Community Hall and Public Library	Per 15000 Population	0	0	0
Cremation Ground	Per 20000 Population	0	0	0
Post Office	Per 10000 Population	0	0	0
Gram Panchayat Building	Each Individual/Group Panchayat	1	1	0
APMC	Per 100000 Population	0	0	0
Fire Station	Per 100000 Population	0	0	0
Public Garden	Per Village	1	0	1
Police Post	Per 40000 Population	0	0	0
Shopping Mall				
Electrical Design				
Electricity Network		Adequate	Inadequate	
Any Smart Village Facility				
Technology				
		ESR Cap	0	
		Sump Cap	0	
		Lat	0	

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

Table 31: Summary of Design

Sr. No.	Village Name	Discipline	Part - I	Part - II
1	Bhutsad	Civil	Public Toilet	ATM
			Community Hall	Supermarket
			Medical Store	Library
			Cybercafe	Chabutaro
			Post Office	Rain Water Harvesting
			Garden	Bank
		Electrical	Submersible Pump	Automatic Solar Street Light
			Solar based advanced water quality monitoring system using wireless sensor network	Power Factor Improvement in Agriculture load
			Solar Water Pump Simulation	Automatic Hand Sanitizer Dispatcher
2	Kalakachha	Civil	Community Hall	Opening gate of village
			Public Toilet	Super Market
			Post Office	Cyber Cafe
			Bank	Electric shop
			Public Garden	Library
		Electrical	Solar power plant	Street light
			Solar Rooftop system	Solar panel cleaning machine
			Wiring of gram panchayat building	Speed breaker generation

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

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

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

Summary Of Photographs Of Amalsad – Ideal Village :



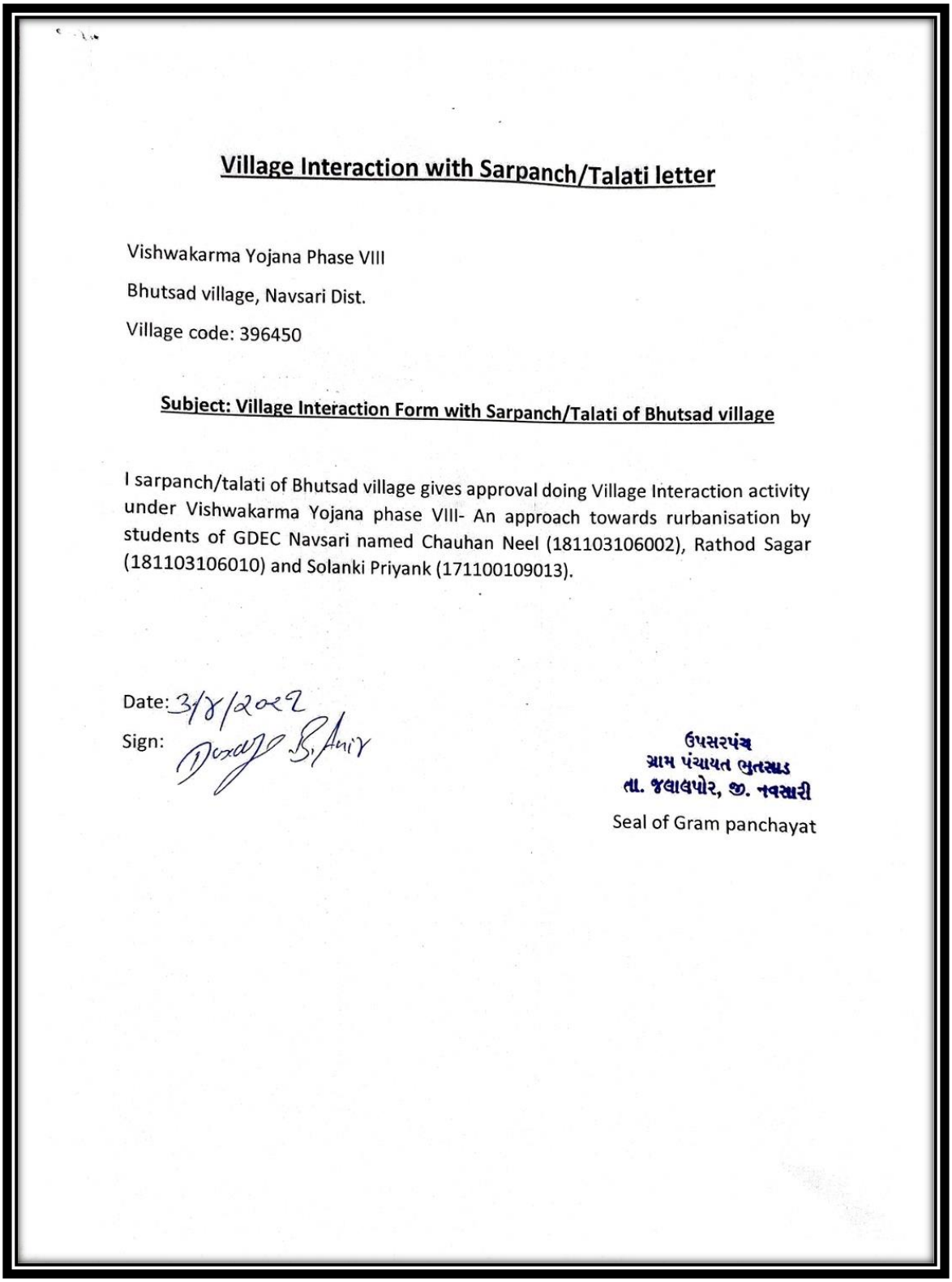
Summary Of Photographs Of Lilapore – Smart Village :



Summary Of Photographs Of Bhutsad – Allocated Village :



12.8 Village Interaction with sarpanch/talatiReport :



Village Interaction with Sarpanch/Talati letter

Vishwakarma Yojana Phase VIII

Bhutsad village, Navsari Dist.

Village code: 396450

Subject: Village Interaction Form with Sarpanch/Talati of Bhutsad village

I sarpanch/talati of Bhutsad village gives approval doing Village Interaction activity under Vishwakarma Yojana phase VIII- An approach towards rurbanisation by students of GDEC Navsari named Chauhan Neel (181103106002), Rathod Sagar (181103106010) and Solanki Priyank (171100109013).

Date: 3/8/2021

Sign:

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તા. જલાલપોર, જી. નવસારી

Seal of Gram panchayat

12.9 Sarpanch Letter giving information about the village development :

Approval Letter For Proposed Design Approval

Vishwakarma Yojana Phase VIII

Bhutsad village, Navsari Dist.

Village code: 396450

Subject: Approval of design proposal for Bhutsad village

I sarpanch/talati of Bhutsad village gives approval for following design proposal given under Vishwakarma Yojana phase VIII- An approach towards rurbanisation by students of GDEC Navsari named Chauhan Neel (181103106002), Rathod Sagar (181103106010) and Solanki Priyank (171100109013).

- Approved main design proposals as of part 1:
  1) Community hall
  2) Public Toilet
  3) Solar water pumping systtem

Date: 3/8/2022

Sign: D. B. Amin

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ગ્રામ પંચાયત ભુતસાડ
તા. જલાલપોર, જી. નવસારી

Seal of Gram panchayat

Approval Letter for Swachhta & Covid Awareness Activity Approval

Vishwakarma Yojana Phase VIII

Bhutsad village, Navsari Dist.

Village code: 396450

Subject: Approval of doing awareness activity for swachhta and covid for Bhutsad village

I sarpanch/talati of Bhutsad village gives approval of doing swachhta and covid awareness activity under Vishwakarma Yojana phase VIII- An approach towards rurbanisation by students of GDEC Navsari named Chauhan Neel (181103106002), Rathod Sagar (181103106010) and Solanki Priyank (171100109013).

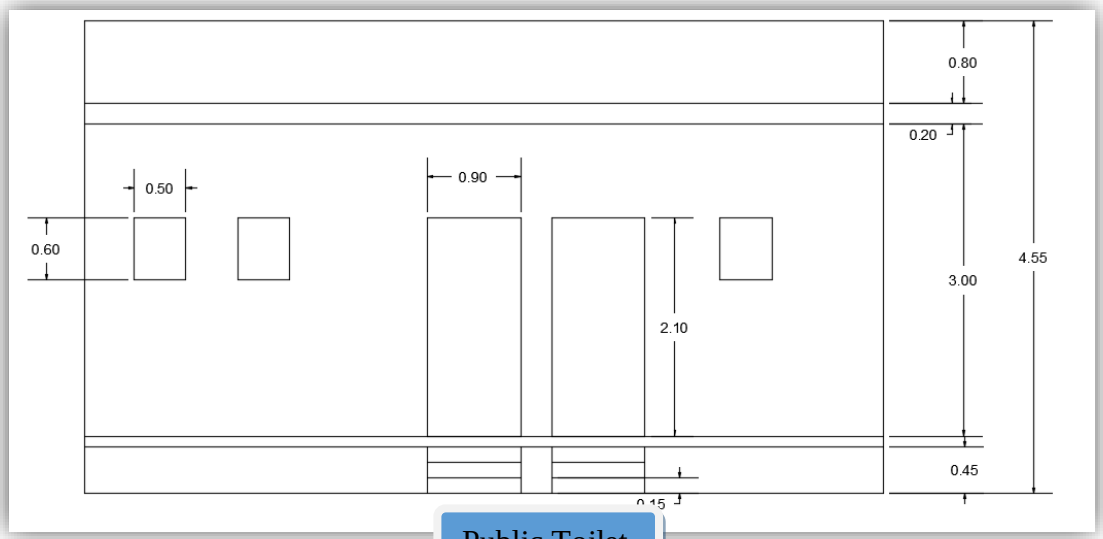
Date: 3/8/2022

Sign:

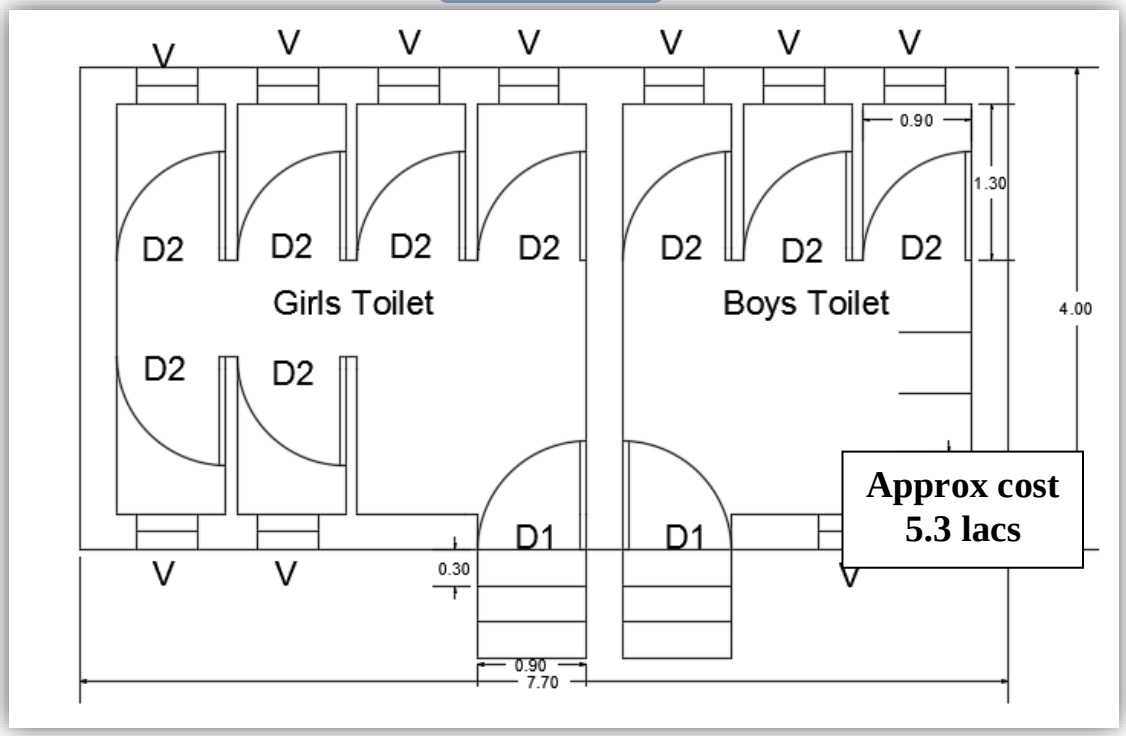
ઉપસરપંચ
ગ્રામ પંચાયત ભુતસાડ
તા. જલાલપોર, જી. નવસારી

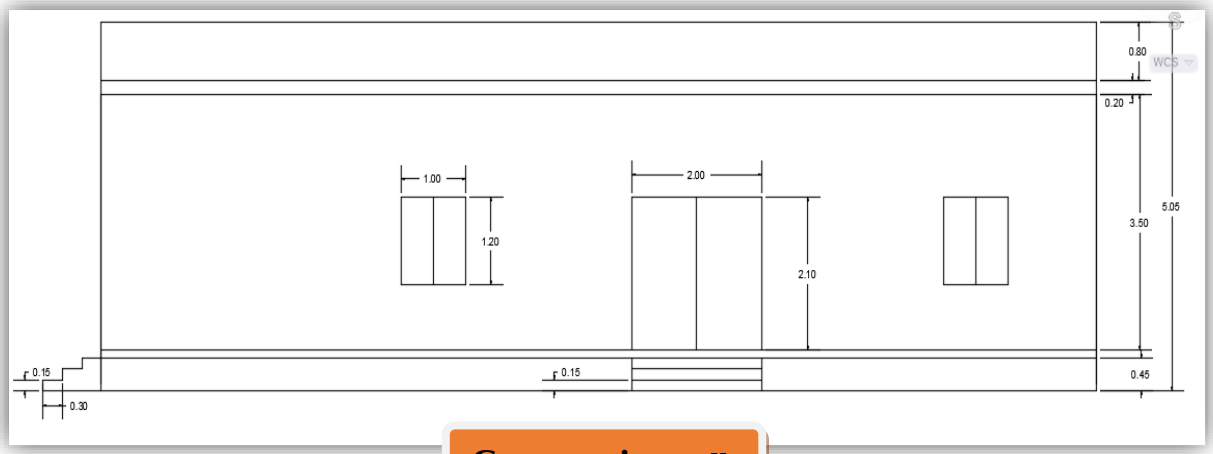
Seal of Gram panchayat

12.10 Comprehensive report as per format

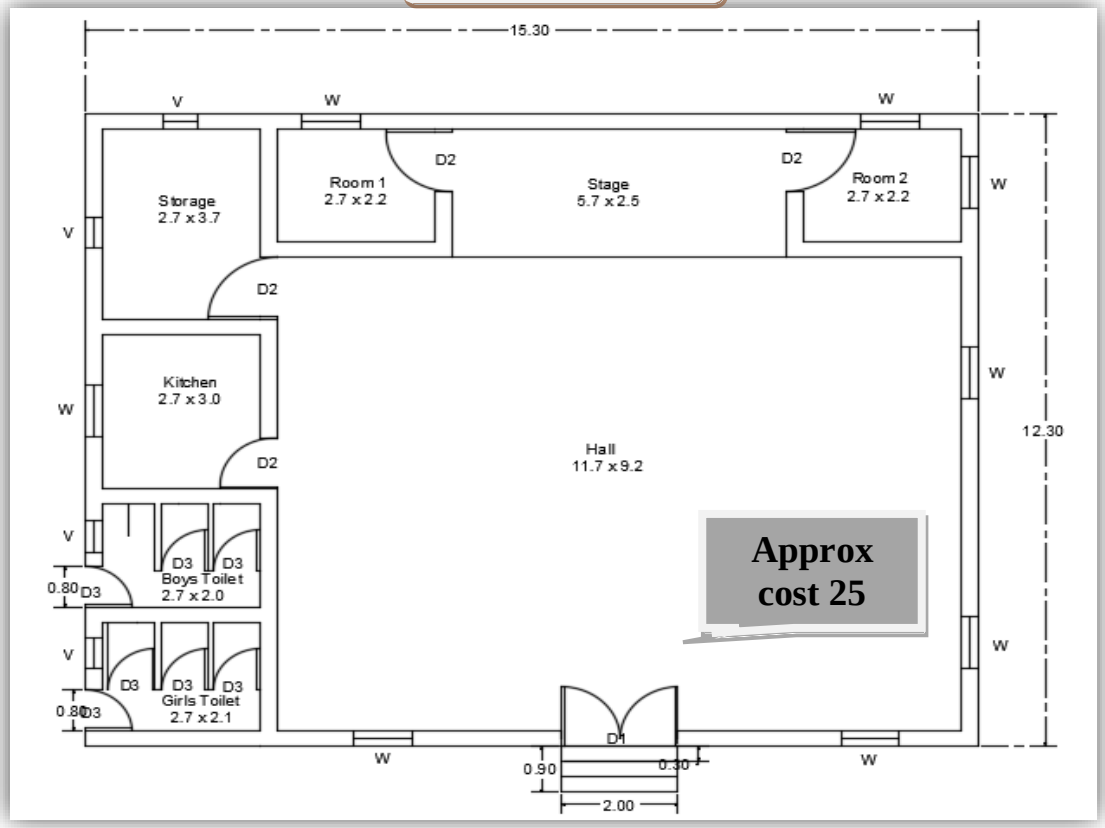


Public Toilet





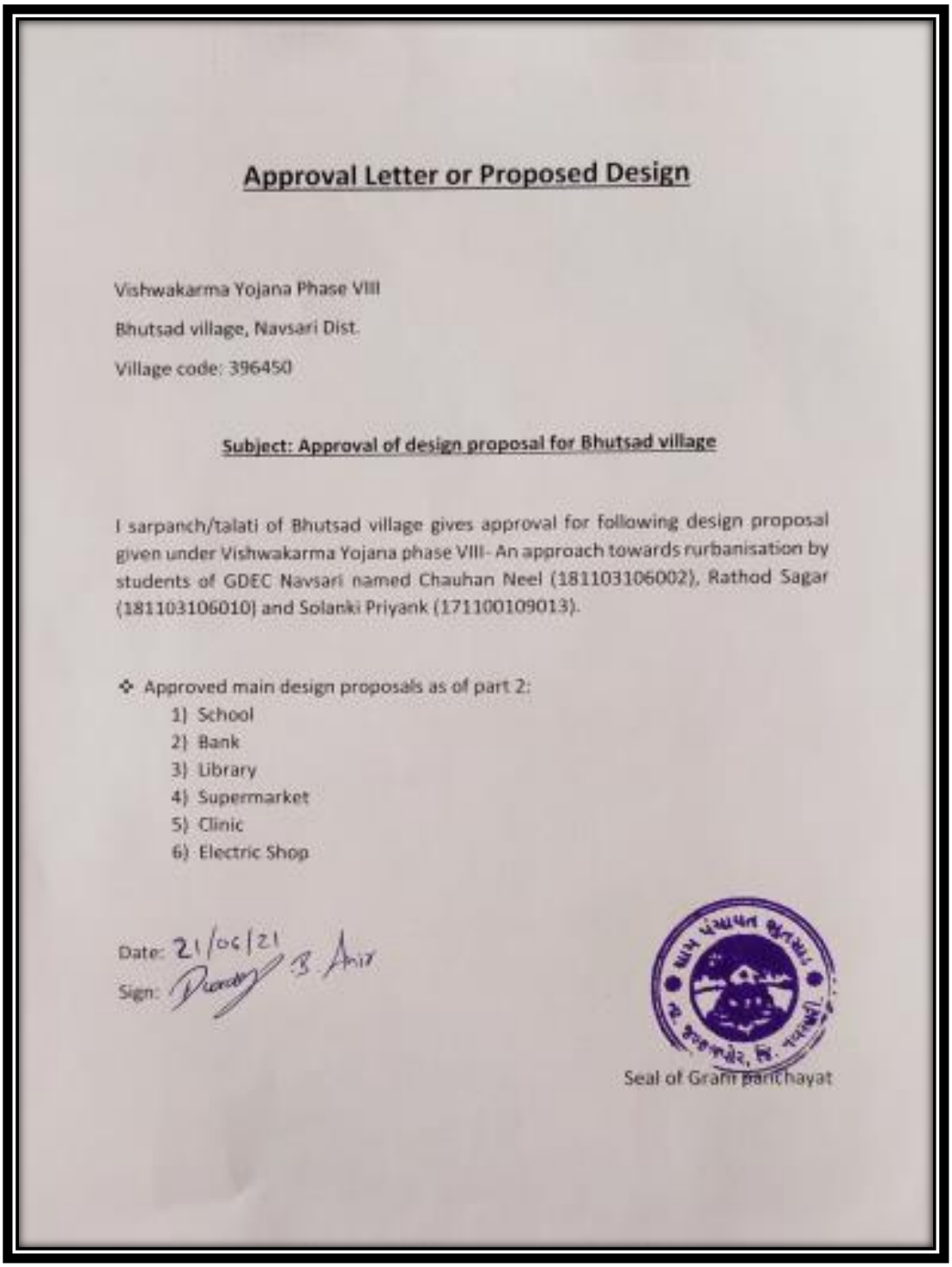
Community Hall



We have design many building are shown in another chapter

Chapter: 13 Designs

Part-2 Design Approval Letter :



Approval Letter or Proposed Design

Vishwakarma Yojana Phase VIII

Bhutsad village, Navsari Dist.

Village code: 396450

Subject: Approval of design proposal for Bhutsad village

I sarpanch/talati of Bhutsad village gives approval for following design proposal given under Vishwakarma Yojana phase VIII- An approach towards rurbanisation by students of GDEC Navsari named Chauhan Neel (181103106002), Rathod Sagar (181103106010) and Solanki Priyank (171100109013).

- Approved main design proposals as of part 2:
  1) School
  2) Bank
  3) Library
  4) Supermarket
  5) Clinic
  6) Electric Shop

Date: 21/06/21

Sign:

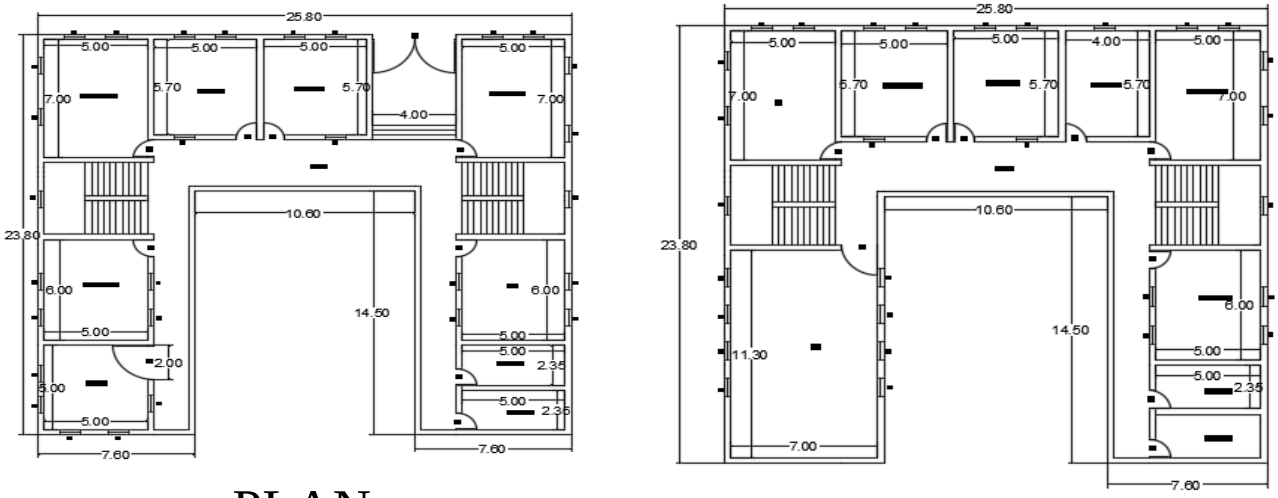
Seal of Gram panchayat

13.1 Design Proposal

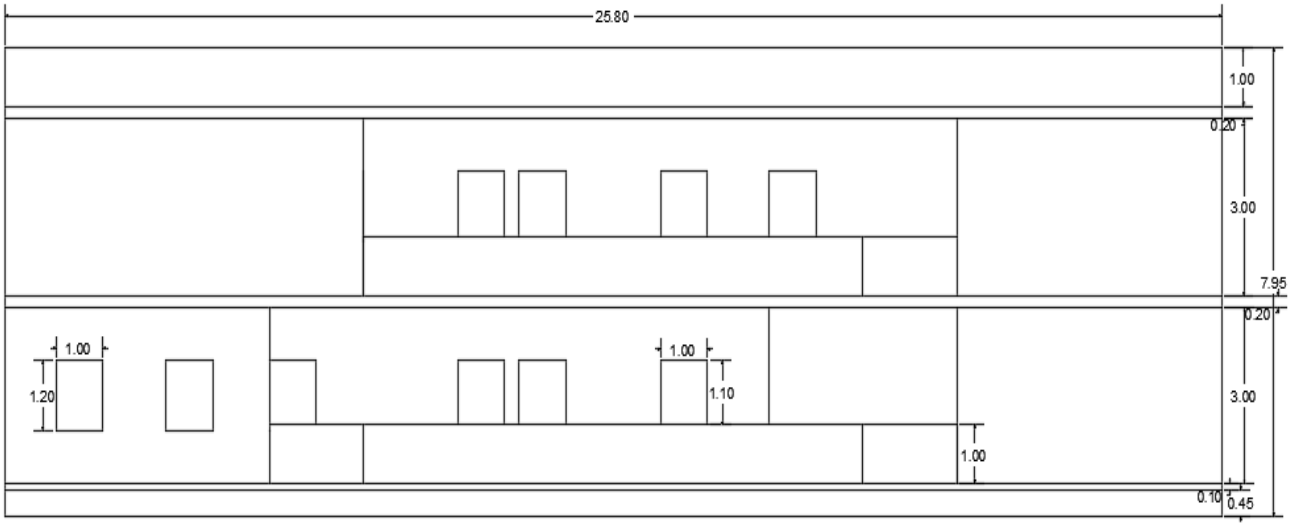
13.1.1 Civil Design-1

Ground Floor

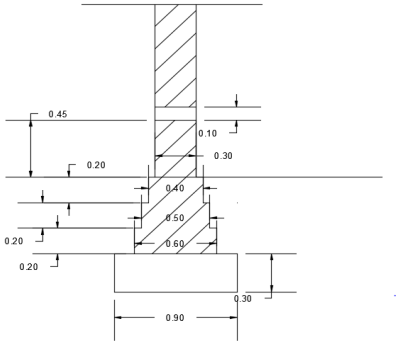
First Floor



PLAN



ELEVATION



SECTION

Figure 80: School

Table 32: Measurement Sheet of School

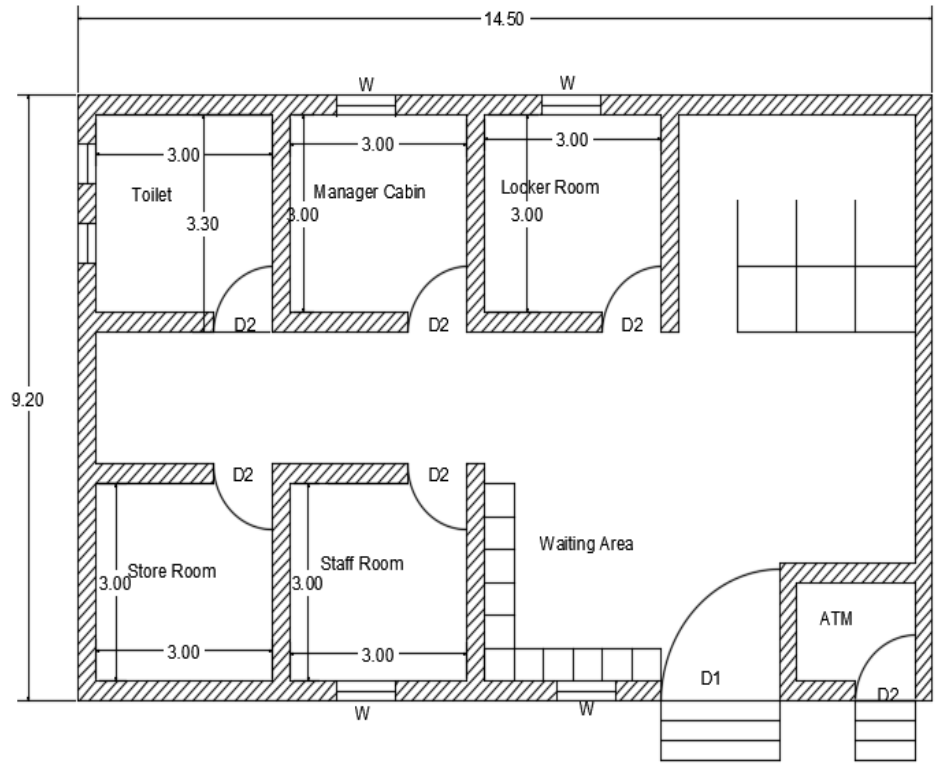
Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	204.8	0.9	0.9	165.89	**165.89 m3**
2	**P.C.C. in Foundation**	1	204.8	0.9	0.3	55.3	**55.3 m3**
3	**Brick work in foundation**	-	-	-	-	62.6	**62.6 m3**
4	**Brick work upto plinth**	1	210.8	0.3	0.45	28.46	**28.46 m3**
5	**Earth filling in plinth**					176.68	**176.68 m3**
6	**PCC In Plinth**	1	210.8	0.3	0.1	6.324	**6.324 m3**
7	**Brick work in Stair**					1.08	**1.08 m3**
8	**Brick work in superstructure**						
	Ground Floor						
		1	210.8	0.3	3	189.72	
	Deduction					-19.26	
	Deduction for Lintel					-1.64	
						168.82	
	First Floor						
		1	211.2	0.3	3	190.08	
	Deduction					-16.55	
	Deduction for Lintel					-1.503	
						172.03	
							340.85 m3
9	**R.C.C. Lintel**						
	Ground Floor					1.641	
	First Floor					1.503	

							3.144 m3
10	**R.C.C. Slab**						
	Ground Floor					82.316	
	First Floor					82.316	
							164.632 m3
11	**Parapet Wall**	1	127	0.3	1	38.1	**38.1 m3**
12	**Plaster work inside**						
	Ground Floor						
						1158.7	
	Deduction					-46.8	
	First Floor						
						1169.2	
	Deduction					-40.8	
							2240.3 m2
13	**Plaster Work Outside**					872.6	
	Deduction					-32.4	
							840.2 m2
14	**Flooring**						
	Ground Floor					361.3	
	First Floor					360.4	
							721.4 m2

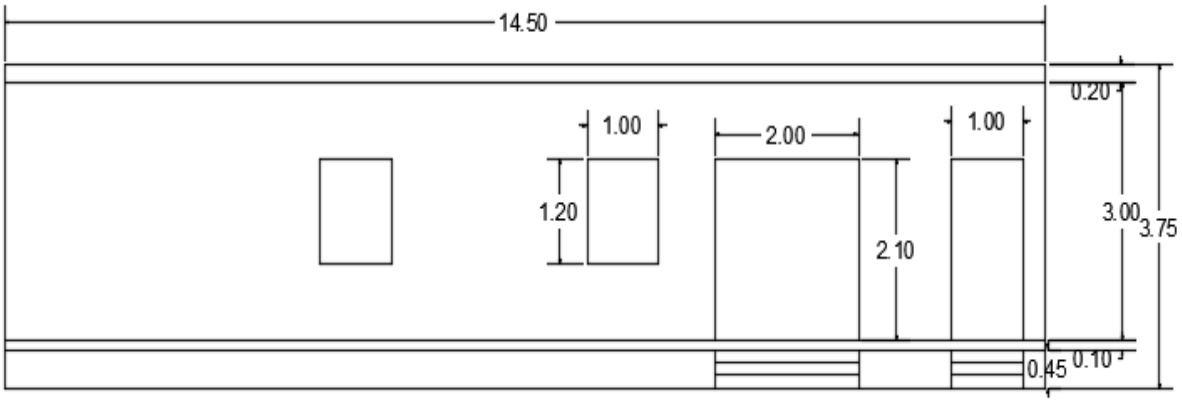
Table 33: Astract Sheet of School

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	165.89	m3	162	**27361**
2	**P.C.C. in Foundation**	55	m3	4000	**220000**
3	**Brick work in foumndation**	62.6	m3	7100	**444460**
4	**Brick work upto plinth**	28.46	m3	7100	**202066**
5	**Earth filling in plinth**	176.68	m3	80	**14135**
6	**PCC In Plinth**	6.324	m3	4000	**25296**
7	**Brick work in Stair**	1.08	m3	7100	**7668**
8	**Brick work in superstructure**	340.85	m3	7100	**2420035**
9	**R.C.C. Lintel**	3.144	m3	9000	**28296**
10	**R.C.C. Slab**	164.632	m3	9000	**1481688**
11	**Parapet Wall**	38.1	m3	7100	**27051**
12	**Plaster work inside**	2240.3	m2	1100	**2454330**
13	**Plaster Work Outside**	840.2	m2	1100	**924220**
14	**Flooring**	721.4	m2	700	**504980**
				Total	**8791586**

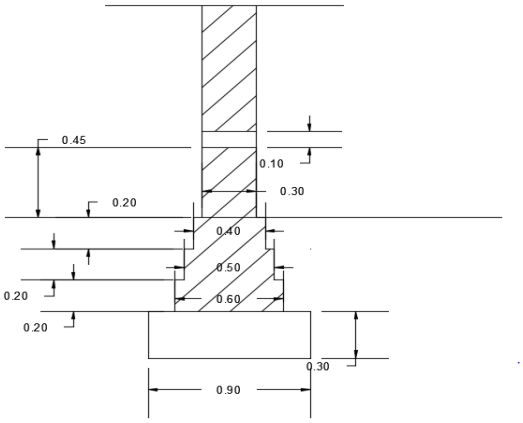
13.1.2 Civil Design - 2



PLAN



ELEVATION



SECTION

Figure 81: Bank

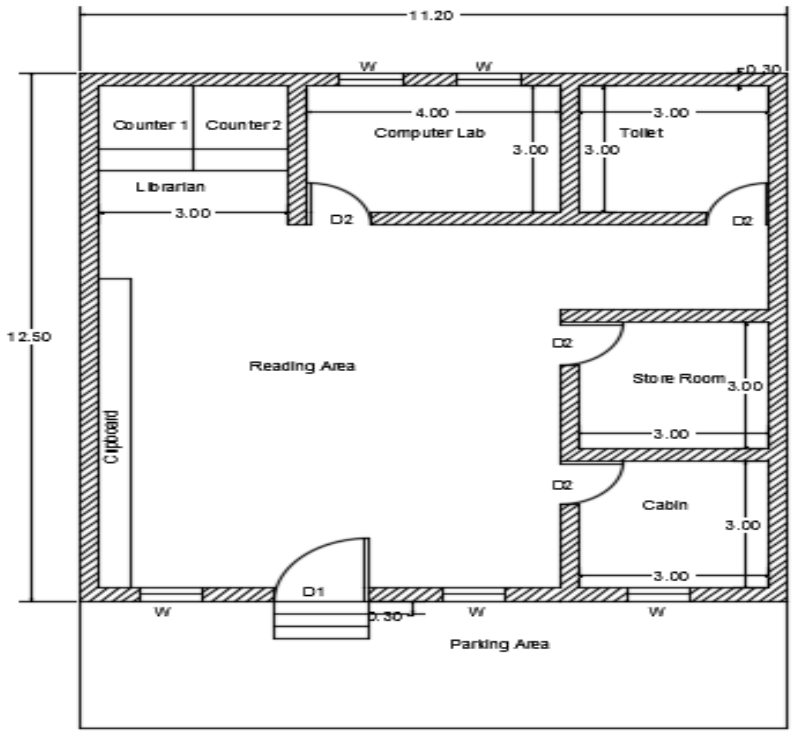
Table 34: Measurement Sheet of Bank

Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	77.9	0.9	0.9	63.1	**63.1 m3**
2	**P.C.C. in Foundation**	1	77.9	0.9	0.3	21.03	**21.03 m3**
3	**Brick work in foumndation**	-	-	-	-	24.06	**24.06 m3**
4	**Brick work upto plinth**	1	81.5	0.3	0.45	0.979	**11 m3**
5	**Earth filling in plinth**	-	-	-	-	53.79	**53.79 m3**
6	**PCC In Plinth**	1	81.5	0.3	0.1	2.45	**2.45 m3**
7	**Brick work in Stair**	-	-	-	-	0.81	**0.81 m3**
8	**Brick work in superstructure**	1	81.5	0.3	3	73.35	
	Deduction	-	-	-	-	-6.66	
	Deduction for Lintel	-	-	-	-	-0.513	
							66.18 m3
9	**R.C.C. Lintel**	-	-	-	-	0.513	**0.513 m3**
10	**R.C.C. Slab**	1	14.2	8.9	0.2	25.28	**25.28 m3**
11	**Plaster work inside**	-	-	-	-	433.4	
	Deduction	-	-	-	-	-16.41	
							416.99 m2
12	**Plaster Work Outside**	-	-	-	-	177.75	
	Deduction	-	-	-	-	-7.26	
							170.49 m2
13	**Flooring**	-	-	-	-	95.09	**95.09 m2**

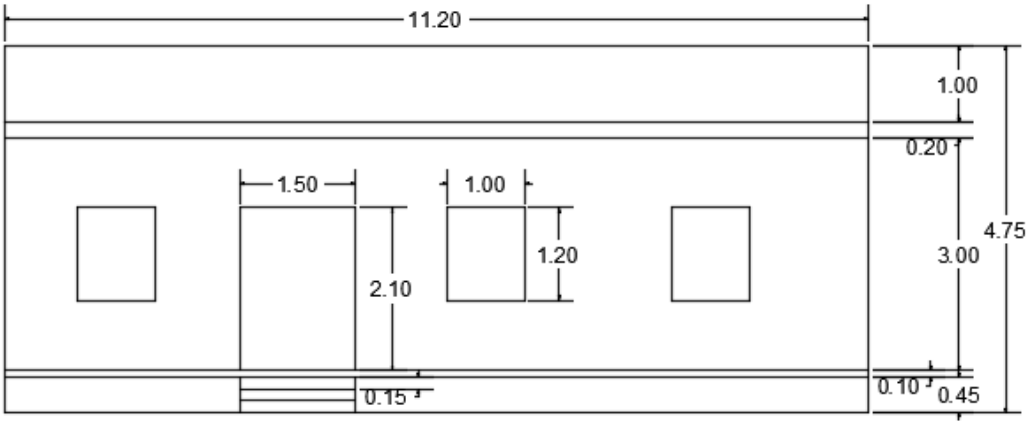
Table 35: Astract Sheet of Bank

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	63.1	m3	162	**10222**
2	**P.C.C. in Foundation**	21.03	m3	4000	**84120**
3	**Brick work in foumndation**	24.06	m3	7100	**170826**
4	**Brick work upto plinth**	11	m3	7100	**78100**
5	**Earth filling in plinth**	53.79	m3	80	**4303**
6	**PCC In Plinth**	2.45	m3	4000	**9800**
7	**Brick work in Stair**	0.81	m3	7100	**5751**
8	**Brick work in superstructure**	66.18	m3	7100	**469878**
9	**R.C.C. Lintel**	0.513	m3	9000	**4617**
10	**R.C.C. Slab**	25.28	m3	9000	**227520**
11	**Plaster work inside**	416.99	m2	1100	**458689**
12	**Plaster Work Outside**	170.49	m2	1100	**187539**
13	**Flooring**	95.09	m2	700	**66563**
				Total	**1777928**

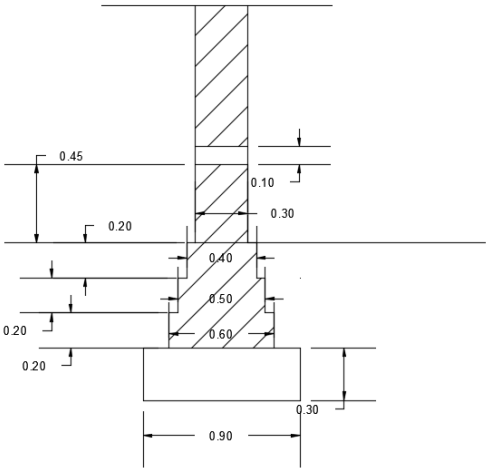
13.1.3 Civil Design - 3



PLAN



ELEVATION



SECTION

Figure 82:Library

Table 36: Measurement Sheet of Library

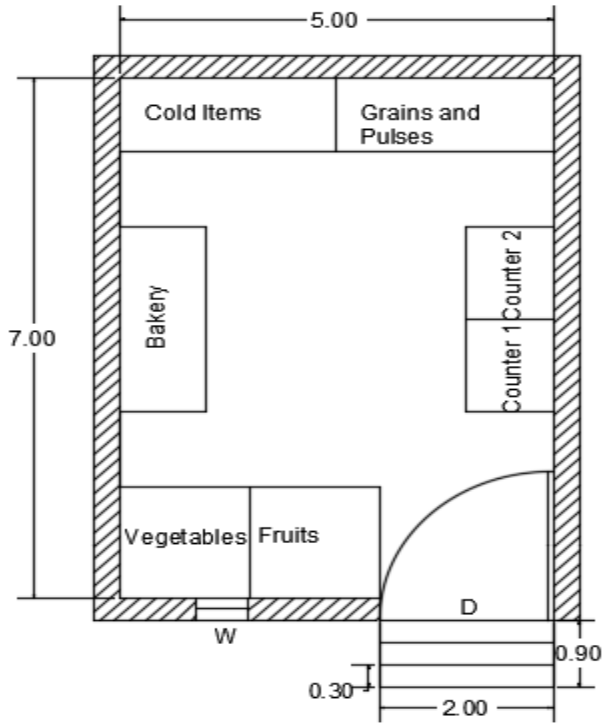
Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	70.2	0.9	0.9	56.86	**56.86 m3**
2	**P.C.C. in Foundation**	1	70.2	0.9	0.3	18.95	**18.95 m3**
3	**Brick work in foundation**	-	-	-	-	21.53	**21.53 m3**
4	**Brick work upto plinth**	1	72.6	0.3	0.45	2.18	**2.18 m3**

5	**Earth filling in plinth**	-	-	-	-	53.23	**53.23 m3**
6	**PCC In Plinth**	1	72.6	0.3	0.1	2.18	**2.18 m3**
7	**Brick work in Stair**	-	-	-	-	0.41	**0.41 m3**
8	**Brick work in superstructure**	1	72.6	0.3	3	65.34	
	Deduction	-	-	-	-	-5.27	
	Deduction for Lintel	-	-	-	-	-0.41	
							59.66 m3
9	**R.C.C. Lintel**	-	-	-	-	0.41	**0.41 m3**
10	**R.C.C. Slab**	1	11.2	12.5	0.2	28	**28 m3**
11	**Parapet Wall**	1	46.4	0.3	1	13.92	**13.92 m3**
12	**Plaster work inside**	-	-	-	-	412.28	
	Deduction	-	-	-	-	-13.73	
							398.55 m2
13	**Plaster Work Outside**	-	-	-	-	225.15	
	Deduction	-	-	-	-	-6	
							219.15 m2
14	**Flooring**	-	-	-	-	118.28	**118.28 m2**

Table 37: Astract Sheet of Library

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	56.86	m3	162	**9212**
2	**P.C.C. in Foundation**	18.95	m3	4000	**75800**
3	**Brick work in foumndation**	21.53	m3	7100	**152863**
4	**Brick work upto plinth**	9.8	m3	7100	**69580**
5	**Earth filling in plinth**	53.23	m3	80	**4259**
6	**PCC In Plinth**	2.18	m3	4000	**8720**
7	**Brick work in Stair**	0.41	m3	7100	**2911**
8	**Brick work in superstructure**	59.66	m3	7100	**423586**
9	**R.C.C. Lintel**	0.41	m3	9000	**3690**
10	**R.C.C. Slab**	28	m3	9000	**252000**
11	**Parapet Wall**	13.92	m3	7100	**98832**
12	**Plaster work inside**	398.55	m2	1100	**438405**
13	**Plaster Work Outside**	219.15	m2	1100	**241065**
14	**Flooring**	118.28	m2	700	**82796**
				Total	**1863719**

13.1.4 Civil Design - 4



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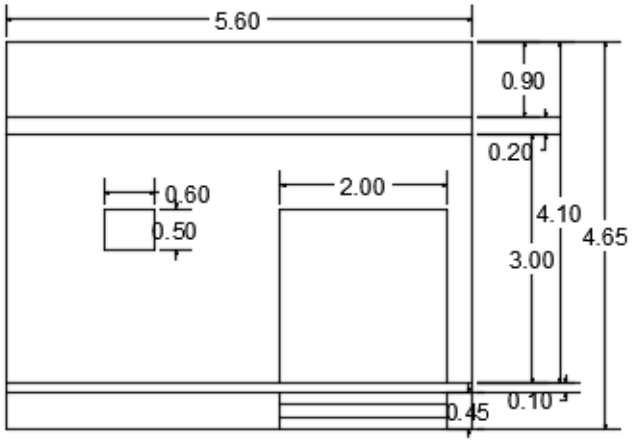

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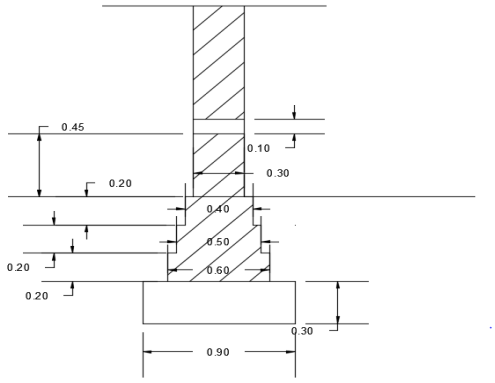


SECTION

Figure 83: Super Market

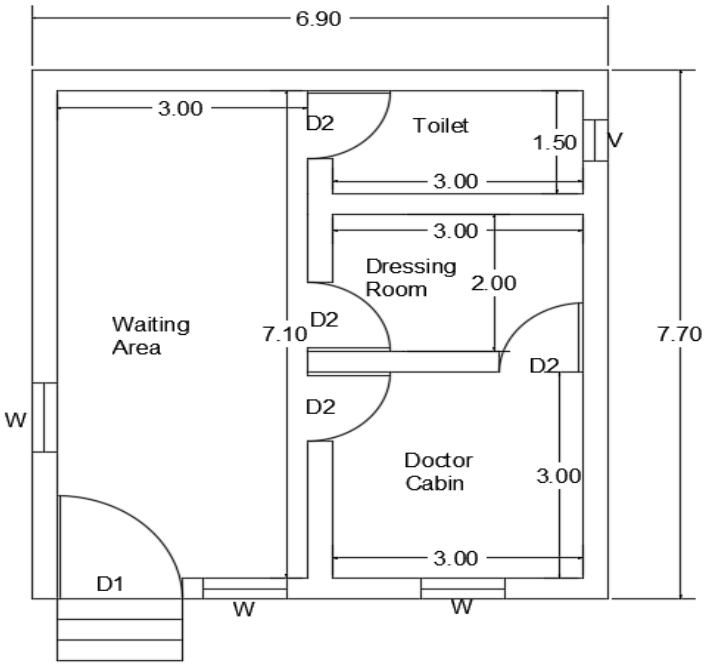
Table 38: Measurement Sheet of Super Market

Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	25.2	0.9	0.9	20.41	**20.41 m3**
2	**P.C.C. in Foundation**	1	25.2	0.9	0.3	6.8	**6.8 m3**
3	**Brick work in foundation**	-	-	-	-	7.55	**7.55 m3**
4	**Brick work upto plinth**	1	25.2	0.3	0.45	3.4	**3.4 m3**
5	**Earth filling in plinth**	1	5	7	0.45	15.75	**15.75 m3**
6	**PCC In Plinth**	1	25.2	0.3	0.1	7.56	**7.56 m3**
7	**Brick work in Stair**		-	-	-	0.54	**0.54 m3**
8	**Brick work in superstructure**	1	25.2	0.3	3	22.68	
	Deduction	-	-	-	-	-1.35	
	Deduction for Lintel	-	-	-	-	-0.096	
							21.234 m3
9	**R.C.C. Lintel**	-	-	-	-	0.096	**0.096 m3**
10	**R.C.C. Slab**	1	5.3	7.3	0.2	7.74	**7.74 m3**
11	**Parapet Wall**	1	25.2	0.3	0.9	6.81	**6.81 m3**
12	**Plaster work inside**	-	-	-	-	107	
	Deduction	-	-	-	-	-4.5	
							102.5 m2
13	**Plaster Work Outside**	-	-	-	-	122.76	
	Deduction	-	-	-	-	-2.7	
							120.06 m2
14	**Flooring**	1	5	7	-	35	**35 m2**

Table 39: Astract Sheet of Super Market

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	20.41	m3	162	**3307**
2	**P.C.C. in Foundation**	6.8	m3	4000	**27200**
3	**Brick work in foumndation**	7.55	m3	7100	**53605**
4	**Brick work upto plinth**	3.4	m3	7100	**24140**
5	**Earth filling in plinth**	15.75	m3	80	**1260**
6	**PCC In Plinth**	7.56	m3	4000	**30240**
7	**Brick work in Stair**	0.54	m3	7100	**3834**
8	**Brick work in superstructure**	21.234	m3	7100	**150762**
9	**R.C.C. Lintel**	0.096	m3	9000	**864**
10	**R.C.C. Slab**	7.74	m3	9000	**69660**
11	**Parapet Wall**	6.81	m3	7100	**48351**
12	**Plaster work inside**	102.5	m2	1100	**112750**
13	**Plaster Work Outside**	120.06	m2	1100	**132066**
14	**Flooring**	35	m2	700	**24500**
				Total	**682539**

13.1.5 Civil Design - 5



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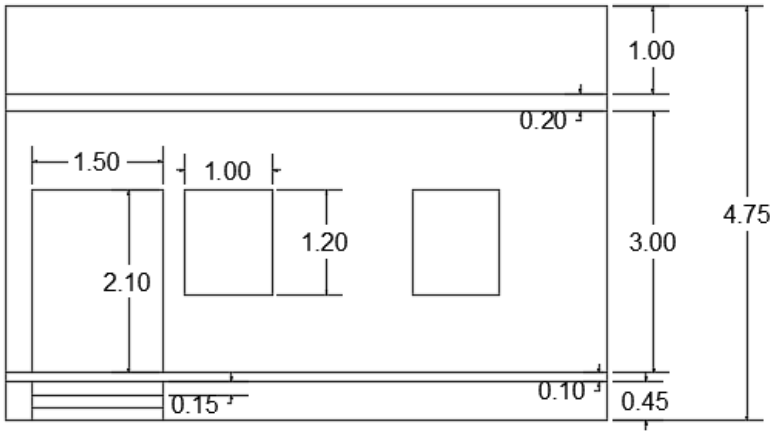

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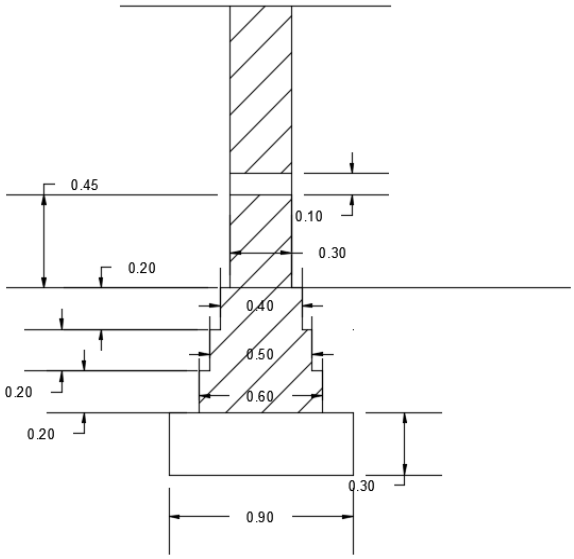


SECTION

Figure 84: Clinic

Table 40: Measurement Sheet of Clinic

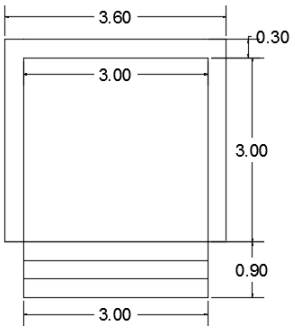
Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	39.3	0.9	0.9	31.83	**31.83 m3**
2	**P.C.C. in Foundation**	1	39.3	0.9	0.3	10.61	**10.61 m3**
3	**Brick work in foundation**	-	-	-	-	12.134	**12.134 m3**
4	**Brick work upto plinth**	1	41.1	0.3	0.45	5.55	**5.55 m3**

5	**Earth filling in plinth**	-	-	-	-	18.225	**18.225 m3**
6	**PCC In Plinth**	1	41.1	0.3	0.1	1.23	**1.23 m3**
7	**Brick work in Stair**	-	-	-	-	0.41	**0.41 m3**
8	**Brick work in superstructure**	1	41.1	0.3	3	36.99	
	Deduction	-	-	-	-	-4.635	
	Deduction for Lintel	-	-	-	-	-0.354	
							32 m3
9	**R.C.C. Lintel**	-	-	-	-	0.354	**0.354 m3**
10	**R.C.C. Slab**	1	6.9	7.7	0.2	10.63	**10.63 m3**
11	**Parapet Wall**	1	28	0.3	1	8.4	**8.4 m3**
12	**Plaster work inside**	-	-	-	-	194.4	
	Deduction	-	-	-	-	-11.93	
							182.47 m2
13	**Plaster Work Outside**	-	-	-	-	138.7	
	Deduction	-	-	-	-	-4.5	
							134.2 m2
14	**Flooring**	-	-	-	-	40.8	**40.8 m2**

Table 41: Astract Sheet of Clinic

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	31.83	m3	162	**5157**
2	**P.C.C. in Foundation**	10.61	m3	4000	**42440**
3	**Brick work in foumndation**	12.134	m3	7100	**86152**
4	**Brick work upto plinth**	5.55	m3	7100	**39405**
5	**Earth filling in plinth**	18.225	m3	80	**1458**
6	**PCC In Plinth**	1.23	m3	4000	**4920**
7	**Brick work in Stair**	0.41	m3	7100	**2911**
8	**Brick work in superstructure**	32	m3	7100	**227200**
9	**R.C.C. Lintel**	0.354	m3	9000	**3186**
10	**R.C.C. Slab**	10.63	m3	9000	**95670**
11	**Parapet Wall**	8.4	m3	7100	**59640**
12	**Plaster work inside**	182.47	m2	1100	**200717**
13	**Plaster Work Outside**	134.2	m2	1100	**147620**
14	**Flooring**	40.8	m2	700	**28560**
				Total	**945036**

13.1.6 Civil Design - 6



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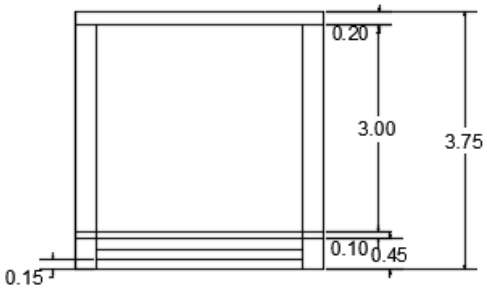

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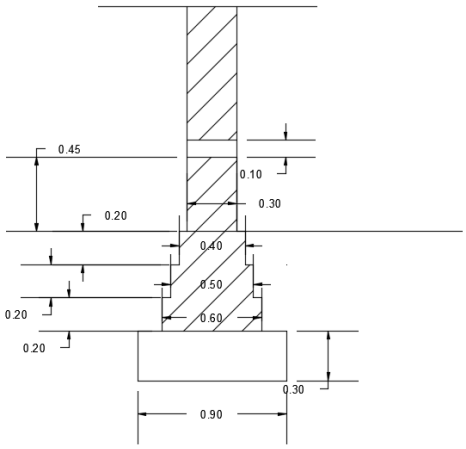


SECTION

Figure 85: Electric Shop

Table 42: Measurement Sheet of Electric Shop

Sr. No.	Description of work	No	Length	Width	Height	Quantity	Net Quantity
1	**Excavation for foundation**	1	12.75	0.9	0.9	10.33	**10.33 m3**
2	**P.C.C. in Foundation**	1	12.75	0.9	0.3	3.44	**3.44 m3**
3	**Brick work in foundation**	-	-	-	-	3.88	**3.88 m3**
4	**Brick work upto plinth**	1	13.05	0.3	0.45	1.762	**1.762 m3**
5	**Earth filling in plinth**	1	3	3	0.45	4.05	**4.05 m3**
6	**PCC In Plinth**	1	13.05	0.3	0.1	0.3915	**0.4 m3**
7	**Brick work in Stair**	-	-	-	-	0.97	**0.97 m3**
8	**Brick work in superstructure**	1	9.45	0.3	3	8.505	**8.51 m3**
9	**R.C.C. Slab**	1	3.6	3.45	0.2	2.484	**2.484 m3**
10	**Plaster work inside**	4	3	3	-	36	**36 m2**
11	**Plaster Work Outside**	-	-	-	-	38.25	**38.25 m2**
12	**Flooring**	1	3	3	-	9	**9 m2**

Table 43: Astract Sheet of Electric Shop

Item No.	Item Description	Quantity	Per	Rate	Amount
1	**Excavation for foundation**	10.33	m3	162	**1673.46**
2	**P.C.C. in Foundation**	3.44	m3	4000	**13760**
3	**Brick work in foumndation**	3.88	m3	7100	**27548**
4	**Brick work upto plinth**	1.76	m3	7100	**12496**
5	**Earth filling in plinth**	4.05	m3	80	**324**
6	**PCC In Plinth**	0.4	m3	4000	**1600**
7	**Brick work in Stair**	0.97	m3	7100	**6887**
8	**Brick work in superstructure**	8.51	m3	7100	**60421**
9	**R.C.C. Slab**	2.484	m3	9000	**22356**
10	**Plaster work inside**	36	m2	1100	**39600**
11	**Plaster Work Outside**	38.25	m2	1100	**42075**
12	**Flooring**	9	m2	700	**6300**
				Total	**235041**

13.1.7 Electrical Design:-1

Design & simulation of Solar-powered Automatic Street lighting system

Solar Street lights are raised light source which is powered by photovoltaic panels mounted on the lighting structure. The photovoltaic panels charge a rechargeable battery, which powers LDR during the night. The idea of designing a new system for the streetlight that do not consume a huge amount of electricity and illuminate large areas with the highest intensity of light is concerning each engineer working in this field.

Providing street lighting is one of the most important and expensive responsibilities of a rural electrification, village, and campus. Automatic streetlight needs no manual operation of switching ON and OFF. The system itself detects whether there is a need for light or not. When darkness rises to a certain level then automatically streetlight is switched ON and when there is another source of light, the streetlight switches OFF.

This is done by a sensor called light-dependent resistor (LDR) which senses the light like our eyes. This vital use of light gives rise to the idea of using solar energy to power streetlights as an alternative to electricity. These solar powered streetlights can then be used for the provision of illumination on roads at night to enhance security and prevent accidents that may otherwise occur due to poor visibility.

Problem statement

In Bhutsad village there is no enough street lightning system required reliability and standard form of installation. The main aim of this project is to reduce the cost & loss of energy as well as manpower to manually turn off streetlight.

The current scenario:-

The above Figure shows the condition of streetlight in Bhutsad village. The streetlight has no individual pole on lanes. The light is embedded in the electrical pole itself which is not safe. Another disadvantage is the manual operation of turning ON and OFF the streetlights. If someone forgets to turn OFF the streetlights then it will result in wastage of electricity, which is not the ideal case.

Figure 86: Bhutsad Village street light

The proposed solution:-

This project is aiming to develop an independent and individual automatic streetlight which will operate automatically by sensing the light conditions around it. The streetlights will automatically turn ON after sensing low light in the environment after evening time.

condition

Project Objectives

The general objective of this project is to supply electric power for street lighting systems using solar energy and making the system ON/OFF automatically and Providing fully automatic street light regulation that certainly affects humanity. It will have a cost-effective public lighting system; it will help to minimize crime, and it will have less impact on the environment.

Literature review

Comparison of different techniques

The Table below outlines the comparison of the various methods that were applied previously. For this analysis different papers written by different authors were analyzed and compared for tabular form considering the methods used, the merits, and the demerits.

Paper	Technique	Merits	Demerits
Solar Lighting System	Solar Panel, Passive Solar Technology	1. Operation and cost is minimum 2.Less maintenance 3. Nonpolluting source	1.Initial investment is higher 2.Cost of equipment is high 3. Climatic condition may be affected.
GSM Based Street Light System	GSM modem, circuitry system, client server mechanism	1.Low cost 2 Easy deployment 3.Highly scalable	1.No appropriate Communication Protocol 2.Not defined in Semantic point of view.
Street Light System Control with Single Chip Microcomputer	Photo resistor & Fixed resistor. Photo sensitive Technique.	1.Compact in structure 2.Low cost	Maintains must be done regularly.

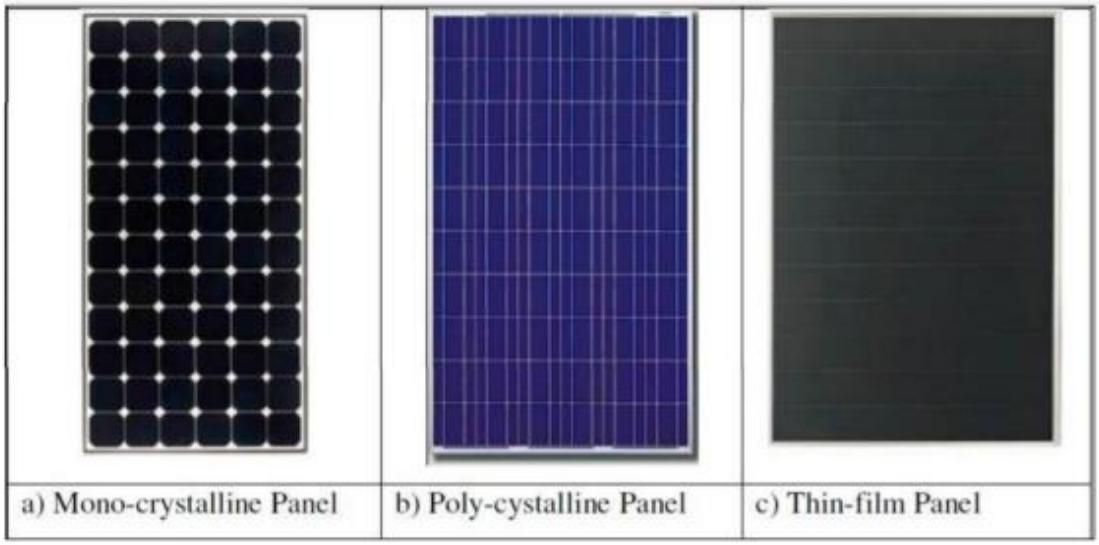
Advantages of photovoltaic system

- Operate with renewable energy resources and is environmentally friendly.
- If the system is utilized properly, it can operate for at least 20 years.
- Less initial investment cost as compared to hydroelectric power and grid extension.
- The technology is simple for installation, maintenance, and operation since there are no rotating parts such as motors in a photovoltaic.
- The main fuel for solar-powered systems is the sun, which is available all around the world as a free resource.
- The environment effect is no harmful byproducts.

Specification of basic components of solar-powered Automatic Street lighting system

Solar Panel

A Solar Panel is basically a module that converts light energy (photons) from the sun to generate electricity in direct current (DC) form. There are two types of solar panels, mainly crystalline and thin-film types. There are two types of crystalline solar panels: - a) Mono-crystalline Solar Panel. b) Poly-crystalline Solar Panel



a) Mono-crystalline Panel | b) Poly-cystalline Panel | c) Thin-film Panel

Battery

A battery is a power source consisting of one or more electrochemical cells with external connections. for powering electrical devices such as flashlights, mobile phones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of a single cell.

Batteries are used once and discarded, as the electrode materials are irreversibly changed during discharge; a common example is the alkaline battery used for flashlights and a multitude of portable electronic devices. Secondary (rechargeable) batteries can be discharged and recharged multiple times using an applied electric current; the original composition of the electrodes can be restored by reverse current. Examples include the lead-acid batteries used in vehicles and lithium-ion batteries used for portable electronics such as laptops and mobile phones.

Batteries come in many shapes and sizes, from miniature cells used to power hearing aids and wristwatches to small, thin cells used in smartphones, to large lead acid batteries or lithium-ion batteries in vehicles, and at the largest extreme, huge battery banks the size of rooms that provide standby or emergency power for telephone exchanges and computer data centers.

Batteries have much lower specific energy (energy per unit mass) than common fuels such as gasoline. In automobiles, this is somewhat offset by the higher efficiency of electric motors in converting electrical energy to mechanical work, compared to combustion engines.

Few types of rechargeable batteries, which are: -

Lead-Acid (LA) Battery

These batteries are the most commonly used in solar powered systems due to its maturity in technology and low pricing. They can only be used with low Depth of Discharge (DOD) in order to extend its lifespan.

Nickel-Cadmium (Ni-Cad) Battery

Nickel-Cadmium (Ni-Cad) batteries are expensive and disposing of Cadmium is hazardous. Even though they have several advantages over Lead- Acid batteries, such as longer life span, and tolerance for higher discharge.

Lithium-Ion (LI) or Lithium-Polymer (LP) Battery

Lithium based batteries are considered the future of batteries used in solar powered systems. This is due to several factors such as high specific energy, high DOD, and higher number of charging cycles.

LED lamp

An LED lamp or LED light bulb is an electric light that produces light using light-emitting diodes (LEDs). LED lamps are significantly more energy-efficient than equivalent incandescent lamps and can be significantly more efficient than most fluorescent lamps,[1][2][3] The most efficient commercially available LED lamps have efficiencies of 200 lumens per watt (Lm/W). Commercial LED lamps have a lifespan many times longer than incandescent lamps.

LED lamps require an electronic LED driver circuit to operate from mains power lines, and losses from this circuit means that the efficiency of the lamp is lower than the efficiency of the LED chips it uses. The driver circuit may require special features to be compatible with lamp dimmers intended for use on incandescent lamps. Generally the current waveform contains some amount of distortion, depending on the luminaires' technology.

LEDs come to full brightness immediately with no warm-up delay. Frequent switching on and off does not reduce life expectancy as with fluorescent lighting. Light output decreases gradually over the lifetime of the LED (see Efficiency droop section).

Figure 87: LED light Panels

Some LED lamps are drop-in replacements for incandescent or fluorescent lamps. LED lamps may use multiple LED packages for improved light dispersal, heat dissipation, and overall cost. The text on retail LED lamp packaging may show the light output in lumens, the power consumption in watts,

the color temperature in Kelvin or a color description such

as "warm white", "cool white" or "daylight", the operating temperature range, and sometimes the equivalent wattage of an incandescent lamp delivering the same output in lumens.

LDR Sensor

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically. When the light level is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors. Consequently, the LED does not light photoresist or (also known as a light-dependent resistor, LDR, or photo-conductive cell) is a passive component that decreases resistance with respect to receiving luminosity (light) on the component's sensitive surface. The resistance of a photoresistor decreases with increase in incident light intensity; in other words, it exhibits photoconductivity. A photoresistor can be applied in light-sensitive detector circuits and light-activated and dark-activated switching circuits acting as a resistance semiconductor.

In the dark, a photoresistor can have a resistance as high as several mega ohms (MΩ), while in the light, a photoresistor can have a resistance as low as a few hundred ohms. If incident light on a photoresistor exceeds a certain frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electrons (and their hole partners) conduct electricity, thereby lowering resistance. The resistance range and sensitivity of a photoresistor can substantially differ among dissimilar devices. Moreover, unique photo resistors may react substantially differently to photons within certain wavelength bands.

Basic principle

The automatic streetlight control system operates on 12 V DC supply. The automatic streetlight controller has a photoconductive device whose resistance changes proportional to the extent of illumination, which switches ON or OFF the LED with the use of transistor as a switch. Light dependent resistor, a photoconductive device has been used as the transducer to convert light energy into electrical energy.

The central dogma of the circuit is that the change in voltage drop across the light dependent resistor on illumination or darkness switches the transistor between cut-off region or saturation region and switches OFF or ON the LEDAs we know property of LDR that during the time of day resistance is low therefore voltage at the inverting input (IE(pin 2) is higher than the voltage at the non-inverting input (pin3) hence the output at the pin6 is low so the transistor goes into the cut off state which means LED or bulb will not glow.

Electrical Design:-1 (Circuit Design)

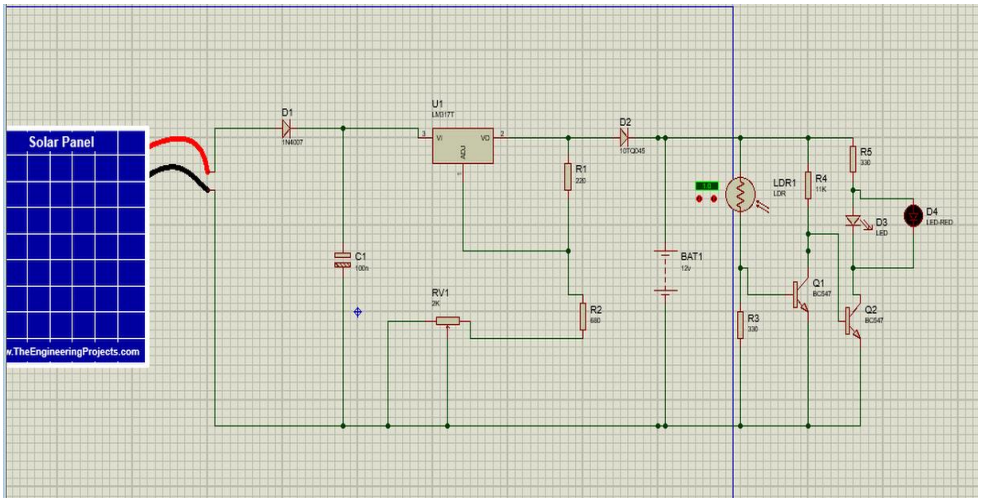


Figure 88: Circuit Design

Table 44: List of components

SR NO	PARTS	RANGE	QUANTITY
1	LDR		1
2	TRANSISTOR	BC-547 NPN	2
3	RESISTOR	IK, 330ohm	3
4	LED		1
5	PCB		1
6	POWER SUPPLY	6V OR 9V	1

Specification of components

LDR (Light dependent resistor)

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically. When the light level is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors. Consequently, the LED does not light.

Transistors

BC547 is an NPN bi-polar junction transistor. A transistor, stands for transfer or resistance commonly used to amplify current. A small current at its base controls a larger current at collector & emitter terminals. BC547 is mainly used for amplification and switching purposes. It has a maximum current gain of 800. Its equivalent transits. The transistor terminals require a fixed DC voltage to operate in the desired region of its characteristic curves.

This is known as the biasing. For amplification applications, the transistor is biased such that it is partly on for all input conditions. The input signal at base is amplified and taken at the emitter. BC547 is used in common emitter configuration for amplifiers. The voltage divider is the commonly used biasing mode. For switching applications, transistor is biased Page. 5 so that it

remains fully on if there is a signal at its base. In the absence of base signal, it gets completely off.

Resistors

Resistor is an electrical component that reduces the electric current. The resistor's ability to reduce the current is called resistance and is measured in units of ohms (symbol: Ω).If we make an analogy to water flow through pipes, the resistor is a thin pipe that reduces the water flow.

LED (Light emitting diode)

A light-emitting diode (LED) is a two-lead semiconductor light source that resembles a basic injunction diode, except that an LED also emits light. When an LED's anode lead has a voltage that is more positive than its cathode lead by at least the LED's forward voltage drop, current flows. Electrons are able to recombine with holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.

PCB (Printed circuit board)

A printed circuit board (PCB) mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from copper sheets laminated onto a nonconductive substrate. PCBs can be single sided (one copper layer), double sided (two copper layers) or multi-layer. Conductors on different layers are connected with plated-through holes called bias. Advanced PCBs may contain components - capacitors, resistors or active devices - embedded in the substrate.

Power supply

A power supply is a device that supplies electric power to an electrical load. The term is most commonly applied to electric power converters that convert one form of electrical energy to another, though it may also refer to devices that convert another form of energy (mechanical, chemical, solar) to electrical energy. A regulated power supply is one that controls the output voltage or current to a specific value; the controlled value is held nearly.

Calculation of selection component

1. Power of Solar cell components=Total power of LED lamps * Electricity time * Loss coefficient (1.6 ~ 2.0)

2. Battery capacity=Total power of LED lamps * Electricity time * Rainy Days * System safety factor (14 ~ 1.8) / system voltage.

• The theoretical algorithm is as follows.

1. Battery capacity = Total current * duration / residual coefficient (0.7)

2. Solar panel power = Total power consumption / system utilization factor (0.6) / effective sunshine time

Calculation

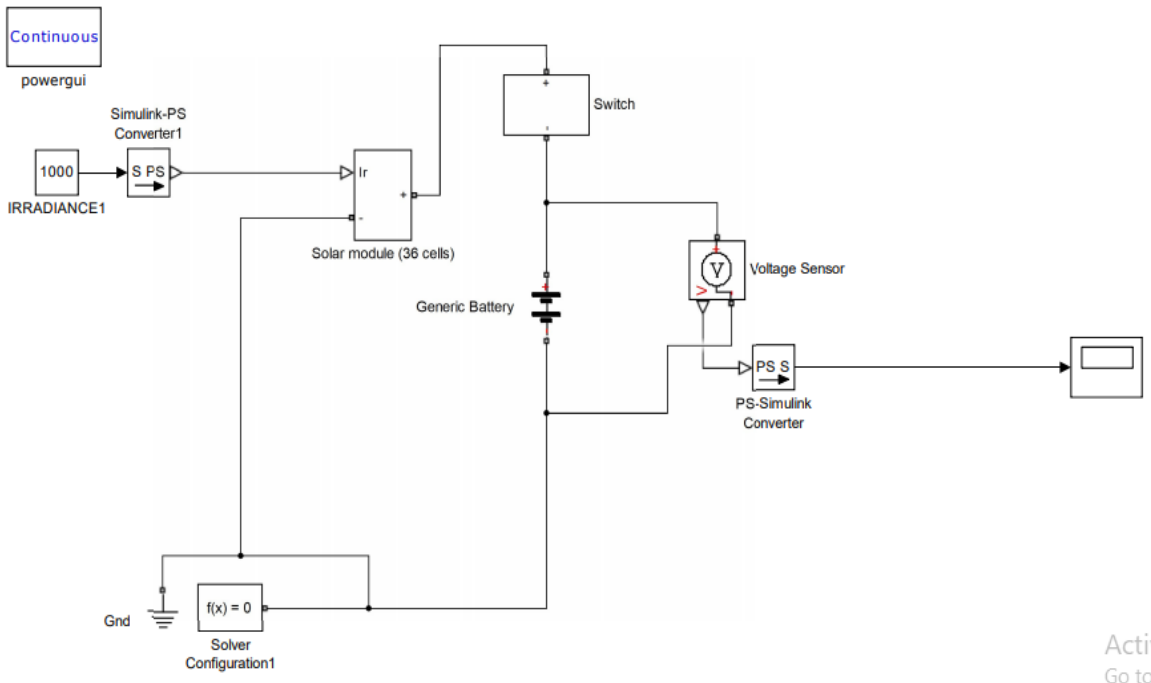
1. Panel

1 cell = 0.46 V * 36 = 16.56 V

2. Take 12V / 90 w. Street lamp as an example. The Number of hours used per day is 10 hours.
   P=IV
   I= P/V
   I = KW/V
   I = 90/12
   = 7. 5 A

3. Calculate the battery capacity Battery capacity
   C = 7.5 A / 10 H
   = 75AH

Electrical Design 1.1



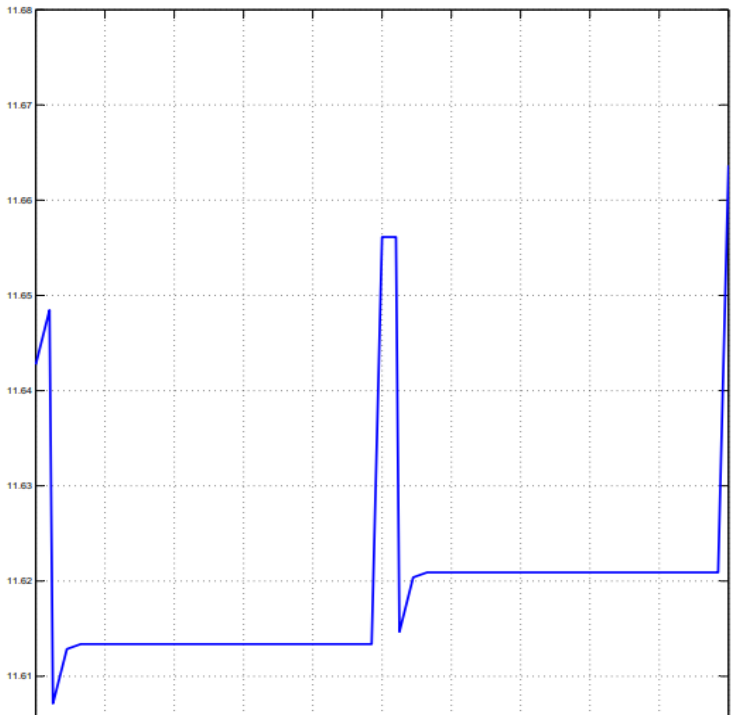


Figure 89: Simmulation of solar- powered Automatic Street lighting

Working

Circuit of a compact and true solid-state automatic lawn light is described here. The circuit can be used to switch on incandescent garden light bulbs at desk and switch off them at dawn. A 10 mm encapsulated light dependent resistor (LDR) here works as the twilight detector. The whole circuit can be housed in a very small plastic cabinet. For powering the circuit AC household supply is needed. With a little skill and patience, you can easily modify this circuit to drive a number of white LED strings, instead of the incandescent bulb load at the output. When ambient light is normal, transistor T1 is reverse biased by the low resistance of LDR. Multitier plastic trimpotP1 sets the detection sensitivity. If ambient light dims, transistor T1 turns on to drive the triac T2. Now the lamp load at the output of T2 energies. When the ambient light level restores, circuit returns to its idle state and light(s) switched off by the circuit. Working voltage for the circuit is derived directly from the AC supply input through components R1, R2 and R3. This obviates the requirement of a bulky.

If you wish to operate the, light bulb(s) on a little reduced power, just replace the triac T2 with a suitable silicon-controlled rectifier (SCR). This may give a long life to the incandescent load. Finally, the LDR should not be mounted to receive direct sunlight. It may be mounted at the top of the enclosure, pointing to the sky say southwards. LDR offers Very high Resistance in darkness. In this case the voltage drop across the LDR is more than 0.7V.

This voltage is more sufficient to drive the transistor into saturation region. In saturation region, IC (Collector current) is very high. Because of this IC. The relay gets energized, and switches on the lamp. LDR offers Very low Resistance in brightness. In this case the voltage drop across the LDR is less than 0.7V. This voltage is not sufficient to drive the transistor into saturation region.

Hence, the transistor will be in cut-off region. In cut-off region, IC (Collector current) is zero. Because of this IC, The relay will not be energized, and the lamp will be in ON state only. Diode is connected across the relay to neutralize the reverse EMF generated.

Positioning of LED streetlight.

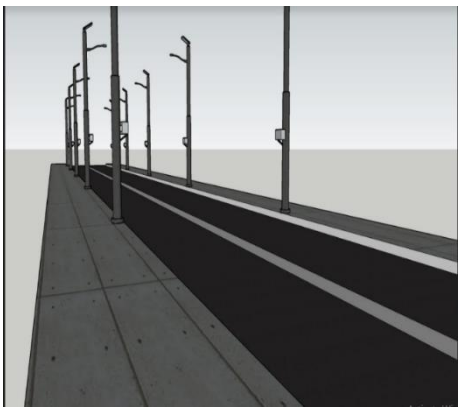


Figure 90: Right & Side view

Figure 92: Design of pole

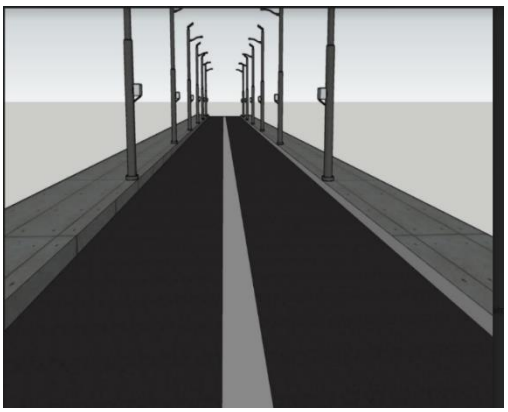


Figure 91: Front view

Table 45: Pole Dimension

Sr No	Part Name	Dimension
1	Pole	7000mm*317.5mm*150mm
2	Solar Panel	435mm*673mm*34mm*
3	LED Light	380mm*140mm*50mm
4	Battery Box	520mm*230mm*280mm

- The distance between the poles installed on the road is 10 meters.
- Material used in making the LED streetlight pole: Iron, Steel, Mild Steel, gi, MS with hot dip galvanizing, MS with powder coating, MS with painting, MS with pu.

Procedure

- Insert first transistor Q1-BC547 (NPN) on PCB board shown in the circuit diagram
- Connect another transistor Q2-BC547 (NPN) on PCB board shown in the circuit diagram.
- Connect wires across emitter pin of both transistor and negative terminal of battery on the PCB board.
- Connect a wire across collector pin of transistor Q1 and base pin of transistor Q2.

- Connect a resistor 1k across positive terminal of battery on the PCB board and collector pin transistor Q1.
- Connect LDR (Light Dependent Resistor) across positive terminal of the battery and base terminal of transistor Q1
- Insert a transistor 330 ohm across base pin of transistor Q1 and negative terminal of battery.
- Connect a resistor 330 ohm across positive terminal of battery and anode terminal of LED connect the cathode terminal of LED to collector pin of transistor Q2.

Advantages and Disadvantages

By using this automatic system for street light controlling, we can reduce energy consumption because the manually operated street lights are not switch off properly even the sun light comes and Also not switched on earlier before sunset.

- Low cost
- Automated operation
- Low power consumption
- Very flexible

Application

- Used in street light applications.
- Used in Domestic applications.

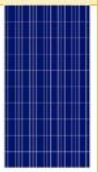
Future scope

We can save the energy for the future use and we can control the losses of the power. We can implement this project for the home lamp or night lamp of the room. This is also used for the signals.

Product comparison of solar powered streetlight

LED Lights

Parameter	Syska LED Street light 60 watt	Polycab LED streetlight 60 WATT	D Mak LED Street light
Size	380mm*140mm *50mm	435mm* 205mm* 54mm	423mm* 187mm* 45mm
Operating voltage	12V	12V	12V
Prize	2,915	2,500	3500
LED			

Parameter	Ameresco Solar panel	Photonix Solar panel	Solartech Solar panel
Watt	90 WATT	90 WATT	90WATT
Operating voltage	12V	12V	12V
Open circuit voltage	22.1V	21V	22.2V
Current at max power (Imax)	5.03A	5.29A	5.0
Short circuit current	5,21A	5.7A	5.58A
Module efficiency	13.1% / 13.9%	11.6%	13.9%
Prize	3,700	3,222	3,033
Solar panel			

Component	Name	Rating	Cost in 1n Rs	Total Num of components	Total cost in rupees
Solar panel	Solartech	90 WATT	3033	1	3033
LED light	Polycab LED street light	60 WATT / 12 V	2500	1	2500
Battery	Exide battery	12 V	5500	1	5500
LDR Sensor	-	3.3 to 5 V	99	1	99
Pole	Phoenix	-	6700	1	6700
Battery box	KS plastic trading company	-	150	1	150
Cable	Reliable wires	2 core	40	6 meter	240
					Total cost : 18,270

13.1.8Electrical Design: - 2 (Automatic hand sanitizer dispenser)

Introduction

In early 2020, a virus emerged that was spreading rapidly to several countries. The first case related to the virus was reported in Wuhan, Hubei Province. WHO named this disease the 2019 novel coronavirus (2019-nCoV), then changed its name to Coronavirus Disease (COVID19) which was caused by the virus of Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-Cov-2). This virus is zoonotic (a virus that is transmitted between animals and humans) and originates from bats. Besides, this virus can also be transmitted from humans to humans. Coronavirus can be transmitted either by air, direct contact, or indirectly.

However, it is most commonly spread by droplets. Symptoms caused by this virus include the mild flu, namely a cold, sore throat, cough, fever, and difficulty breathing. In severe cases, Covid-19 can manifest as pneumonia. Patients can develop acute respiratory distress syndrome.

The existence of this disease has a big impact on both socials and economics. WHO has declared this a pandemic disease and many cities around the world are in a lockdown situation. To prevent the cause of this virus, it can be done by keeping a distance at least 1 meter, avoid going to crowded places, avoid touching the eyes, mouth, and nose when outside and cleaning hands with soap or alcohol-based hand rub. Providing containers for cleaning fluids in public spaces is a form of Covid-19 prevention, but the provision of containers is currently ineffective because there are parts that are often touched. This could be a point of transmission for Covid-19.

Many health actions are carried out using automatic systems including air quality monitoring, hand sanitizers, hand hygiene. Hand sanitizers are an alternative for washing hands during a pandemic. It can be used when and water is not available. Hand sanitizer is also available in several forms such as liquid (spray) or gel. Hand sanitizer is usually made from materials such as alcohol, polyacrylic acid, glycerin, propylene glycol, or plant extracts. The process of killing germs starts with removing the oil on the skin, and then the bacteria in the body will come to the surface. Soap or alcohol will kill bacteria after rubbing to your hand. Hand sanitizer is effective against Covid-19.

So far, most of the available hand sanitizers do not operate automatically. This article aims to make an automatic hand sanitizer where soap and water can come out automatically. Besides that, automated hand sanitizer will make notification to the owner, if the liquid has run out to the smartphone. The infrared (IR) will sense the presence of heat and motion of the object and send data to the Adriano Uno so that it can activate the pump.

So far, most of the available hand sanitizers do not operate automatically. This article aims to make an automatic hand sanitizer where soap and water can come out automatically. Besides that, automated hand sanitizer will make notification to the owner, if the liquid has run out to the smartphone. The infrared (IR) will sense the presence of heat and motion of the object and send data to the Adriano Uno so that it can activate the pump.

Method

Several steps were carried out in this research to test the Automatic hand sanitizer container has shown in Figure.1. Due to the spread of Covid disease, first we analyses the importance of environment needed for automatic hand sanitizer. The second step we make the literature study about the related article. We design the hardware, examine the product and report the result.

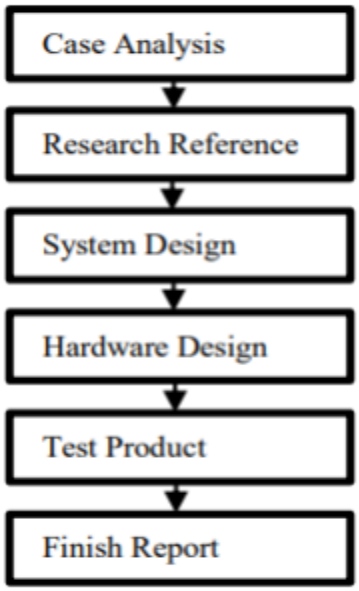


Figure 93: Block diagram

The working of Automatic sanitizer dispenser is as follows:

We have made use of Adriano UNO as the controller. Our project makes use of Ultrasonic sensor to measure an appropriate distance between the hand and the sensor. If the distance between the hand and the sensor is 30 cm then the motor will be activated and sanitizer will be dispensed out of the machine for a considerable amount of time.

Then Adriano will send the value to activate the water pump. This automatic hand sanitizer container uses sensors to detect temperature, object motion, and water level in the tank. This system uses an ultrasonic sensor and an infrared sensor. The ultrasonic sensor will detect if the water level is 30 cm from the sensor. Data from the ultrasonic sensor will send to Adriano.

We are using the ultrasonic sensor (HC-SR04) to detect the presence of a hand. When it detects presence offhand below 10cm, it will trigger the first servo motor to move from 0 degrees to 180 degrees in order to pour the liquid on the and.

In this system, microcontroller is used to control all the attached devices across the external electronics equipment which are: ultrasonic sensor, motor, electromagnetic lock,. The electromagnetic lock taps directly from the 12V DC power source and then Microcontroller and servo motor are fed with regulated DC power supply, which is 5Vand 9V respectively.
Program

```
int trig = 9;
int echo = 7;
int motor = 6;
int a, distance;
Void setup()
{Serial.begin(9600);
pinMode(trig, OUTPUT);
pinMode(motor, OUTPUT);
pinMode(echo, INPUT);}
void loop()
digitalWrite(trig, LOW);
delayMicroseconds(5);
digitalWrite(trig, HIGH);
delayMicroseconds(10);
digitalWrite(trig, LOW);
 a = pulseIn(echo, HIGH);
 distance= a*0.034/2;
Serial.println(distance);
 if (distance <30)
 {digitalWrite(motor, HIGH);
delay(1000);
digitalWrite(motor, LOW);
delay(3000);}
else{
digitalWrite(motor,LOW);}
```

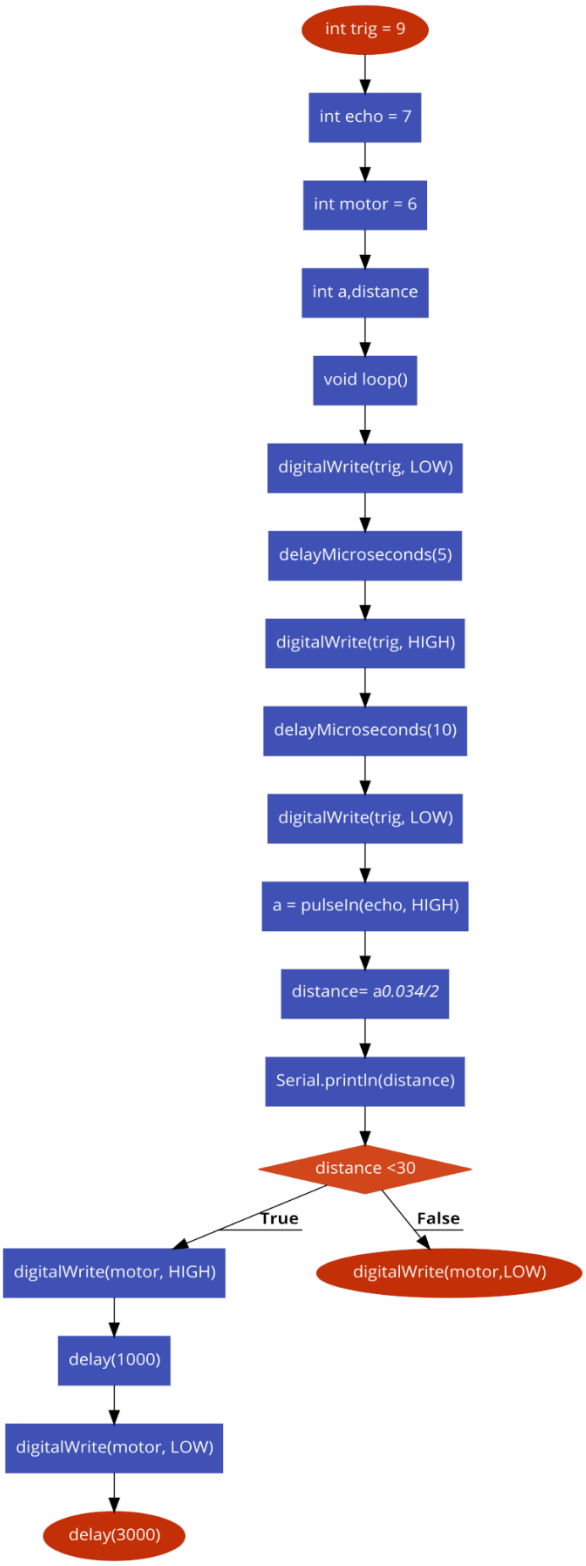


Figure 94: Flow chart

Electrical Design:-2

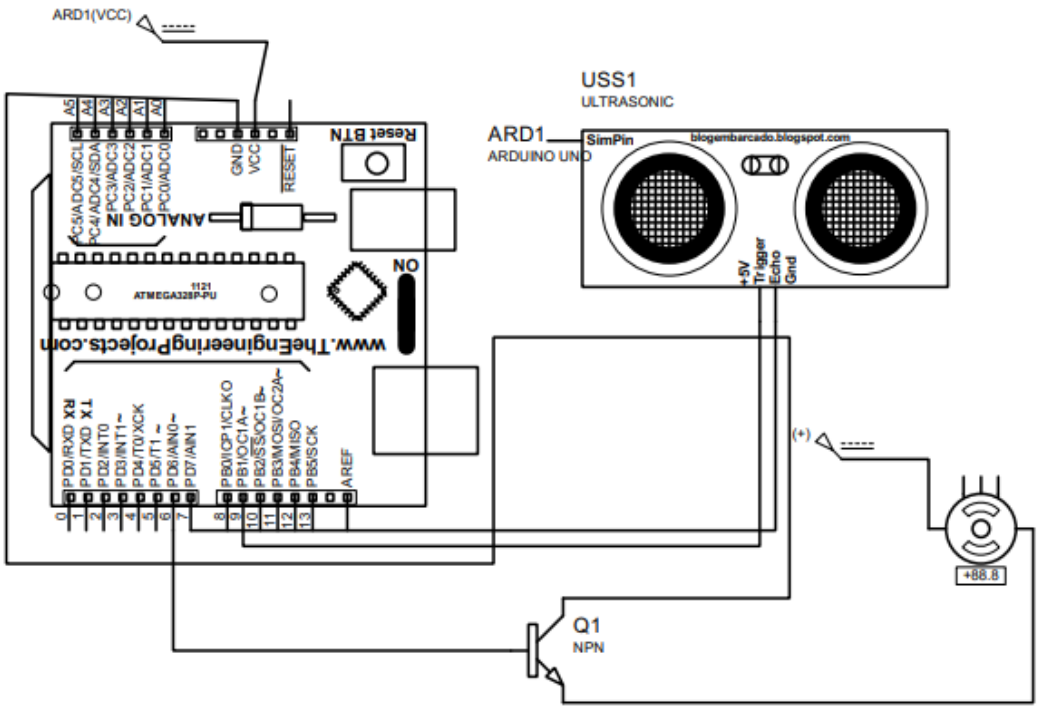


Figure 95: Circuit design of automatic hand sanitizer dispenser

Working

We have made use of Adriano UNO as the controller. Our project makes use of Ultrasonic sensor to measure an appropriate distance between the hand and the sensor. If the distance between the hand and the sensor is 30 cm then the motor will be activated and sanitizer will be dispensed out of the machine for a considerable amount of time. And as soon as the hand is removed the distance gets increased and the sanitizer flow gets stopped. This is the concept of our automatic touch less sanitizer dispenser.

The Hardware parts include:

- Ultrasonic sensor
- 12V DC Power Supply, 9V and 5V DC Regulator
- Transistor
- Motor
- Resistors, Capacitors and Diodes.
- Arduino

Table 46: Total cost of one (Automatic hand sanitizer dispenser)

Component	Rating	Cost in 1n Rs	Total No of component	Total cost in Rs
Arduino UNO R3	12V	499	1	499
Ultrasonic sensor	5V	75	1	75
DC motor	12V	149	1	149
DC plug Adapter	12V	299	1	299
Extra cost	-	-	-	500
				Total Cost:1522

Conclusion

Based on the testing result and discussion, it can be concluded that the results of the automatic hand sanitizer testing can run smoothly with a minimum detection error of transferring data. Infrared can detect the motion up to 50mm and ultrasonic sensor can detect the level of water with the distance to the sensor 35 cm. Ultrasonic sensor can send data to the MCU and Blink server and send notification to the user. So that it can be conclude that the system can work smoothly that can prevent the spread of Covid-19.

Electrical Design:-3 (3-phase power factor improvement in agriculture load)
3-phase power factor improvement

The power factor frequently is used in the electrical and power electronics industry. For example, home, office, and industrial electrical equipment often are fitted with power factor- corrected power supplies. Many current electronics dictionaries define power factor as the cosine of the phase angle between voltage and current or, but this definition will lead to errors and inaccuracies if applied to measurements on modern equipment,

What is power factor?

Power Factor is the ratio between the real power (kW) and apparent power (kVA) drawn by an electrical load. It is a measure of how effectively the current is being converted into useful work output and a good indicator of the effect of the load current on the efficiency of the supply system.

Poor power factor results in increase load current draw that causes additional losses in the supply and distribution systems. Power factor can also be measured as the cosine of the phase difference between the voltage and the current, however, where the current is distorted such as with electronic equipment loads; this may not be a true indication of the power factor.

Origin of poor power factor

- Electrical equipment need reactive power
- Inductive load draws reactive power
- Phase difference between current and voltage reduces displacement pf
- Reactive power to maintain magnetic fields in motors
- Nonlinear load reduces distortion pf
- True pf being product of displacement and distortion pf is lower than both Capacitor can only improve displacement PF.

Benefits of power factor controller

Electricity tariff savings

Avoidance of Network Service Provider (NSP) penalties for low power factor, including restricted access to more suitable tariffs.

Reduced losses Reduce power drawn from distribution systems, optimum sizing of electrical infrastructure, and Stabilized site voltage levels by reducing the inductive effect of the connected load.

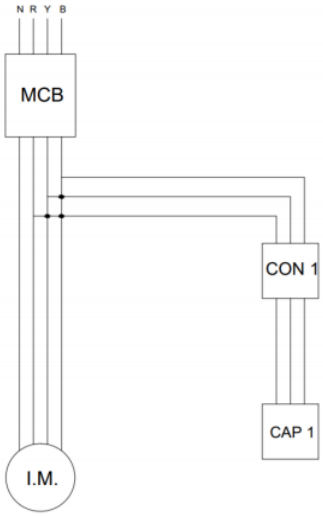


Figure 96: Block diagram of 3- phase power factor control

Basic theory of APFC panel

Varying power demand on the supply system, Power factor also varies as a function of the load requirements, Difficult to maintain a consistent power factor by use of Fixed Co mentation i.e. fixed capacitors, leading power factor under light load. Conditions (fixed co mentation), No manual intervention is needed, as under leading power factor under light load conditions which results in over voltages, saturation of transformers, mal-operation of diesel generating sets and the sinusoidal source voltage by only a scaling factor.

Their waveforms must be identical, though scaled by the effective input resistance of the PFC, by Oh m's Law. The resulting current (ig) would follow the voltage and the power source input would appear resistive, in other words, form a current control loop driven by the input sine wave. Because the loop would require a bipolar range to accommodate a sinusoid, incorporation of a bridge rectifier at the input is to be done. The rectified sine wave (or sine magnitude), now unit-polar (assumed positive going with respect to PFC ground), but is not followed by a storage capacitor, that capacitor is, instead, placed at the output of the current-loop converter. Power-factor controller (PFC) conceptual design provides no control over the output voltage.
Coincidentally, it can vary for the sine magnitude input controlling the current, If the scale-factor is electronically adjusted using an analog multiplier, then it can be implemented a second outer control loop to control the output voltage. This scheme consequently works like this. The outer

voltage loop compares the storage-capacitor output voltage, scaled by a voltage divider, HV, against the controlled voltage, set by a voltage reference.
If too low, a voltage-loop error amplifier, Ave, increases its input to the multiplier. The other input is the sine magnitude voltage-divided first by a fixed divider, Tg, that is increased in amplitude. The multiplier output now is a larger sine magnitude controlling the current of the current control loop.

Benefits of APFC

- Consistently high-power factor under fluctuating loads. Prevention of lead in power factor.
- Eliminate power factor penalty Lower energy consumption by reducing losses. Continuously sense and monitor load automatically switch on/off relevant capacitors steps for consistent power factor.

Application

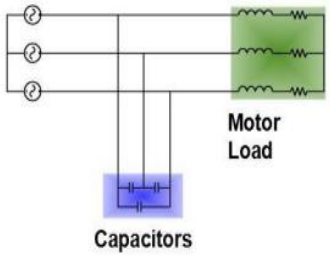
- Automobile Industries, Cement Industries, Metal Industries. Chemical & Fertilizer Plant, Pharmaceutical Industries.
- Hospitals, Malls, Banks, IT Parks, Commercial Complexes. Windmill, Power Stations, DG Stations, Crushers. Railway / M ES / Ordinance Workshops.

Features

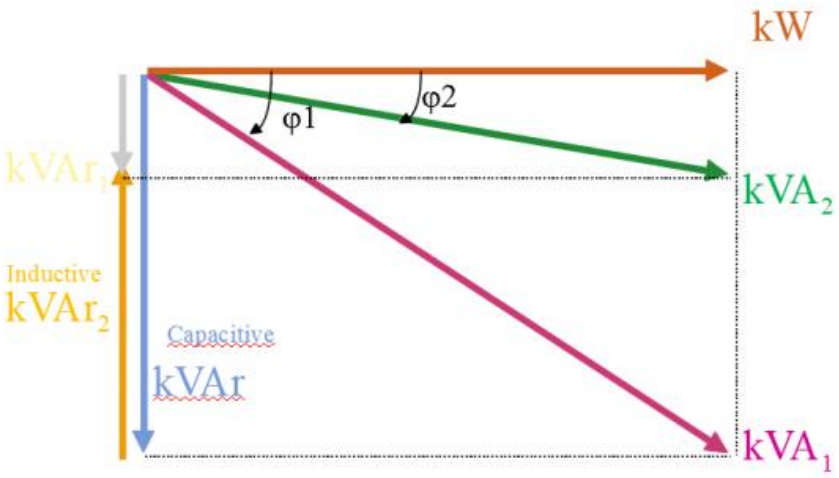
- Modular Structure Protection to each step. Well ventilated design. Powder coated metallic frame structure design Four modes of operation. Door interlocks Facility.
- Good Service Backup.

Capacitors

- Capacitors are used to compensate the Reactive Power.
- The resulting capacitive current is leading current and is used to cancel the lagging inductive current flowing from the supply.



How to power factor improvement



Needs of power factor improvement

Real power is given by P = VIcosφ. The electrical current is inversely proportional to cosφ for transferring a given amount of power at a certain Voltage. Hence higher the pf lower will be the current flowing. A small current flow requires a less cross-sectional area of conductors, and thus it saves conductors and money.
From the above relation, we see having poor power factor increases the current flowing in a conductor and thus copper loss increases. A large Voltage drop occurs in the alternator, electrical transformer and transmission and distribution lines – which gives very poor voltage regulation.

The KVA rating of machines is also reduced by having higher power factor, as per the formula.

There are three main ways to improve power factor:-

- Capacitor Banks
- Synchronous Condensers
- Phase Advancers

Capacitors bank

- Improving power factor means reducing the phase difference between voltage and current. Since the majority of loads are of inductive nature, they require some amount of reactive power for them to function.
- A capacitor or bank of capacitors installed parallel to the load provides this reactive power. They act as a source of local reactive power, and thus less reactive power flows through the line. Capacitor banks reduce the phase difference between the voltage and current.

Working

- The basic relation between Current and power factor is that with the decrease of the power factor the current draw by the load increases as the reactive power drawn by the instrument increases .base on this relation we have developed our circuit
- The basic principle for power factor improvement is to connect a device which takes leading current in parallel with inductive loads to neutralize the effect of lagging current. Therefore, the net line current I' is the phasor sum of load current I and capacitor current Ic.
- The simplest way to improve power factor is to add PF correction capacitors to the electrical system. PF correction capacitors act as reactive current generators. They help offset the non-working power used by inductive loads, thereby improving the power factor.

13.1.9Electrical Design:-3

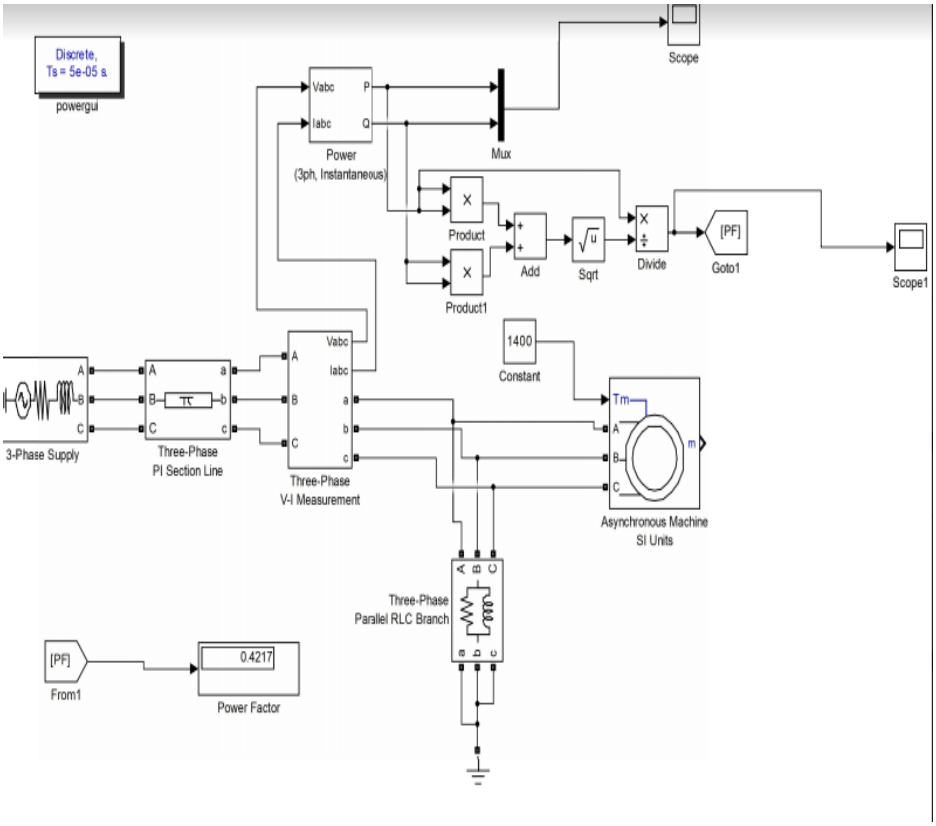


Figure 97: Simulation of without capacitor power factor

Show above Simulation to see in without capacitor power factor and that time power factor result is 0.4217.

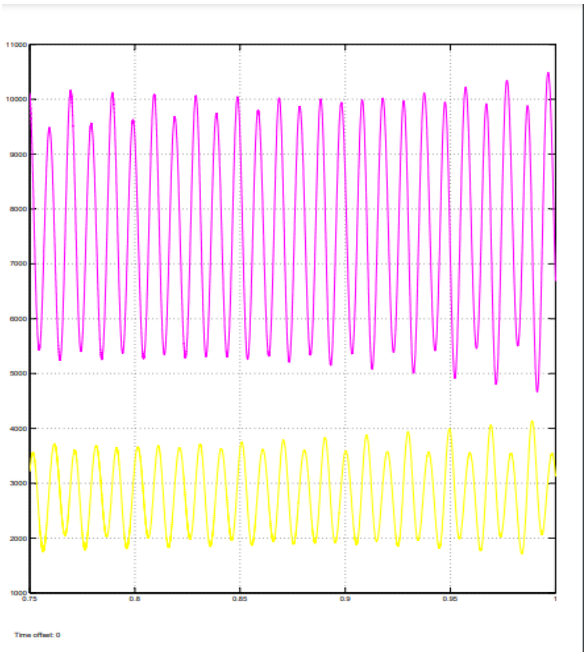


Figure 98:Without capacitor Active or Reactive Power

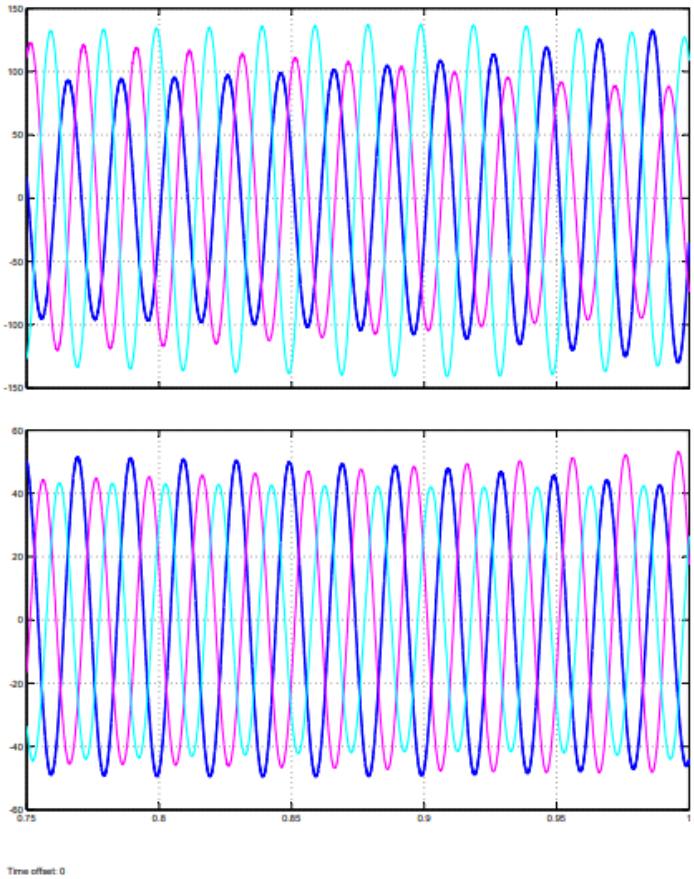


Figure 99:Without Capacitor Voltage and current

Electrical Design 3.1

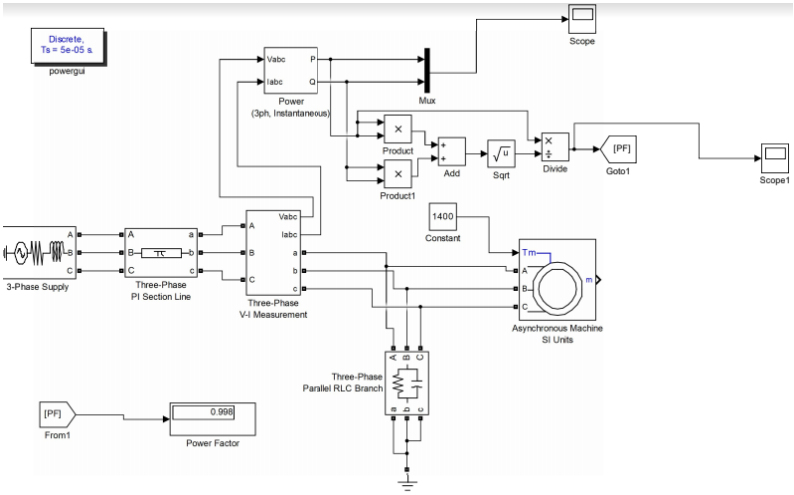


Figure 100: Simulation of with capacitor power factor

Show above Simulation to see in with capacitor power factor and that time power factor result is 0.998 so power factor is improvement.

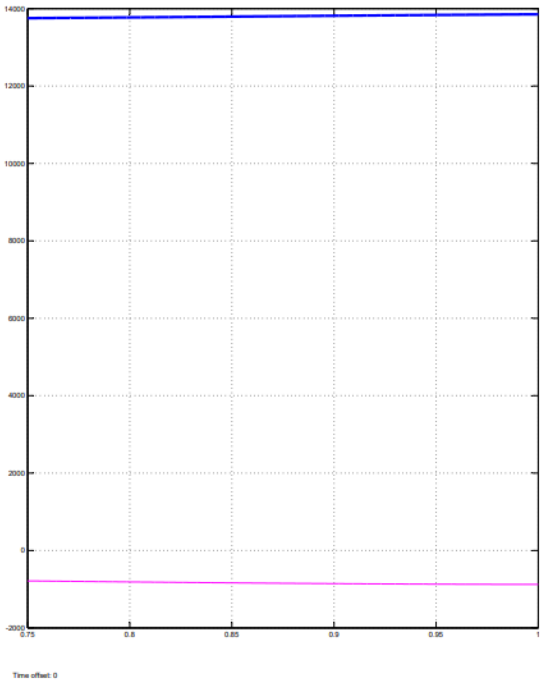


Figure 101: With capacitor active and reactive current

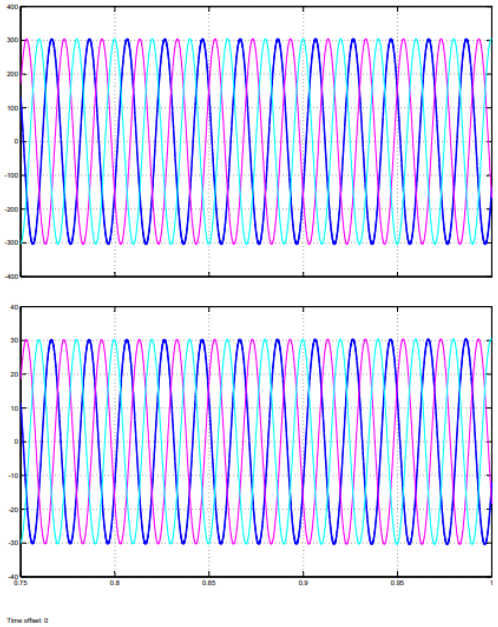


Figure 102: With capacitor voltage wave form 3 phase

Calculation

V = 415

KW = 2.2

$cos\emptyset = 0.3$

HP = 2.95025

$tan\emptyset = 3.17$

Apparent power KVA= KW /$cos\emptyset$

= 2.2 / 0.3

= 7.33

Desired power factor $\cos \emptyset 2$=0.95

$tan\emptyset 2$=0.3286

Required KVAR= 2.2 ($tan\emptyset 1 - tan\emptyset 2$

= 2.2 (3.17 – 0.3280)

= 6.25 KVAR

New reactive KVAR = KVA * $sin\emptyset 2$ = 7.33 * 0.3122

= 2.4086 KVAR

New apparent = 2.2 / 0.95

= 2.315 KVA

KVA reduction = 7.33 – 2.315

= 5.018 KVA

Capacitor selection:-

$$C=\frac{1}{2\pi fxc}$$

C=18μf

Calculation of light bill without capacitor

= KVA * COSØ * Unit * Hour * Days

= 7.33 * 0.3 * 4 * 10 * 30

= 2638.8 Rs

Calculation of light bill with capacitor

=KVA * COSØ * Unit * Hour * Days
= 2.315 * 0.95 * 4 * 10 * 30
= 2622 Rs

So I installed a capacitor which save 16 rupees per month and 192 rupees per year and also there is one more benefit that we can increase motor efficiency if we improve power factor.

Benefits of Power Factor Correction

Benefit 1 - Reduce Utility Power Bills

- In areas where a KVA demand clause or some other form of low power factor penalty is incorporated in the electric utility's power rate structure, removing system KVAR improves the power factor reduce power bills by reducing the KVA. Most utility bills are influenced by KVAR usage.

Benefit 2 – Increase System Capacity

- The power factor improvement releases system capacity and permits additional loads (motors, lighting, etc.) to be added without overloading the system. In a typical system with a0.80 PF, only 800 KW of productive power is available out of 1000 KVA installed. By correcting the system to unity (1.0 PF), the KW = KVA. Now the corrected system will support1000 KW, versus the 800 KW at the .80 PF uncorrected condition; an increase of 200 KW of productive power. This is achieved by adding capacitors which furnish the necessary magnetizing current for induction motors and transformers.
- Capacitors reduce the current drawn from the power supply; less current means lesser load on transformers and feeder circuits. Power factor correction through devices such as capacitors can avoid an investment in more expensive transformers, switchgear and cable, otherwise required to serve additional load. The figure below shows the empirical relationship of system capacity vs. power factor .From the figure one can see that improving power factor from .8 to .9 or .8 to .95 shall release approximately 12% or 20% system capacity respectively.

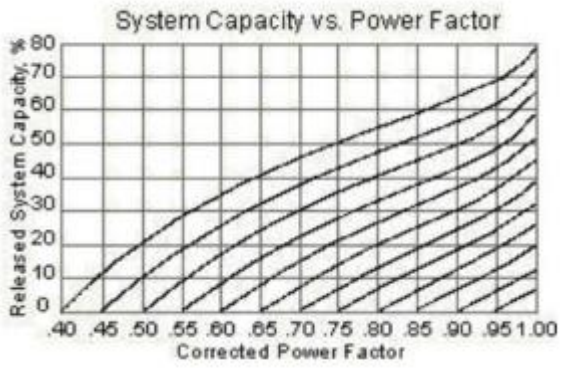


Figure 103: System Capacity vs. Power Factor

Benefit 3 - Improve System Operating Characteristics (Gain Voltage)

A good power factor (0.95) provides a "stiffer" voltage, typically a 1-2% voltage rise can be expected when power factor is brought to +/-0.95. Excessive voltage drops can make your motors sluggish, and cause them to overheat. Low voltage also interferes with lighting, the proper application of motor controls and electrical and electronic instruments. Motor performance is improved and so is production. An estimate of voltage rise from the improved power factor with the installation of power capacitors can be made using following equation.

$$\%\text{of Volatge Rise} = \frac{\text{KVAR of capacitor} \times \%\ \text{Impedance of Transformer}}{\text{KVA of Transformer}}$$

Benefit 4 - Improve System Operating Characteristics (Reduce Line Losses)
Improving power factor at the load points shall relieve the system of transmitting reactive current. Less current shall mean lower losses in the distribution system of the facility since losses are proportional to the square of the current (I2R). Therefore, fewer kilowatt-hours need to be purchased from the utility. An estimate of reduction of power losses can be made using following equation:

$$\%\ \text{Reduction of Power Losses} = 100 - 100\left(\frac{\text{Original Power Factor}^2}{\text{Improved Power Factor}^2}\right)$$

13.2Reason for Students Recommending this Design

In these Village there is only one school and it is onlyprimaryschoo. So we have design higher secondary school. So that student who have study higher do not go outside village.

The nearest bank from the village is far from village. So we have design bank with ATM so that villagers do not go outside.

The existing library in the village is closed since long time sothat we design Library for the villagers.

In these village there is no clinic. In case of emergency thehave to go outside to the village. So we have design small clinic for the villagers.

For fruits, Vegetables and other food items villagers have to go outside of the village. So we have design super market. All the food items , grains and pulse all are in these.

There is no electric shop in these village. So that we design electric shop.

13.3About designs Suggestions / Benefit of the villagers

About design suggestion sport club is also design because in recent time sports is very important. In the village there is only one play ground. It is very useful for the progress of the children of the village. Playing outdoor sports is fit the ant person.Sports club provide an opportunity for children and youth to learn skill that will help them in school,as well as in their future careers and personal relationship. Through engagement sport, they learn leadership,teamwork,responsibility, problem-solving, responsibility.

Chapter: 14 Technical Options wth case studies

14.1 Civil Engineering

14.1.1 Advance Earthquake Resistant

Introduction

An Earthquake is Earth's Shaking or in other words release of energy due to the movement of tectonic plates. This can be destructive enough to kill thousands of people and bring huge economic loss. This natural disaster has many adverse effects on earth like ground shaking, landslides; rock falls from cliffs, liquefaction, fire, tsunami etc. Buildings are highly affected by an earthquake, and in some cases they are shattered down to the ground level. When the ground shaking occurs beneath the building's foundations they vibrate in an analogous manner with that of the surrounding ground. The inertia force of a structure can develop shearing effect on it which in turn causes stress concentration on the connections in structure and on the fragile walls. This results in partial or full failure of structure.

The excitement and prevalence of shaking depends on the orientation of the building. High rise structures have the tendency to magnify the magnitude of long time periodic motions when comparing to the smaller one. Every construction has a resonant prevalence which are the characteristics of structure. Taller buildings have a tendency for long time periods than shorter one which make them relatively more susceptible to damage. Hence, one has to be careful while performing the analysis of a tall structure.

In order to analyses a tall structure many analysis procedures are valid like a) Equivalent static analysis, b) Response spectrum analysis, c) Linear dynamic analysis, d) Nonlinear static analysis or nonlinear pushover analysis and e) Nonlinear dynamic analysis. Soil structure interaction analysis is also essential to be considered. After identifying the soil type, analyzing procedure is selected to do the detailed analysis of the interaction between soil and structure. To reduce the seismic effects on tall buildings several equipment is used like dampers or base isolation process. In dampers viscous damper, friction damper, yielding damper, magneto rheological fluid dampers tuned mass damper or harmonic absorber can be used. In base isolator magneto rheological elastomer, elastomeric bearing system, sliding system can be used for decreasing the degrees of freedom.

Analysis Method

Equivalent Static Analysis

Equivalent static analysis is a kind of response spectrum of seismic design. It can also be defined as the forces which act on building and it represents the ground motion effect due to earthquake. In this procedure it is considered that the building responds with fundamental mode. For happening this, the building should be shorter and it should not twist significantly when movement of ground occurs. This type of analysis is used for estimating displacements of structures. For structures and individual frames this analysis is best suited. The earthquake load will be assumed as an equivalent force which is static and horizontal and applied to the

individual frames. The given force will be same as the multiplication of acceleration response spectrum and its weight. In this analysis the response is studied from a response spectrum where the building's natural frequency is given either by calculating the building design criteria. It also defined by the building code. Application of the analysis procedure is highly used for many building codes. For taller buildings the factors are used with some higher modes which is also used in case of low levels of twisting. Yielding effects of structure are analyzed by applying force reduction modification factors that reduce the design forces also.

Response Spectrum Analysis

Response spectrum analysis is a kind of statistical analysis which is linear-dynamic. It measures the mode of vibration and indicates the maximum seismic response of elastic structure. It depends on the theory of structural dynamics and derived from basic principles. This analysis gives acuteness into dynamic behaviour with the help of velocity, acceleration, displacement, measurement as a structural period function for a given damping level and time history.

As Response spectrum analysis relates type selection of structure to dynamic performance, this is very useful for decision-making in design. To pick out the response of linear system resulting plot can be used. This analysis includes the multiple modes of response of a building except very simple and very complex structures. This analysis is required in many buildings codes. The response of a structure is also prescribed as a summation of many special modes that in a vibrating string correlate with the "harmonics". To determine these modes for a structure computer analysis can be used. A response is studied from the spectrum design from each mode, depends on the modal mass, frequency. Then these are combined for providing the estimation of the all response of structure. Then we should do the calculation of magnitude forces in all directions and observe the building's effect. Combination methods include the addition of absolute peak values, square root of amount of squares, combination of complete quadratic.

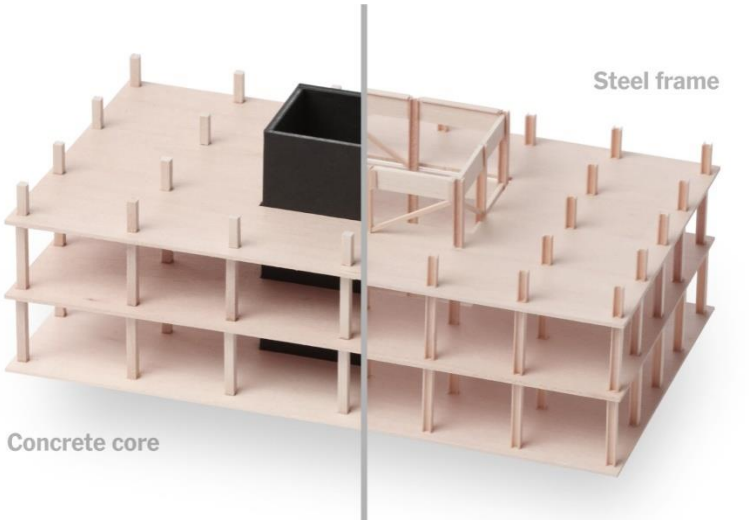
Linear Dynamic Analysis

For lower seismic effects, static analysis procedure is appropriate but for higher seismic effects, higher buildings, buildings with irregularities or non-orthogonal systems, dynamic analysis procedure is used. In this process of linear dynamic analysis, the structure is analyzed as a multiple degree of freedom system with viscous damping matrix and elastic stiffness matrix. Time history analysis and modal special analysis are used when analyzing the seismic effects. But in these cases, the displacements and internal forces are calculated with the help of linear elastic analysis. Higher modes are considered in the linear dynamic analysis and this gives an advantage over the linear static analysis. Even so these are depends on linear elastic response and thus the application of it reduces with increment in non-linear behavior. Hence, it is imprecise by reduction factors of global force. In this analysis the reaction of the structure's ground motion is deliberated in the domaintime and all the phase information is sustained. Only linear properties are taken up. In the analysis the modal decomposition can be used for decreasing the degrees of freedom.

Nonlinear Static Analysis

Nonlinear static analysis, known as pushover analysis is an analysis which is under everlasting vertical loads and thinly rising lateral loads. The forces induced by earthquake are described by static lateral loads. A sketch of displacement versus total base shear in a structure is acquired by

this analysis. It would specify any weakness and failure. This analysis is performed up to failure, thus it allows determining the ductility capacity and collapse load.



Nonlinear static analysis is controlled by force and displacement. The combination of full load is attached in the pushover procedure which is controlled by force. This procedure is applied for the known loads. As pushover analysis is very simple, the guidelines and codes propose this analysis as the tool for seismic performance evolution. For evaluation of seismic performance, pushover analysis is a suitable tool of old and new structures. It is more suitable in the analysis of seismic vulnerability. This analysis gives enough information on seismic demands decided by ground's motion on the system. The pushover analysis cannot describe the phenomena property and it depends on the loading which is static. This may not track out important notes of deformation that may fall out in a earthquake related structure, and this may enhance others.

Nonlinear Dynamic Analysis

Nonlinear dynamic analysis gives the results with low unpredictability. It is because this analysis exploits the summation of ground motion records with the details of structural model. In this analysis the structural model estimates the deformation for all the degrees of freedom. It is considered that the properties of this analysis are portion of domain of time analysis.

According to building codes this analysis is meticulous and necessary for important configuration. The response calculation can be sensorial to the ground's motion and it is used as a input of earthquake. Various analyses are necessary to calculate the records of ground's motion and for estimating the structural response distribution. As the characteristics of seismic response based on intensity and earth shaking, an extensive measurement is required to describe different earthquake.

14.1.2 Seismic Retrofitting of Buildings

Introduction

Seismic retrofitting of constructions vulnerable to earthquakes is a current problem of great political and social relevance. Most of the Italian building stock is vulnerable to seismic action even if located in areas that have long been considered of high seismic hazard. During the past thirty years moderate to severe earthquakes have occurred in Italy at intervals of 5 to 10 years. Such events have clearly shown the vulnerability of the building stock in particular and of the built environment in general. The seismic hazard in the areas, where those earthquakes have occurred, has been known for a long time because of similar events that occurred in the past. It is therefore legitimate to ask why constructions vulnerable to earthquakes exist if people and

institutions knew of the seismic hazard. Several causes may have contributed to the creation of such a situation.

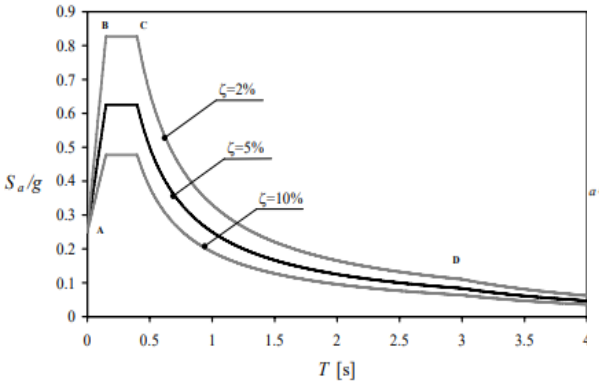
These are associated to historical events, fading memory, greed, avarice, poverty and ignorance. Among historical events particularly relevant are wars, epidemics, and natural disasters which may limit, in a significant way, the available resources of a country. In such circumstances there is a tendency to build with poor materials and without too much attention to good construction techniques and safety margins. A situation of this kind occurred in Italy and in Japan after the Second World War and similar situations have occurred in Italy many times in the past. In such a situation it is possible that the phenomenon of fading memory occurs and past memories are easily erased. In Italy commercial profits often result from the employment of poor material and workmanship rather than of the optimal utilization of the production factors. The depressing situation of poor quality control and material acceptance also falls into this framework, which, in most cases, results only in paperwork devoid of substantive value. Marginal propensity to expenditure sometimes ensures that even the owner prefers a low quality product to save resources for more immediate needs. Among causes arising from ignorance there may be both an inadequate knowledge of the seismic hazard and design errors due to insufficient knowledge of the earthquake problem; also the inability to correctly model the structural response to the seismic action. While considerable progress has been made in recent years by the research community in dealing with the above problems, it has become more difficult to transfer the results to the seismic engineering profession and the situation can only deteriorate in the near future.

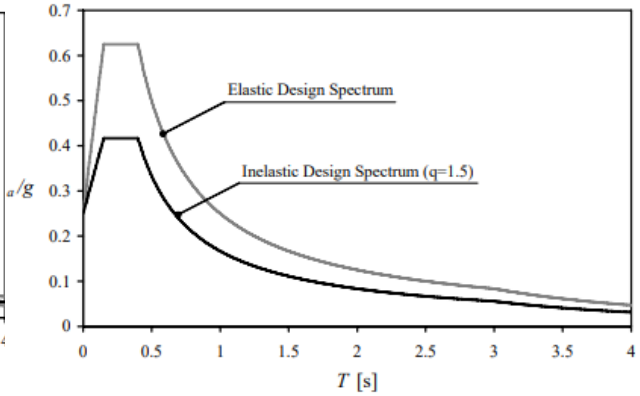
Seismic Action

Seismic vulnerability is not an absolute concept but is strongly related to the event being considered. The same construction may not be vulnerable to one class of earthquakes and yet be vulnerable to another. Therefore, before attempting a seismic vulnerability evaluation of a given construction, the seismic action that will affect that construction must be fully specified. All seismic codes specify the seismic action by means of one or more design spectra. These are a synthetic and quantitative representation of the seismic action which, besides depending on the characteristics of the ground motion, depends on some intrinsic characteristics of the structure such as the fundamental mode of vibration and its energy dissipation capacity. The elastic design spectrum depends on the vibration periods of the structure and on the available damping. In Figure 1 the elastic spectrum of Euro code 8 (CEN, 1998) is drawn for three different values of damping. A new draft of Euro code 8 (CEN, 2003) became available in 2003, but is not being used here because some of the Euro code 8 material relevant to the present work is still questionable and not generally accepted.

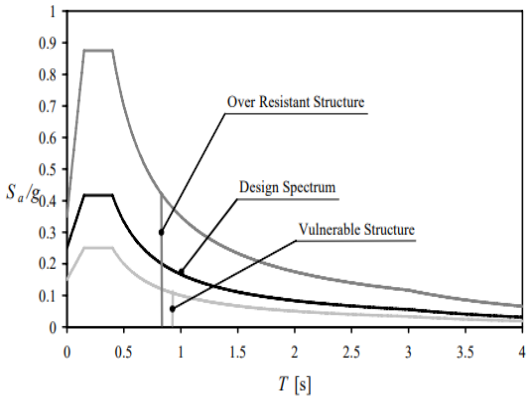
The value of the spectral pseudo-acceleration, corresponding to a vanishing small period, corresponds to the peak ground acceleration (PGA). In fact, for T = 0 the structure is rigid and, therefore, subject to the same acceleration as the ground. This acceleration, called the maximum effective ground acceleration or PGA, depends directly on the seismic hazard at the construction site and acts as the anchoring acceleration of the spectrum. This value is generally prescribed by seismic codes as a function of the seismic hazard at the construction site. Furthermore, four regions may be identified for the elastic spectrum, each defined by a lower and upper period. In the first region, $(0) \leq \leq T\ TB$, the spectral ordinates increase linearly with the period; in the second $(\ ) T\ TT\ B\ C \leq \leq$, these are independent of the period; in the third $(\ ) T\ TT\ C\ D \leq \leq$, the

spectral ordinates decrease rapidly with the period, that is with the reciprocal of the period T according to Euro code 8; and finally in the fourth region ( ) T T ≥ D , they decrease even more rapidly, with the reciprocal of the period squared according to Euro code 8. More details on the elastic design spectrum may be found in the seismic codes (CEN, 1998), in specialized publications and in the treatises on dynamics of





structures and seismic engineering (Chopra, 2001; Clough and Penzien, 1993). The separation periods, TTT BCD depend on seismological factors and on local site conditions. For instance Euro code 8 specifies them as a function of three subsoil classes: A (firm soil), B (medium soil), C (soft soil)



Seismic Resistance And Vulnerability

Because it is necessary to retrofit only constructions vulnerable to the design earthquake, a vulnerability evaluation is obviously needed before attempting any seismic retrofitting. In the following, a definition of seismic resistance is provided and the corresponding vulnerability of a construction to the design earthquake is also defined. As has been seen, the design earthquake is specified by means of a design spectrum which depends on the energy dissipation capacity through the structure behavior factor. Assuming that the structure behavior factor for the structure being considered can be evaluated, the design spectrum can be drawn. An example of such a spectrum is shown in Figure

If a structure exhibits seismic resistance larger than that required by the design earthquake, it obviously possesses an over-resistance and therefore is not vulnerable. This is the case shown by the longer ordinate in Figure 3. A structure with the resistance specified by such an ordinate is capable of withstanding an earthquake with an anchoring acceleration larger than that associated with the design earthquake. Instead if the seismic resistance of the structure corresponds to the shorter ordinate in Figure 3, it is obvious that the resistance capacity is smaller than the demand that the earthquake places on it and the structure is vulnerable to the design earthquake. In this second case the structure can only withstand an earthquake with an anchoring acceleration smaller than the design one. It is, therefore, necessary to retrofit the structure to allow for the satisfaction of the design inequality.

14.1.3Advance Practices in Construction Field in Modern Material,Techniques andEquipment's

Introduction

Tounderstand all how and about of super performing construction materials we must study materials according to their use from very root to tip. By that way we can easily conclude and infer about the application, implementation and feasibility of that particular construction material. Elements of construction where these smart materials and techniques shall be implemented are:

- Foundation
- Plinth
- Beam
- Column
- Wall
- Sill
- Window
- Door
- Roof
- Parapet
- Skylights
- Finishing Works

Super Performing Materials

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.

Figure 104: Bridge made of high performance concrete

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 colors 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.

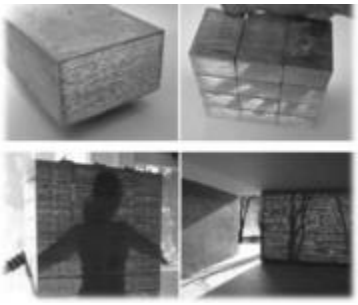


Figure 105: Translucent concrete in use

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 one tenth, AAC is used in load-bearing walls only in low-rise buildings. In high-rises, AAC is used in partition and curtain walls.

Figure 106: Light Weight Concrete

14.1.4 Engineering Aspects of soil mechanics-Environmental impact Assessment

Introduction

Our daily life environment in Nigeria relates to air, noise, sunlight, geological features, fauna, flora, landscape, and etcetera. All these affect the economy of the country: if the environment is abused, daily life style (living and working conditions, etc.) will be affected; and this will in turn affect the economy. As there is need to protect the environment in every possible way, it must also be noted that the need for the existence of infrastructure as an indispensable part of any economy cannot be over emphasized. As those infrastructures come into existence, there are resulting positive effects as well as adverse effects, which in many cases tend to out-number the positive effects; and yet not usually noticed. This inability to take cognizance of the adverse effects of civil engineering infrastructural development projects has become a source of worry to the environmentalists, civil engineers, and, indeed all stakeholders in the environment. Infrastructure development projects are of many types, and their impact on the environment are also very many and vary in magnitude and form depending on the type of civil engineering project. According to the procedural guideline on Environmental Impact Assessment (EIA) by the Federal Environmental Protection Agency, infrastructure projects should include but not limited to: Industrial estate development projects; Canalization and flood relief works; Dams and

Hydropower to hold water; Oil and gas pipe line installations; Solid waste management and sanitation projects; and Industries**.**

Materials and Methods

Topography / Soil Morphology

The topography of the oil field area is flat. The micro-relief is also flat but gradually role into numerous creek lets and lakes in the back swamps. The macro-relief of the whole topography gradually roles into the Orate 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,

Noise

Noise levels were measured within and outside the flow station. This was done by a cell precision integrating sound level meter. The instrument was adequately positioned to the wind and noise direction, to get an accurate noise level measurement. Noise level measurements were taken at: Flow station control room, Generator area, Flare site area, 1km from the station**.**

Microbiology

Water samples were aseptically collected into sterile bottles from various points within the study area. Also, soil samples were collected into sterile polythene bags as composite samples, at 0-15cm and 15-30cm depths, using a soil auger. The following microbial analyses were carried out on the water and soil samples. (A) Total Heterophic Bacterial Count (THC) (b) Total Heterophic Fungal Count (THF) (c) Hydrocarbon Utilizing Bacterial and Fungal Counts (HUB) (d) Identification of the microbial isolates.

For the microbial counts, serial dilutions of the water and soil samples were carried out in sterile normal saline and 1ml of the appropriate dilutions were plated using the standard pour plate techniques. Nutrient Agar (Oxide) and Plate Count Agar containing 0.05% chloramphenicol were used for the fungal assay. The bacterial plates were incubated aerobically at 350C for 5 days while the fungal plates were incubated at room temperature for 7 days. At the end of the incubation period, plates containing between 30 and 300 colonies were selected for estimation. Hydrocarbon utilizing bacteria and fungi count were determined as described by [6] and [7]. Crude oil was used as the test hydrocarbon. Bacterial and fungal identification were done as described in line with existing standards.

Soil Sampling

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.

At each sampling station, three auger borings spaced at 5m apart were collected and examined. Samples were collected at depths of 0-15cm and 15-30cm at a particular sample area. The soil samples were physically examined to assess the environmental impact the soil was subjected to,

at different locations at the flow station, and to identify whether or not there was pollution of the soil.

Sample code	Site Description
WS1	Flare site water
WS2	20m downstream of flare site
WS3	Discharge pond
WS4	Saver pit
WS5	Flushing water
WS6	Storm water
WS7	Borehole located north of flow station

Sample Code	Site Description
OS 1	Manifold Site within flow station
OS 2	Heater location within flow station
OS 3	Gun barrel within flow station
OS 4	Compressor within flow station
OS 5	Generator point within flow station
OS 6	Waste discharge point just outside flow station
OS 7	Saver pit within flow station

Sample No.	Location
OS 1	API (saver pit)
OS 2	Heater
OS 3	Oil Tank
OS 4	Compressor
OS 5	Generator
OS 6	Water pit
OS 7	Gas Flare Burnt Forest

14.1.5 Water Supply – Sewerage system- Waste water – Sustainable development

Introduction In order to develop sustainable wastewater treatment it is needed to view the wastewater treatment systems using a holistic approach. A holistic approach implies considering the primary and secondary environmental effects and costs that the systems produce. Examples are the pollution produced at the power plant (generating electricity for wastewater treatment) and the energy cost of producing treatment chemicals. Designing or selecting a treatment system based on sustainability criteria over the last decade sustainable wastewater treatment has been an issue at several conferences (Ødegaard 1991, Hence et al. 1997, Graf 1999). The first international conferences of "Ecological engineering for wastewater treatment", was held in Sweden in 1991 (Entire and Guterstam 1991), addressing sustainable wastewater treatment systems. The focus was on natural or ecologically engineered systems, that optimize resource gains and minimized resource use, hence, recycling and energy aspects, were in focus. Later several conferences have been held regarding ecological sanitation (Staudenmann et al. 1996, Kleve et al. 1999, Jana et al. 2000, Werner et al. 2004). The year 2008 which had been declared the "Year of Sanitation" by the United Nations to bring more focus to sanitation because the Millennium goals for sanitation are far behind schedule to fulfill the goals. To promote sustainable sanitation systems toward 2008 a Sustainable Sanitation Alliance (SSA 2007) was formed. The SSA unites forces of universities working with sustainable sanitation with major world organizations as UNDP and the world bank national donor organizations and NGOs.

Sustainability Analysis of Wastewater Treatment Systems

In earlier times and even to day, engineers and politicians nearly always use a simple cost/benefit analysis when choosing a wastewater system. This means that, for instance, only the discharge of organic matter (BOD) or phosphorus and the cost is looked upon. However, the quest for

sustainability is necessary because we see many problems are coming like global warming, acidification, diminishing ozone layer, micro-organic pollutants and other toxic chemical matters, eutrophication, diminishing important resources like phosphorus, potassium and oil and other threats to mankind, flora and fauna. This shows that many indicators must be used when deciding what type of wastewater systems we should implement. And we should choose the wastewater system that contributes most to an overall sustainable future.

The notion sustainability should include ecology, economy and sociological aspects and the sustainability must also perform on three different stages:

1. Local, where hygienic and health aspects are of concern in time scales of hours or days.

2. Regional, where classic environmental problems operate in time scales of months or years.

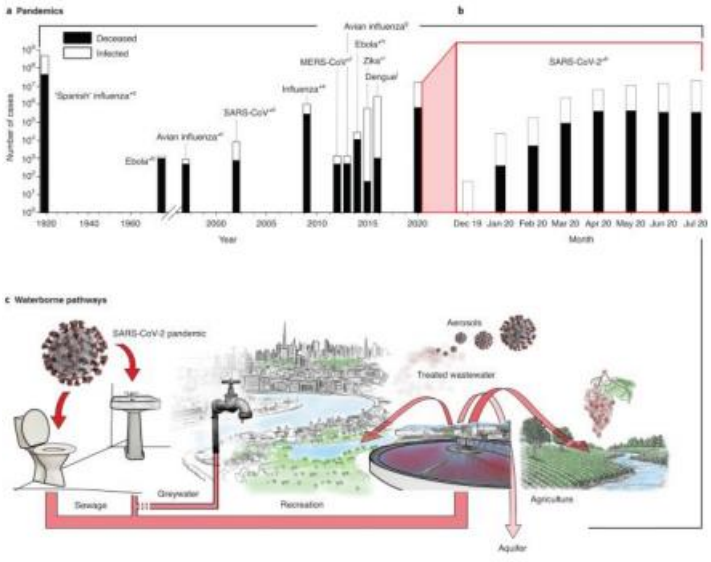
3. Global, where sustainability matters in a time scale of decades or centuries.

To compare two wastewater alternatives the following indicators may be considered as relevant for a sustainability analysis (Lindholm and Nodded 2000):
Discharge of pollution to local recipients and major recipients. For instance: phosphorus, nitrogen and organic matter (BOD).

The amount of micro-organic pollutants and heavy metals in the sludge going to agriculture.
Discharge of climate gases like methane and CO2.
Use of electric energy and fossil energy.
Use of products with hazardous components.
Use of finite or critical resources.
Costs as present value of investments, operation and maintenance.

Resources in domestic wastewater and organic household waste

Substantial amounts of plant nutrients and organic matter are present in household waste and waste from food processing industries (Jensen and Skjelhaugen 1994). Theoretically speaking, the nutrients in domestic wastewater and organic waste are nearly sufficient to fertilize crops to feed the world population (Wollaston 1992). This,



Figures for the amount of mineral fertilizer that can be substituted for organic fertilizer sources vary and depend on several factors, one being whether a country has a net import or

export of food. In countries belonging to the Organization for Economic Cooperation and Development (OECD) the nutrients in wastewater average 8 % of the applied mineral fertilizer and the nutrients in household and yard waste constitute another 7 % (Gardner 1997). If all the nitrogen and phosphorous in Norwegian wastewater was reclaimed and recycled into agriculture, application of mineral fertilizer could be reduced 15-20 % (Jensen and Vat 1991). The corresponding figures for Sweden are 16-17 % (Guterstam 1991). In most developing countries these levels are higher (Gardner 1997), and according to Entire and Jenssen (1997) more than 40 % of the nutrients present in chemical fertilizers could, theoretically, be substituted with nutrients from wastewater. Organic matter accounts for one third of the input to landfills in industrialized countries and as much as two thirds, in developing countries (Gardner 1997).

Large conventional treatment systems

The Norwegian Institute for Water Research (NIVA), showed in the 60`s and the 70`s, that it was important to remove phosphorus from wastewater in Norway, because phosphorus is the main limiting factor for algal blooms in rivers, lakes and narrow fjords (Holton 1976).

Phosphorus removal by chemical precipitation has been refined in Norway, Sweden and Finland over the last 30 years. The concentration of phosphorus is easily reduced down to 0,50 mg P/l in the effluent, measured as total phosphorus and a net removal of 95 % or more is achieved. The cost and energy consumption in the chemical precipitation process is low compared to biological P-removal methods, because adding and mixing chemicals to the wastewater is far more energy efficient than the aeration needed for biological treatment processes. Chemical precipitation also removes other wastewater constituents than phosphorus (Table 1).

Table 47:Removal % of waste water constituent

Waste water constituent	Removal %
Organic Matter Expressed as BOD	75-80
Suspended solids	85-90
Dissolved organic	30-55
Total nitrogen	15-40

The energy consumption for chemical precipitation in Norway is only 0,23 kWh/m3 treated water for larger treatment plants. Most of this energy consumption is used for heating and ventilation of the buildings over the treatment basins. For biological treatment (activated sludge with only 30 % phosphorus removal) the energy use is in the order of 0,37 kWh/m3 (O`Brien, J.K. 1986) showing that from an energy aspect chemical precipitation is more sustainable than a biological process.

14.2 Electrical Engineering

14.2.1Design of power electronics converter

Nature, energy supply from renewable energy sources is fluctuating depending on the availability of the energy source. Availability of the energy sources is mostly unpredictable (e.g. wind energy, solar energy, etc.) therefore, it is essential to have other energy sources that are more predictable to guarantee energy availability during periods of low energy supply from renewable sources.

Power Electronics Converters

According to the characteristics of the distributed generation systems based on the fuel cells, interface converters are necessary to boost the low variable voltage from the fuel cells and other auxiliary power sources

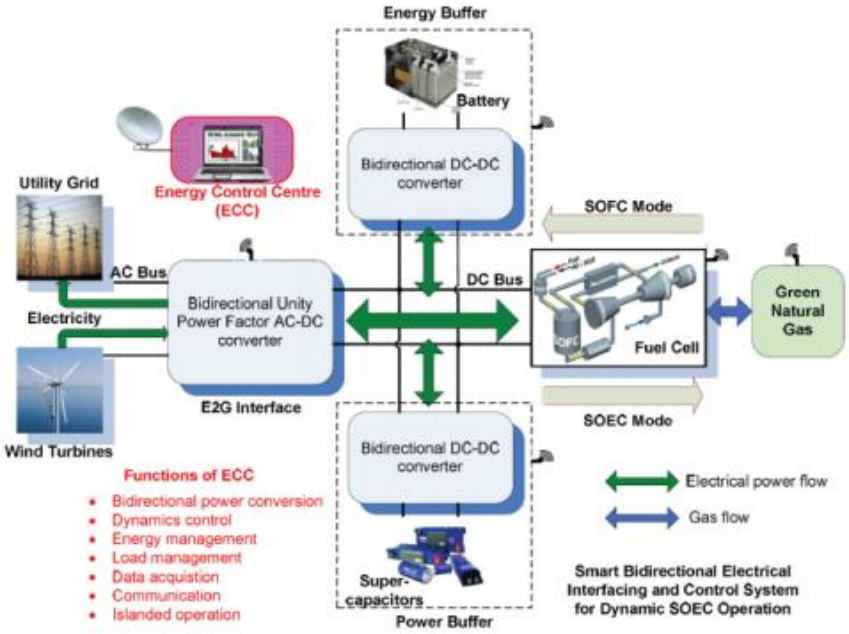


Figure 107: Block Diagram of a fuel cell battery and super-capacitor powered line-interactive renewable generation system

(APS) such as batteries and super-capacitors, in order to provide the high quality, regulated dc voltage to the cascaded inverter for grid-connecting purposes. Hence, a large number of alternative converter topologies and implementations for low voltage high power applications have been proposed.

DC-DC converters

Basically, DC-DC converters can be divided into two categories depending on using the galvanic insulation or not: non-isolated converter or isolated converter. As to the non-isolated converters, normally, boost-type converters are favorable to fuel cell application. These topologies are simple, but they require a bulky input inductor to limit the current ripple in the components, especially with high voltage gains are required. To minimize the input inductor size and the current ripple, as well as to reduce the switch current stress, the converter can be designed with multiple legs interleaving each other by means of the input coupling inductors, and high efficiency can be obtained.

For isolated DC-DC converters, in, the low voltage high power isolated converters have been overviewed and compared very well. The high efficiency full-bridge boost type fuel cell converter without any auxiliary snubbed circuit is designed in . Moreover, a novel parallel method is proposed in to increase the power level to 10 kW. Summarily, as with typical designs, tradeoffs exist in choosing the optimum DC-DC converter, so the designers must establish the

exact requirements of the fuel cell system in question to determine the most advantageous design.

DC-AC inverters

The DC/AC converter technology is mature and uses mainly the hard-switching voltage source inverter (VSI), with single-phase, dual-phase or three-phase output, controlled by means of sinusoidal pulse-width-modulation (SPWM) or space vector PWM (SVPWM) [18]. Multilevel voltage-source inverters provide a cost effective solution in the medium voltage energy management market. Nowadays, there exist three commercial topologies of multilevel voltage-source inverters: neutral point clamped (NPC), cascaded H-bridge (CHB), and flying capacitors (FCs). Among the high-power converters, the NPC inverter introduced 25 years ago is the most widely used in all types of industrial applications, such as wind power generation, UPS and so on, in the medium and high voltage range.

14.2.2 Electronic soft starter for 1/3 phase induction motor for agriculture

The direct-on-line starting of induction motors produces troublesome torque and current transients. Soft-starting techniques, which are commonly used with three-phase induction motors, lead to more reliable operation and allow the reduction of the motor sizing: they limit the phase currents during the starting transient in order to obtain a smooth connection to the power supply. Unfortunately, little investigation has been made so far on the application of these techniques to single-phase motors; even if they are widely used e.g. in households purpose and of course suffer of the same troubles as in the three-phase motors. Now a days, the present work can deals with various soft-starting techniques, implemented on a simulation tool.

Out of these some are almost based on the so-called point-on-wave technique of switching, which is actually a delayed insertion, either simultaneous or independent, of both the main and auxiliary phases to the main supply. In order to limit the total transient current within the allowed maximum for household appliances, the gradual insertion of the motor's main phase, is also investigated and discussed.

Table 48: Method controlled parameter

Soft Start Method	Parameter Controlled	Performance Parameter Influenced
Time voltage Ramp	Voltage	Start current, Start torque, Acceleration
Constant current	current	Start current, Acceleration
Torque control	Torque	Start current, Acceleration
Adaptive Acceleration control	Acceleration	Start current, Acceleration

Timed Voltage Ramp (TVR) Starting

Timed voltage ramp (TVR) was the earliest form of soft starting. TVR slows the application of voltage, which reduces the start current. This reduces start torque and slows the motor’s rate of acceleration.

Current limit

Starting With limiting of current of starting, the soft starter can delivers voltage to the motor so that it reaches a specified current level, then pauses the voltage ramp. When the current drops, the voltage ramp continues. This keeps start current within the required limit, although the motor's actual current level varies throughout the start. This can be useful for generator set applications where the supply is limited.

Constant current

With constant current starting, the current is raised from zero to a specified level and keeps the current stable at that level until the motor has accelerated. Constant current starting is very ideal for all applications where the starting current must have to keep below a particular level.

Adaptive Control

For Starting Adaptive Acceleration Control is a new intelligent motor control technique. In an adaptive nature of control with soft start method, the soft starter are able adjusts the current value to start the motor within a specified time and using a selected acceleration profile. Every application has a particular starting profile, based on characteristics of the load and the motor. Adaptive Acceleration Control offers three different starting profiles schemes, to be suit the requirements of various applications.

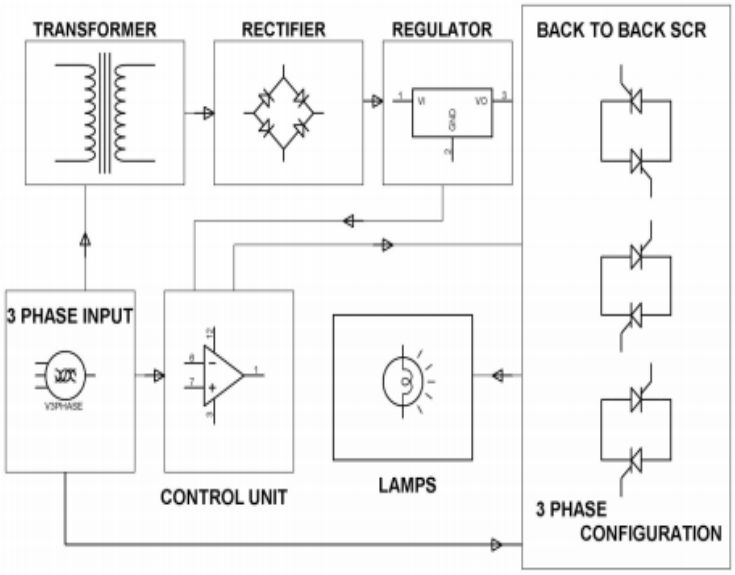


Figure 108: Adaptive Control

- System analysis and design
- Regulated voltage supply

The 12V DC regulated voltage supply is achieved with the help of following circuit diagram. The step down transformer (230V/12V AC) is used initially after that the bridge rectifier circuit is used to convert ac supply to dc supply. By getting output of bridge rectifier circuit it is further fed to regulating IC7812 to get positive 12V DC regulated supply. The LED used for indicating purpose.

Amplifier circuit

Initially at the time of switch on the base of transistor allows current flow from emitter to base and charges the capacitor as well as current flows from emitter to collector and charges capacitor. When capacitor is fully charged, the base becomes high due to which the current stops flowing from emitter to base and collector. The positive terminal of capacitor is connected to the non-inverting pin of LM324 comparator, the inverting terminal of comparator is fed from a fixed voltage. When the capacitor is charging the voltage at non-inverting terminal is greater than the inverting terminal, hence the output of comparator is high during this time. When the capacitor

starts discharging the voltage at the output of comparator also falls gradually because the voltage at non inverting terminal falls lower slowly than the inverting terminal. Hence the level of the voltage is initially high and gradually falls down, this level voltage L is fed to another comparator of Op-amp LM339.

SCR power circuit

In this circuit antiparallel SCR's are connected per phase. The 440 V, 3-phase, 50 Hz supply is fed to SCR's the opt-coupler circuit used in triggering for isolation purpose. The capacitors are used in circuit for certain amount of voltage regulation. The cathode of SCR's is connected to load terminal of induction motor.

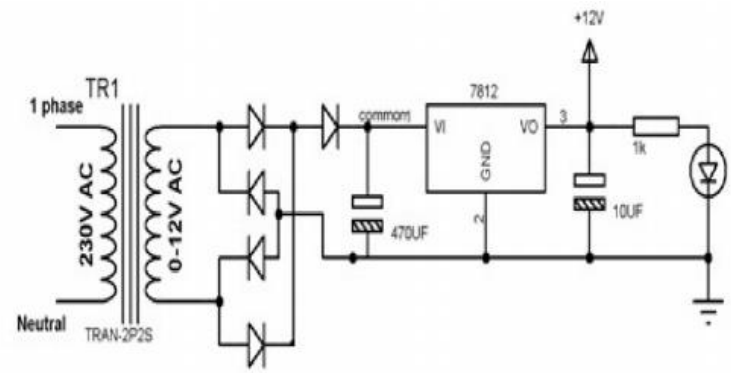


Figure 109: SCR Power circuit

14.2.3 Advanced wireless power transfer system

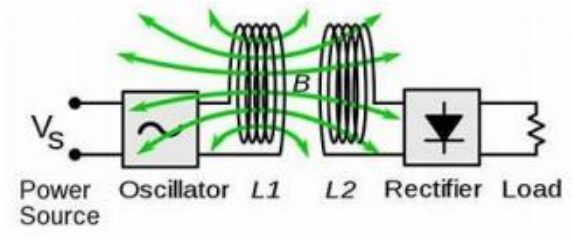
Introduction

The Transfer of electrical power in reliable and efficient way is always challenging for the designers and engineers. Presently all electrical power from the generating stations to the distribution station is transferred by the uses of wires and underground cables. One of the major issues in these types of systems is the losses due to resistance of the material. Generally the percentage of loss of power during the transmission and distribution is 26% In modern technology the use of portable device has increased such as mobile robots and electric vehicle. Mobility is the main concern of these equipment i.e. they are not connected to the main source of power.

Figure 110: Advanced wireless power transfer system

In modern technology the use of portable device has increased such as mobile robots and electric vehicle. Mobility is the main concern of these equipment i.e. they are not connected to the main source of power.

Wireless Power Transfer Method



This type of WPT is simply based on inductive coupling between two coils. This is a type of near field technique measuring with appliance near the source. It is generally based on the principle of mutual induction, where two coils are placed vicinity to each other and there is no physical connection between these two coils. The simplest example is transformer where the transfer of energy takes place due to electromagnetic coupling. Each of these coils connected without wires and it has been an important and popular technology to transfer power without wires because of its simplicity and reliability. Based on this technology there are various application device has been already made including electric brush and charging pad for cell phones or laptop. But this kind of method also has some limitation i.e. the range can be very less upto few cm and separation distance is very less than the coil diameter.

Magnetic Resonance coupling WPT

This is also one of the important methods for transferring power based on near field technique. It generally overcomes the disadvantage of up to some extent which arise in non-resonant inductive coupling. This type of coupling used the concept of resonance. At resonance we know that natural frequency and excitation frequency are same. This leads to the maximum amplitude that means a maximum amount of energy is transferred between two coils. Here the receiver and transmitter coils are tuned to be at same resonant frequency .This allow us to transfer significant amount of power by increasing distance between coils . These type of system are used for building mid-range power transfer. Mid-range can be specified by distance upto 10 times the diameter of the transmitting coil. Magnetic resonance coupling have several advantage such as efficiency increases with decrease in the radiation and power loss and range can be increase upto some meter and it is directional. The mainly disadvantage is that selection of resonance frequency which tunes with the natural frequency and it cannot be used for long range application.

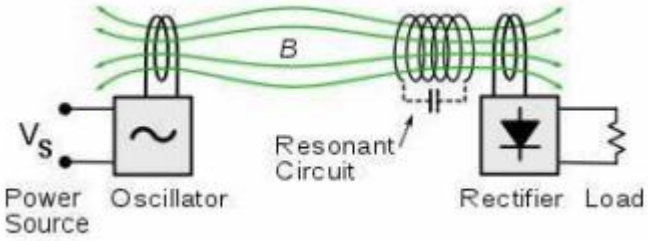


Table 49:Comparison between WPT Methods

WPT METHODS	SEPERATION DISTANCE	POWER	EFFICIENCY
Inductive coupling	Few mm	Few watts	Low
Magnetic Resonance coupling	Few metre	Few kilo watts	High
Microwave WPT	Upto 100KM	Upto 100MW	High
LASER	Few meter but with high intensity	Uto 100MW	Low

Advantage

- It gives the human comfort as there is no chording or wiring problem, so mobility is easier.

- There is no problem of power failure and extensive heating.
- Cost of overall system decreases due to no uses of wires.
- Overall efficiency increases due to decrease in the power loss.
- It offers no corrosion as there is no exposure to the atmosphere which is Ecofriendly.
- Disadvantage
- WPT methods use the electromagnetic radiation for power transfer and the main effect of electromagnetic wave is its biological impact which harms human beings and animal.
- Biological impact of inductive coupling and resonance coupling is far less than compared to microwave power transmission

14.2.4 Industrial Temperature Controller

Introduction

The modern sensing technology and control methods are undergoing continuous innovation, where the real-time temperature control is demanding higher accuracy and faster response more than ever. Temperature control is widely used in production and industrial control processes in all aspects. For example, in the iron and steel smelting process, iron and steel to be baked requires heat treatment in order to achieve their performance indicators; plastic qualitative process also needs to maintain a certain temperature range. The fact is that the temperature control system is a complex process object involving large inertia and pure delay with multi-variable and time-varying parameters. At present, the PID control methodology is adopted in most cases. In this way, different PID parameters should be selected for different control objects, for which some practical experience is needed. As a language controller, the fuzzy PID control is to imitate the way of human thinking and experience to achieve its control process that can more closely reflect the best control behavior of the controller. With strong robustness and control stability, it can be applied to different control objects. The combination of fuzzy control and PLC, which is widely used in industrial control, is one of the hotspots in this research area..

System Design

In the hardware part of the system, the acquisition module uses the temperature sensor to measure the measured object temperature, and the temperature signals are converted into electrical signals, which are then transmitted to the temperature transmitter, where the electrical signal is converted into a 4 ~ 20mA current signal, so that the module EM235 in the PLC expansion module can be facilitated as to the analog signal input. EM235 receives data, which will be sent directly to the PLC output control text display (display temperature) and the temperature control device (heating &cooling device). The system block diagram is shown in Figure.

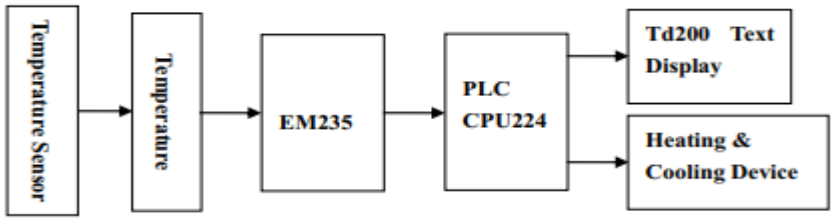
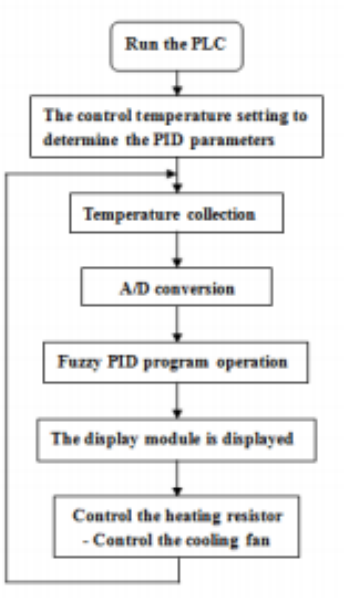


Figure 111: Block diagram of Temperature Control System

Software design

According to the system design requirements, the software program flow is shown in Figure 3. First of all, the parameters of the temperature control system undergoes wake-up initialization, mainly to set the control temperature and the PID initial value, including the value settings of PID gain, PID integral time, PID differential time and PID sampling time. Then, the ambient temperature is collected through the sensor in a range of 6400 ~ 320000, as the digital signal. As the fuzzy PID algorithm requires real-format temperature signal input, there is the need for A/D conversion of temperature signal prior to the PID algorithm process.



The collected digital signal is converted into double integer signal, which is then transformed into a real figure. The actual temperature is calculated by the temperature calculation formula. The measured temperature is taken as the input signal for PID operation, and the output is ready for the control of the heating resistance and cold air fan. In the design, the temperature control is based on the PID control algorithm.

PID is the most commonly applied in industrial production, a control method being able to meet the need for high-precision measurement and control systems. Using PID algorithm to achieve the temperature control system can be more stable and reliable.

Figure 112: Software programme Flow Chart

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. 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 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%. In this paper we discussed to the technologies which use in proposed system, GPS and GSM cooperate with VANET. In addition we studied in the related work research papers steps are being taken as to how to minimize the loss of life and property despite poor emergency facilities. The authors have also aimed at giving an overview of implementing safety services in vehicular systems of today and future development. We gave brief analysis to these research papers taking in consideration the Strengths and weaknesses. Then we proposed the system which based on vibration sensors and processing capabilities can be used to overcome the challenges of detecting traffic accidents and deliver the emergency message at short time.

GPS and GSM based system

Mostly vehicle tracking systems are based on GPS and GSM. Short Messaging Service (SMS) is a feature available on all mobile phones which allows a small amount of text to be sent between one user and another. GPS consists of a network of 24 satellites in six different 12-hour orbital paths spaced so that at least five are in view from every point on the globe. Today, GPS has a wide range of other applications including tracking package delivery, mobile commerce, emergency response, exploration, surveying, law enforcement, recreation, wildlife tracking, search and rescue, roadside assistance, stolen vehicle recovery, satellite data processing, and resource management.

Vehicle Tracking System

A vehicle tracking system combines the installation of an electronic device in a vehicle, or fleet of vehicles, with aim designed computer software at least at one operational base to enable the owner or a third party to track a vehicle's location, collecting data in the process from the field and send it to the base of operation. Modern vehicle tracking systems commonly use GPS technology for locating the vehicle. Vehicle Information can be viewed on electronic maps via the Internet or specialized software. Vehicle tracking systems are also salable in consumer vehicles as a theft protection and retrieval device. Police can simply follow the signal emitted by the tracking system and locate the stolen vehicle. When used as a security system, a Vehicle Tracking System may serve as either an extension to or instead of a traditional Car alarm. Some vehicle tracking systems make it possible to control vehicle remotely, including block doors or engine in case of emergency. The existence of vehicle tracking device then can be used to less the insurance cost.

GSM Overview

The GSM system was designed as a second generation (2G) cellular phone technology. One of the basic aims was to provide a system that would enable greater capacity to be achieved than the previous first generation analogue systems. GSM achieved this by using a digital TDMA (time division multiple access approach). By adopting this technique more users could be accommodated within the available bandwidth. In addition to this, ciphering of the digitally encoded speech was adopted to retain privacy. Using the earlier analogue cellular technologies it

was possible for anyone with a scanner receiver to listen to calls and a number of famous personalities had been "eavesdropped" with embarrassing consequences.

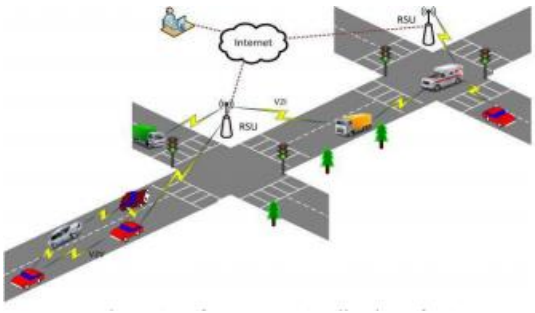
GPS Overview

The GPS project was started in 1973 to overcome the limitations of previous navigation systems, integrating ideas from several predecessors, including a number of classified engineering design studies from the 1960s. GPS was created and realized by the U.S. Department of Defense (USDOD) and was originally run with 24 satellites. It became fully operational in 1994 [1]. The emergency services, for instance, can use GPS not only to find their way to an incident quicker than ever before but also to pinpoint the location of accidents and allow follow-up staff to find the scene quickly. This is particularly useful for search and rescue teams at sea and in extreme weather conditions on land where time can be a matter of life or death.

VANET Overview

VANET belongs to wireless communication networks area, and it is the emerging field of MANET in which vehicles act as the mobile nodes within the network. The basic aim of VANET is to increase safety of road users and comfort of passengers. VANET is the wireless network in which communication takes place through wireless links mounted on each node (vehicle) . Each node within VANET act as both, the candidate and router of the network as the nodes communicates through other intermediate node that lies within their own communication range. VANET are self-organizing network.

It does not depend on any fixed network infrastructure. Although some fixed nodes act as the roadside units to facilitate the vehicular networks for serving geographical data or a gateway to internet. Higher node mobility, speed and quick pattern movement are the main characteristics of VANET. This also causes rapid changes in network topology.



VANET is a particular type of MANET, in which vehicles act as nodes. Unlike MANET, vehicles move on predefined roads, vehicles velocity depends on the speed signs and in addition these vehicles also have to follow traffic signs and traffic signals.

There are many challenges in VANET that are needed to be solved in order to provide reliable services. Stable & reliable routing in VANET is one of the major issues. Hence more research is needed to be conducted in order to make VANET more applicable. As vehicles have dynamic behavior, high speed and mobility that make routing even more challenging.

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. Vehicle Ad hoc Network is a Network which contains mobile nodes that topology constantly changing. The mobile nodes can move quickly from one place to another place. Most current VANET routing protocols select paths according to minimum hop count.

Minimum hop paths have poor performance because they tend to contain wireless links between far nodes. These long wireless links can be slow or loss, 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.

Case study on Seismic Retrofitting Of Historic Masonry Building

Abstract Masonry heritage building built during early part of 19th century have characteristic colonial architecture using masonry walls and jack arch roofing supported on steel beams. They are highly vulnerable to failure during earthquakes. This paper describes a methodology to quantify their vulnerability and then based on this a scheme of structural retrofitting is suggested. The aim of this presentation, through 4 case studies of buildings located in Delhi, India, is to exemplify various aspects of analysis, design and execution methodology of the retrofitting scheme for such important heritage structures. The assessment of vulnerability is based on its location, codes of practice with respect to materials and loading. The main challenge in choosing the appropriate retrofitting scheme lies in retaining the architecture and aesthetics. Also the retrofitting has to be completed in the least possible time causing minimum disturbance to the occupants. This has been achieved through a combination of Ferro-cement bands and FRP sheets. The execution of retrofitting was considered to make use of available local materials and expertise. The building is analysed in detail and the areas where stress concentration takes place is further strengthened.

Keywords: Retrofitting, load-bearing masonry, ferro-cement, ferrocement bands, carbon fibre sheet, brick, burnt clay brick, lime concrete, wire-mesh

Introduction

During 1920's, when Britishers were ruling India, several bungalow type residential buildings were built in Delhi. These 'Lutyens Bungalow Zone' (LBZ) bungalows includes the '1, K.Kamaraj Lane', '12, Teen Murthi Marg', '14, Ashok Road' and '9, Janpath Road'. They are used to accommodate members of the parliament or senior government officials and their families. The buildings are load-bearing masonry structures with roof made of lime concrete and steel joists. At present these buildings are treated as having historic value. In a typical LBZ building there are number of walls in both X & Y direction making the structure act like a box under lateral load. The walls parallel to lateral load act as web and that perpendicular act as flanges. The resistance of the box is much higher than resistance of individual wall. The box action in walls results from interaction between web and flanges. T and L junction becomes effective zones and their satisfactory functioning is responsible for developing this interaction. The detail for the Kamaraj Lane building is presented here.

Description of the Historic LBZ Bungalow The approximate plan size of the building is (21.4 X 18.1m). The building is a (unreinforced) load bearing masonry structure. The walls are made of unreinforced burnt-clay brick masonry. The thickness of the wall of the main portion of the building was 450 mm and for a few peripheral walls the thickness was 290 mm. There are no visible cracks in the wall or roof. The brick or the mortars are not deteriorated. The roof was made of lime concrete and was in the form of jack arches in between steel joists. The spaces

above the arches are filled to have a flat roof top. The plan, front elevation and photographs of the building is shown in Figure.

Structural Model

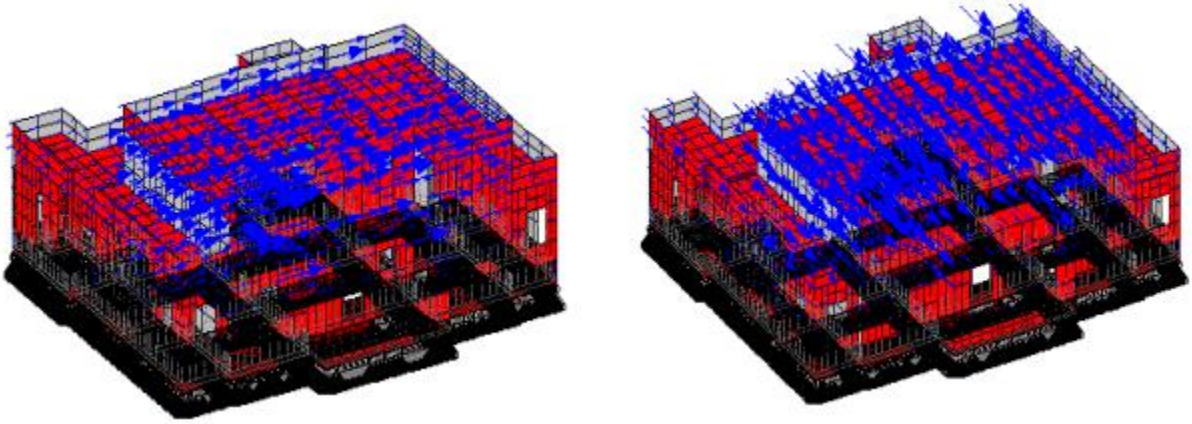
The computer model of the building consists of wall and slab segments created using the plate elements in the structural analysis program STAAD Pro 2006. Brick properties were assigned to wall elements with 290 mm thickness for the outer walls, 450 mm thickness for the inner walls and 650mm at the fire place. Similarly lime concrete properties were assigned for the slab elements with thickness 150 mm for all slabs. The parapet wall also has brick property and is 290 mm thick. The building rests on continuous wall foundation and is assumed to be hinged at the base at the plinth level in the analysis model.

Typical plan of building

Front Elevation of Building

Photography of front elevation of building

The structural model of the building with seismic loading in X&Z directions is shown in Fig.



Computer Method of Analysis Equivalent static (linear elastic) method of analysis is used. In the equivalent static analysis, the essential provisions in IS 1893: 2002, "Criteria for earthquake resistant design of structures", is considered. In static analysis, the vibration, mode shapes or the time-wise variation of the quantities are not considered. Because of the difficulties and uncertainties in a non-linear dynamic analysis, this is not used in the current design. Table shows the parameters used in the analysis.

Parameter used for sysmic analysis

No	Parameter	Values
1	Zone factor	0.24
2	Importance factor	1.5
3	Response reduction factor	1.5
4	Fundamental Natural Period	0.1 sec
5	Rock and Soil Site Factor	2
6	Damping ratio	5%
7	Type of structure	3
8	Depth of foundation	1m below ground level

Results of Analysis

Maximum Compressive stress in Brick Element = 0.385 N/mm2

Permissible Compressive stress in Brick Element = 0.75 N/mm2
Maximum Tensile stress in Brick Element = 0.133 N/mm2
Permissible Tensile stress in Brick Element = 0.0 N/mm2

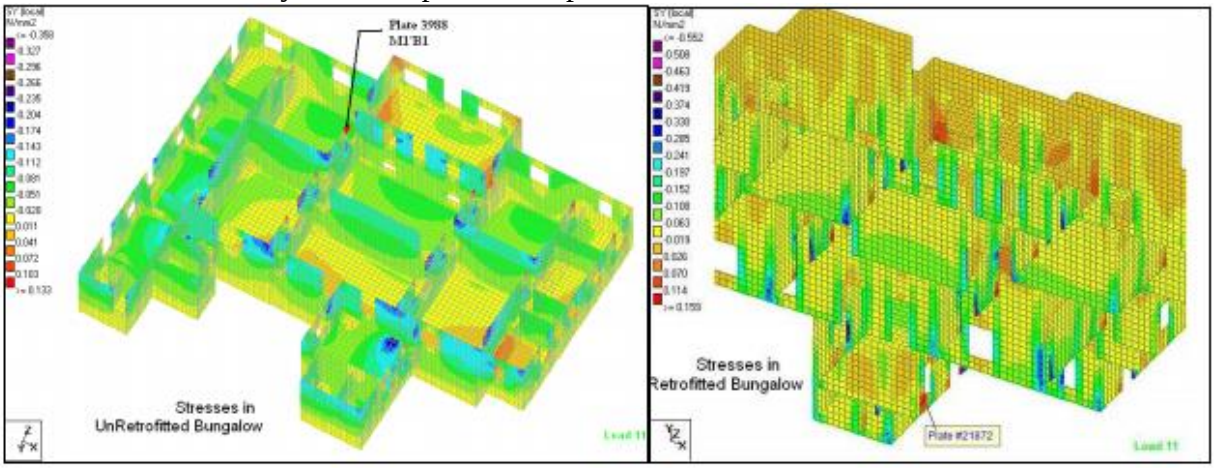
It can be seen that the compressive stress in the brick elements is within the permissible compressive stress. But the tensile stress in brick masonry exceeds the permissible limit. It was concluded that the structure is unsafe under earthquake loading and the structure will be subjected to a large amount of cracks (which may be beyond repair) in the event of an earthquake.

Computer Model Incorporating Retrofitting Scheme
The plate elements that are retrofitted with the Ferro-cement bands are chosen and updated with the combined property of 'masonry with Ferro-cement'. The property for the Ferro-cement band for different thickness of wall is shown in Table.

Properties of Ferro cement band

No	Description	For 450mm wall	For 290mm wall
1	Elastic Modulus kN/m2	8684460	12229630
2	Poison ratio	0.17	0.17
3	Density kN/m3	20.5	20.5
4	Thermal co-efficient	Thermal co-efficient	11 x 10^6

Results of Computer Analysis of Retrofitted Model
The stress values of the computer analysis of the retrofitted model are shown Fig. The stress obtained from the analysis is compared with permissible stress values.



Stress values at critical locations

Maximum Compressive stress in Brick Element = 0.129 N/mm2
Permissible Compressive stress in Brick Element = 0.75 N/mm2
Maximum Tensile stress in Brick Element = 0.036 N/mm2
Permissible Tensile stress in Brick Element = 0.0 N/mm2
Maximum Compressive stress in Ferro-cement Element = 0.619 N/mm2
Permissible Compressive stress in Ferro-cement Element = 2.87 N/mm2
Maximum Tensile stress in Ferro-cement Element = 0.159 N/mm2

Permissible Tensile stress in Ferro-cement Element = 1.124 N/mm2

After retrofitting also, it was seen that there is tensile stress in a few brick elements. But this is very low (< 0.05 N/mm2). Due to these tensile stress in brick masonry, only minor cracks will appear and the tensile stress is taken care of by the Ferro-cement bands.

Conclusion

The procedure described shows how the building can be made safe against earthquake by retrofitting. Retrofitting brings down the stresses to permissible levels, thus enhancing safety. Even after the retrofitting is complete, the original look and feel of the building is retained. Also the strengthening of some beams/slabs was done using Carbon fibre sheet and the overhead tank was strengthened using steel plates. The method used is economic and also recommended by standards.

Chapter 15: Smart and/or Sustainable features of Chapter 8 & 13 designs, Impact on society

For Allocated village development, villagers happiness, comfortable and for enhancement of the village)(**With the Smart village development Concept As Per Your Idea And Village Visit, modern technology with innovation**).

with doing small changes, Period, Amount Expenditure and Benefit –

a) Immediately
b)Within 1 year
c) Long term (3-5 years) along with cost estimation.

If possible, List the sources of the funding available with the Village gram panchayat

Table 50: Sustainability of the design

Part 1

Designs	Design Utilized By	Needs/Benefits	Brief
Public Toilet	The villagers and also otheroutsidevillagers.	In case of emergency or who don't have toilet in their house use anytime.	Public toilet is a room or small building contain one or more toilets for use by the public anytime.
Community Hall	The people of the village and outside villagers for there different purpose.	By designing community hall the function in the village like marriage or party are organised.	The community hall are public locations where members of community tend to gather for group activities or other purpose.
Medical Store	The people of the village and outsider people for there medical use.	It is very useful in case of emergency or by designing it he villagers don't	A pharmacy is a retail shop which provides pharmaceutical drugs among other product. At the pharmacy store, a

		go outside the village.	pharmacist oversees the fulfillment of medical prescriptions.
Cyber Café	The villagers and there relatives for the different uses.	In recent time computer is very useful. For learning or related work can be done by it.	Cyber Cafe is type of business where computers are provided for accessing the internet, playing games, chatting or doing othercomputer related task.
Post Office	The villagers and the outsider people.	It is very useful to the villagers to post and courier.	A post office is public facility that provides mail services, such as excepting letters and parcels, providing post office boxes, Packaging.
Garden	The villagers and nearby outsider.	For walking, cycling and exercise purpose.	Public garden, an urban ground laid with walks, plantings, and building, which offers a variety of entertainment and recreation to the public.

Part 2

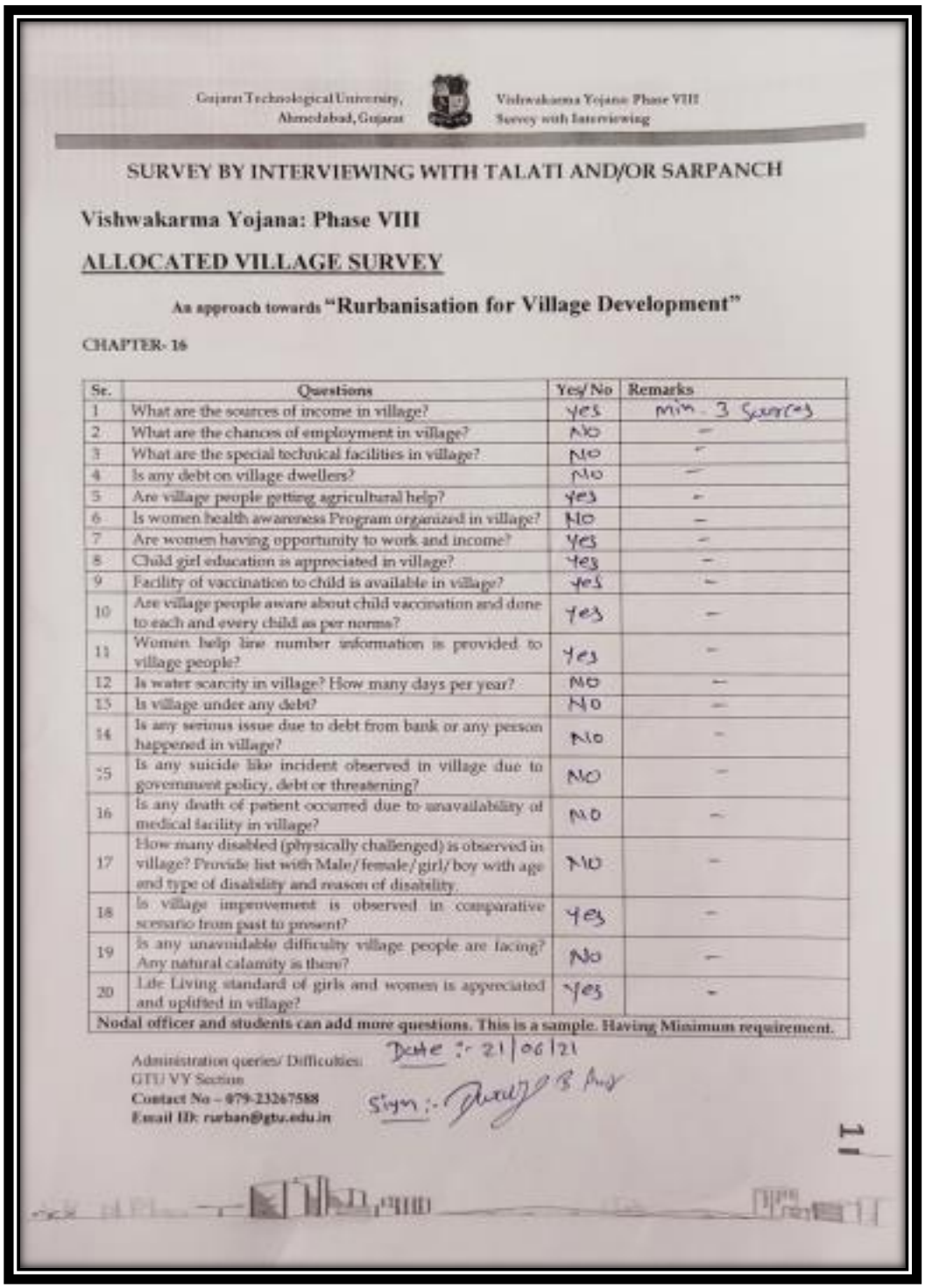
Designs	Design Utilized By	Needs/Benefits	Brief
School	The childern of the village or not are utilized.	In the village there is only one and its primary school. No higher secondary school. So we have designed.	School is a place or building used for instruction, learning and education. School means to train, educate, teach, educate, teach or discipline someone or something.
Bank	The people of the village and outsider people.	In recent time online transaction is very fast.By designing bank with ATM in village villagers do not go outside.	A bank is a financial institution that accepts deposits from the public and creates a demand deposit while simultaneously making loans.
Library	The Students And People For There Use.	The villagers gain some knowledge by reading books.	A place set apart to contain books, periodicals and other material for reading, viewing, listening, study or reference as a room, set of rooms or building where books may be read or borrowed.
Super Market	People living in the village and outsider nearby village.	The grocery easily available in the village.so they don't go outside to the village.	Super market is a self service shop offering a wide variety of food, beverages and household products, organized into sections.
Clinic	All the people who live	There is no clinic in	A clinic is a health that is

	in the village or not are use.	the village.so we have design in case of emergency it is very helpful.	primarily focused on the care of outpatiens. Clinic can be privately operated or publicly managed and funded.
Electric Shop	The people of the village and outsider people.	There is no electric shop in the village. So we have design it.	An electrical shop focused on selling different electrical supplies and electrical devices.

Table 51: Implementation Scenario

Design Name	Implementation	Total Expenditure Amount	Implementation According to Requirement	Implementation (%)
Public Toilet	3 month	536966/-	Immediately	0 %
Community Hall	3 month	2588597/-	Immediately	0 %
Medical Store	1 month	235041/-	Immediately	0 %
Cyber Café	1 month	272844/-	Within 1 Year	0 %
Post Office	2-3 month	937140/-	Within 1 Year	0 %
Garden	3-4 month	1558343/-	Within 1 Year	0 %
School	6 month	8791586/-	Immediatly	0 %
Bank	3-4 month	1777928/-	Within 1 Year	0 %
Library	3 month	1863719/-	Within 1 Year	0 %
Super Market	1 month	682539/-	Within 1 Year	0 %
Clinic	1 month	945036/-	Immediateky	0 %
Electric Shop	1 month	235041/-	Within 1 Year	0 %

Chapter: 16 Survey By Interviewing With Talati and/or Sarpanch



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Survey with Interviewing

SURVEY BY INTERVIEWING WITH TALATI AND/OR SARPANCH

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

CHAPTER- 16

Sr.	Questions	Yes/ No	Remarks
1	What are the sources of income in village?	yes	min. 3 sources
2	What are the chances of employment in village?	NO	-
3	What are the special technical facilities in village?	NO	-
4	Is any debt on village dwellers?	NO	-
5	Are village people getting agricultural help?	yes	-
6	Is women health awareness Program organized in village?	NO	-
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?	yes	-
12	Is water scarcity in village? How many days per year?	NO	-
13	Is village under any debt?	NO	-
14	Is any serious issue due to debt from bank or any person happened in village?	NO	-
15	Is any suicide like incident observed in village due to government policy, debt or threatening?	NO	-
16	Is any death of patient occurred due to unavailability of medical facility in village?	NO	-
17	How many disabled (physically challenged) is observed in village? Provide list with Male/female/girl/boy with age and type of disability and reason of disability.	NO	-
18	Is village improvement is observed in comparative scenario from past to present?	yes	-
19	Is any unavoidable difficulty village people are facing? Any natural calamity is there?	NO	-
20	Life Living standard of girls and women is appreciated and uplifted in village?	yes	-

Nodal officer and students can add more questions. This is a sample. Having Minimum requirement.

Date :- 21/06/21

Sign :-

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

Chapter: 17 Irrigation / Agriculture Activitesand Agro Industry, Alternate Technics and Solution

Irrigation and agriculture activites in Bhutsad village :

The total area is 217 hectares, the Non-Agricultural area is 36 hectares and the total irrigated area is 110 hectares.Paddy, Vegetables, and Banana are agricultural commodities that grow in this village. 8 hours of agricultural power supply in summer and 8 hours of agricultural power supply in winter are available in this village. The total irrigated area in this village is 110 hectares from canals 30 hectares and from Lakes or tanks, 20 hectares are the Sources of irrigation. There is also lake at the entrence of the village.

Figure 113: Farm and Lake

Agro Industry:

Agro-based industry would mean any activity involved in cultivation, under controlled conditions of agricultural and horticultural crops, including floriculture and cultivation of vegetables and postharvest operation on all fruits and vegetables. The development of agro-industries has assumed crucial importance in the economic planning and progress of the country.

Agro Industries are the enterprises, activities. and institutions that deliver material inputs to the farming sector and transform, distribute and otherwise add value to agricultural and food products targeting an identified market demand. Benefits of agro-industries include providing.

Benefits Of Agro-Processing

- Enhanced agricultural productivity and increased farm household incomes.

- Yearround availability of affordable safe and nutritious food.

- Job creation for rural and urban youth.

- Production of fortified foods for vulnerable groups in society.

- Establishment of indigenous food standards.

- Large quantities of agricultural "waste" produced in one location which can be transformed intouseful products such as animal feed.

- Reduce importation of similar or foreign foods and conserve foreign exchange.

- Export to sub-Saharan countries with inadequate resources for agriculture.

Type of Agro Industries I India

- Textile Industry.
- Sugar Industry.
- Vegetable Oil Industry.
- Tea Industry.
- Coffee Industry.
- Leather Goods Industry.

Alternative Techniques and Solution :

With the reducing agricultural land area, water availability and fertility of the soil, along with increasing demands of aquatic fishes & seafood, the need for opting alternative and sustainable methods of farming are becoming a must. There are many such techniques already being adopted in various parts of the world. Out of these techniques, Aquaculture and Hydroponics are popular techniques.

What is Aquaculture?

Aquaculture is the controlled process of cultivating aquatic organisms, especially for human consumption. It's a similar concept to agriculture, but with fish instead of plants or livestock. Aquaculture is also referred to as fish farming. The seafood that you find at your local grocery store is likely labeled as farmed fish. Aquaculture can happen all over the world, and it does: in coastal ocean waters, freshwater ponds and rivers, and even on land in tanks.

The 4 production stages of Aquaculture

- **Hatchery:** Birth or breeding of aquaculture species through the breeding of fish and their hatching from eggs.
- **Feed Mills**: Aquaculture feeds are formulated with a vast pool of ingredients which, when fed to the animal, are intended to supply its nutritional requirements to perform its normal physiological functions, including maintaining a highly effective natural immune system, growth, and reproduction
- **Farm:** The growth cycle of the fish until it reaches its maturity is taken place in the farm stage
- **Processor:** The fish are then transported to a processing facility, where they are packaged and sent to food retailers and grocery stores.

What is Hydroponics?

Plants grow through a process called photosynthesis, in which they use sunlight and a chemical inside their leaves called chlorophyll to convert carbon dioxide (a gas in the air) and water into glucose (a type of sugar) and oxygen. Write that out chemically and you get this equation:

$6CO2 + 6H2O \rightarrow C6H12O6 + 6O2 + Energy$

There's no mention of "soil" anywhere in thereand that's all the proof you need that plants can grow without it. What they do need is water and nutrients, both easily obtained from the soil. But if they can get these things somewhere elsesay, by standing with their roots in a nutrient-rich solutionthey can do without soil altogether.

Advantages

- With smaller roots, you can grow more plants in the same area and get more yield from the same amount of ground (which is particularly good news if you're growing in a limited area like a greenhouse or on a balcony or window-ledge inside).
- Hydroponic plants also grow faster.
- Many pests are carried in soil, so doing without it generally gives you a more hygienic growing system with fewer problems of disease.
- Since hydroponics is ideal for indoor growing, you can use it to grow plants all year round. Automated systems controlled by timers and computers make the whole thing a breeze.

Disadvantages

- The high cost of all the equipment you need—containers, pumps, lights, nutrients, and so on.
- Because hydroponic plants have much smaller root systems, they can't always support themselves very well. Heavy fruiting plants may need quite elaborate forms of support.

Chapter: 18 Social Activities – Any Activities Planned by Students

1. SwachhataAbhiyan :

When we go to the village some parts of the village from the entrance of the gate to school of the village is clean and in this parts all houses are pucca. After that when we go to the end of the village where katchha house there is np cleanliness because of cow and buffalo. We told the people of the village that they should clean the road day by day. We also told that because of the dirt and wastage the people should affect their health.

2. Covid19 Awareness :

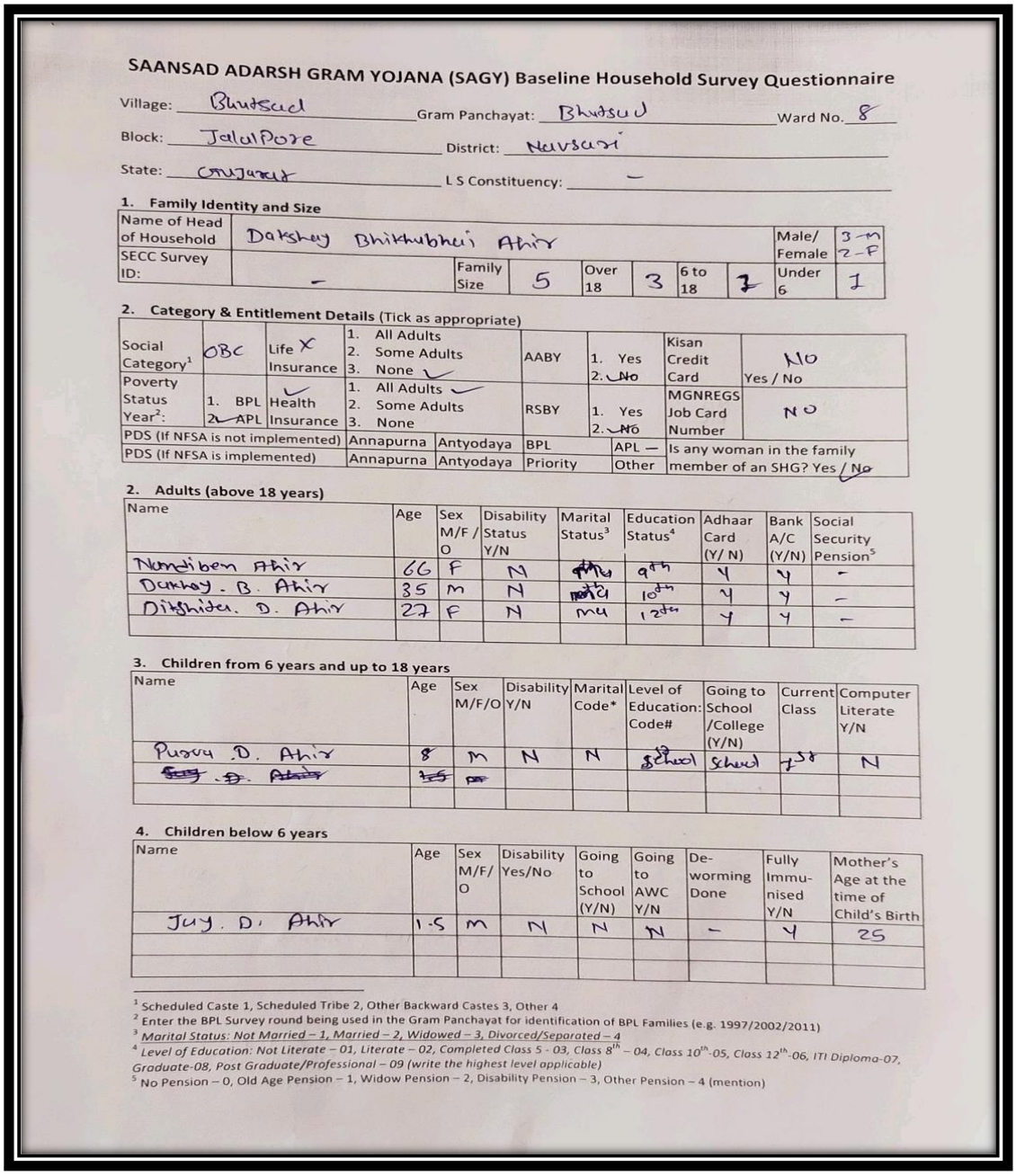
We go to the village and see some people sitting together without mask. We go their and tell them about covid19 awareness. We also told that they should wear mask perfectly and regular when they are go from house. Do hand sanitize when they go public area and then when they go to house wash hand with soap. We also told that the third wave of covid19 is still on the way and stay children at home without any work. We tell them to vaccinated for safety for their health. Also told to away from crowded area and if you are in touch with covid patient before than quarantine yourself for 7 days min in an alone room.

3.Khelo India

We go to the village and told the people of the village and tell the parents and children about khelo India and also tell What is impotance about khelo India. We told them about outdoor sports and mind games like chess to play. Thus they become sharp and stay fit. We met the sarpanch and tell about these.

(with sarpanch)

Chapter: 19 BHUTSAD VILLAGE SAGY Questionnaire Survey form with the Sarpanch Signature (Scanned copy attachment in the soft copy report and Original copy in hardbound report



SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Bhutsad Gram Panchayat: Bhutsad Ward No. 8

Block: Jalalpore District: Navsari

State: Gujarat L S Constituency: –

1. Family Identity and Size

Name of Head of Household	Dakshay Bhikhubhai Ahir							Male/ Female	3-M 2-F
SECC Survey ID:	–	Family Size	5	Over 18	3	6 to 18	1	Under 6	1

2. Category & Entitlement Details (Tick as appropriate)

Social Category[1]	OBC	Life Insurance X	1. All Adults 2. Some Adults 3. None ✓	AABY	1. Yes 2. ~~No~~	Kisan Credit Card	No 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	No
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]
Nandiben Ahir	66	F	N	~~Mrd~~	9th	Y	Y	–
Dakhay. B. Ahir	35	M	N	~~Mrd~~	10th	Y	Y	–
Dikshiben. D. Ahir	27	F	N	Mrd	12th	Y	Y	–

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
Pusva D. Ahir	8	M	N	N	School	School	3rd	N
~~Suraj~~ D. ~~Ahir~~	~~15~~	~~M~~						

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
Jay. D. Ahir	1.5	M	N	N	N	–	Y	25

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

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

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

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

7. Do members take Regular Physical Exercise

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

8. Consumption of Tobacco

	Smoking	Chewing
Adults	No	No
Children	No	No

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 Self	Door Step / Common Point / No Collection System
Homestead Land: Yes / No	Kitchen Garden : Yes / No
Compost Pit: Individual/ Group/ None	Biogas Plant: Individual/ Group/ None

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

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

11. Source of Lighting and Power

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

12. Landholding (Acres)

1. Total	750 sq	2. Cultivable Area	–
3. Irrigated Area	–	4. Uncultivable Area	–

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
Vegetable	kg	–

17. Livestock Numbers

Cows: 5	Bullocks: 0	Calves: 0
Female Buffalo: 0	Male Buffalo: 0	Buffalo Calves: 0
Goats/ Sheep: 0	Poultry/ Ducks: 0	Pigs: 0
Any other: Type Dogs, Horse		No.
Shelter for Livestock: Pucca / Kutcha / None		
Average Daily Production of Milk(Litres): 5lit		

18. What games do Children Play
- Cricket, Carrom

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

Schedule Filled By: Dakshay Ahir
Principal Respondent: Dakshay Ahir
Date of Survey: 21/04/21

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: Bhutsad

b. Block: Jalulpore

c. District: Navsari

d. State: Gujarat

e. Lok Sabha Constituency: –

f. Number of Wards in the Gram Panchayat: 8

g. Number of Villages in the Gram Panchayat: 1

h. Names of Villages:

Bhutsad

Demographic Information

Number of Households 742 Total Population 622 Male 313 Female 309

SC HHs 35 ST HHs 143 OBC HHs above 400 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	NO	
b.	Nearest Primary Health Centre (PHC)	NO	
c.	Nearest Community Health Centre (CHC)	NO	
d.	Nearest Post Office	Yes	–
e.	Nearest Bank Branch (Any)	NO	2.6 km
f.	Nearest Bank with CBS Facility	NO	2.6 km
g.	Nearest ATM	NO	3.6 km
h.	Nearest Primary School	Yes	–
i.	Nearest Middle School	NO	2.6 km
j.	Nearest Secondary School	NO	3.0 km
k.	Nearest Higher Secondary School / +2 College	NO	3 km
l.	Nearest Graduate College	Yes	1.6 km
m	Nearest ITI / Polytechnic Centre	Yes	1.6 km
n	Kisan Seva Kendra	NO	–

1

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

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

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total 1 Public 1 Private 0

b. Mini Stadium : NO 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 -

Names of such villages: -

c. Schools (Number)

Primary Private: - Primary Govt.: 1

Middle Private: - Middle Govt.: -

Secondary Private: - Secondary Govt.: -

Higher Secondary Private: - Higher Secondary Govt: -

VI. Public Distribution System

	Item	Private Contractor	Women's SHG	Gram Panchayat	Cooperative	Other (Mention)	Location in GP (mention Location)	If outside GP, Location & distance from GP HQrs)
a.	Cereal (Rice/ Wheat/ Millets)	NO	NO	NO	NO	-	-	-
b.	Kerosene	NO	NO	NO	NO	-	-	-
c.	Other (mention)	-						

2

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

VII. Coverage of Villages under different Facilities & Services

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

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	–	d.	Pasture / Grazing Land	–	g.	Check Dam	0
b.	Irrigated Land	–	e.	Forests/ Plantations	–	h.	Wells/Bore Wells	0
c.	Un-irrigated Land	–	f.	Other Common Land	–	i	Tanks /Ponds	1

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

3

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

IX. Parameters relating to Households & Institutions

		Number
a)	Number of eligible Households for pension (old age, widow, disability)	-
b)	Number of Households receiving pension (old age, widow, disability)	15(App)
c)	Number of eligible Households who are not receiving pension	-
d)	Number of Households eligible for Ration Card	110 (App)
e)	Number of eligible HHs having ration cards	-
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	-
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	-
h)	Number of active Job Card holders under MGNREGA	-
i)	Number of Job Card holders who completed 100 days of work during 2013-14	-
j)	Number of shops selling alcohol	0
k)	Number of BPL families	30(App.)
l)	Number of landless households	-
m)	Number of IAY beneficiaries	-
n)	Number of FRA[2] beneficiaries	-
o)	Number of Community Sanitary Complexes	-
p)	Number of Households headed by single women	2
q)	Number of Households headed by physically handicapped persons	2
r)	Total number of Persons with Disability in the village	-
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	-

Name and Signature of Surveyor and Respondent'

Surveyor	PRI Respondent (Preferably Gram Panchayat Chairperson)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey
Chauhan Neel	B. Nair	ઉપસરપંચ ગ્રામ પંચાયત ભૂતસાડ તા. જલાલપોર જી. નવસારી	

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

4

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

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

I. Basic Information

a. Village: Bhutsad
b. Ward Number: 8
c. Gram Panchayat: Bhutsad
d. Block: Jalalpore
e. District: Navsari
f. State: Gujarat
g. Lok Sabha Constituency: -
h. Number of Habitations / Hamlets in the Gram Panchayat: -
i. Names of Habitations / Hamlets: -

Demographic Information

Number of Households 141 Total Population 622 Male 313 Female 309

SC HHs 35 ST HHs 143 OBC HHs 400 App. 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	Yes	-
b.	Nearest Middle School	NO	2.6 km
c.	Nearest Secondary School	NO	3.0 km
d.	Kisan Seva Kendra	NO	-
e.	Milk Cooperative /Collection Centre	Yes	-
g.	Health Sub Centre	NO	-
h.	Bank	NO	3.6 km
i.	ATM	NO	3.6 km
j.	Bus Stop	Yes	-
k.	Railway Station	NO	-

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

1

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

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

ii. Road Connectivity

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

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

iii. Drinking Water Facilities

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

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

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

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

iv. Coverage of Habitations under Waste Management System

a. Coverage under Covered Drains: 1 *(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)*

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

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 - All

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

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

vi. Sports Facilities in the Village

a.Number of Play Grounds in the Village (minimum size 200 square meters): 1

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

vii. Education, ICDS

a. Number of Anganwadi Centres: 1

c. Schools (Number)

Primary Private: - Primary Govt.: 1

Middle Private: - Middle Govt.: -

Secondary Private: - Secondary Govt.: -

Higher Secondary Private: - Higher Secondary Govt: -

2

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

viii. Land Category		Area in Acres		Land Category	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	-	d.	Pasture / Grazing Land	-	g.	Check Dam	0
b.	Irrigated Land	-	e.	Forests/ Plnatations	-	h.	Wells/Bore Wells	0
c.	Un-irrigated Land	-	f.	Other Common Land	-	I	Tanks /Ponds	1

ix. Entitlement Related Parameters		
1	Number of active Job Card holders under MGNREGA	-
2	Number of active Job Card holders who have completed 100 days of work	-
3	Number of shops selling alcohol	0
4	Number of BPL families	30 (AD)
5	Number of landless households	0
6	Number of IAY beneficiaries	-
7	Number of FRA beneficiaries	-
8	Number of common sanitation complexes	-
9	Number of SHGs	-
10	Number of active SHGs	-
11	Existence of SHG Federation in the Village (Yes / No)	NO
12	Number of Youth Clubs	-
13	Number of Bharat Nirman Volunteers	-

Name and Signature of Surveyor and Respondent'

Chauhan Neel			
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

ઉપસરપંચ
ગ્રામ પંચાયત ભુતસાડ
તા. જલાલપોર, જી. નવસારી

21-6-21

Chapter: 20 TDO-DDO-Collector email sending soft copy attachment in the report

DEVELOPMENT PRAPOSAL PREPARED FOR BHUTSAD VILLAGE

1 message

Sunil Jaganiya <svj.ced@gdec.in> Fri, 3 Sep 2021 at 3:43 pm
To: ddo-nav@gujarat.gov.in
Cc: sr22062000@gmail.com

Respected Sir/Madam
We are the students of GIDC Degree Engineering College, abrams, Navsari affiliated to
Gujarat Technological University-GTU. GTU has been assigned to Vishwakarma Yojana-
VY in which students survey the Bhutsad village of Navsari district and Design various amenities to deliver to
them making them ideal for living a better life as per requirements & village problem
statements.

In the future, if you need any further information for development then you can use the suggested design and estimations. Furthermore, if you need any technical assistance then feel free to contact us.
Kindly find the attachment of reports for reference.

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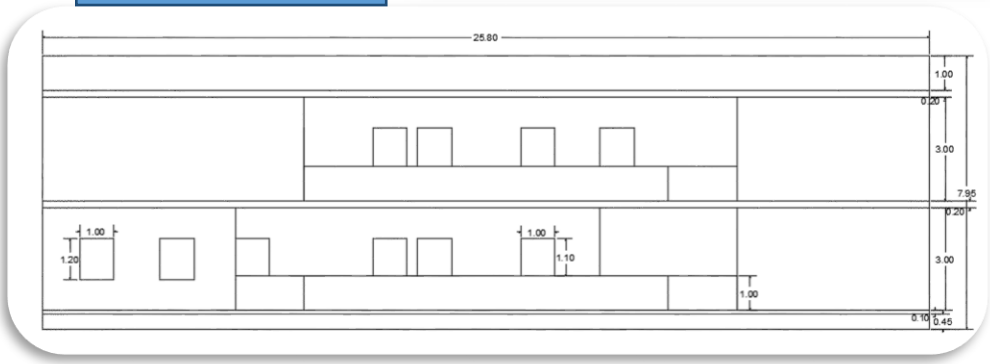
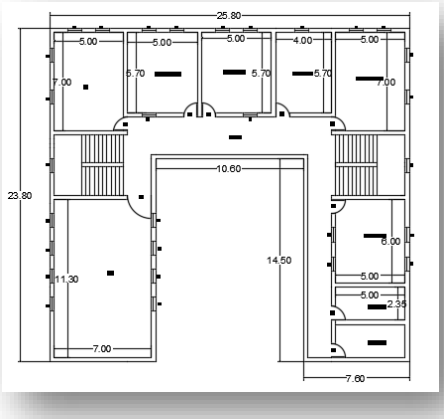
Chapter: 21 Comprehensive report for the entire village

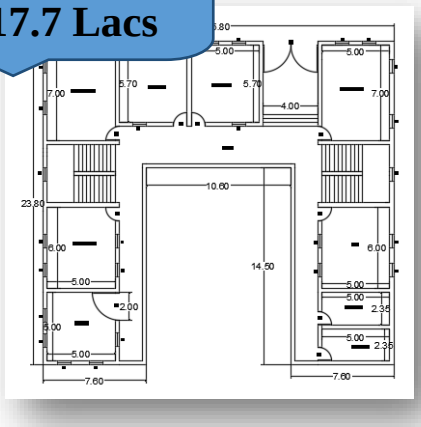
Existing

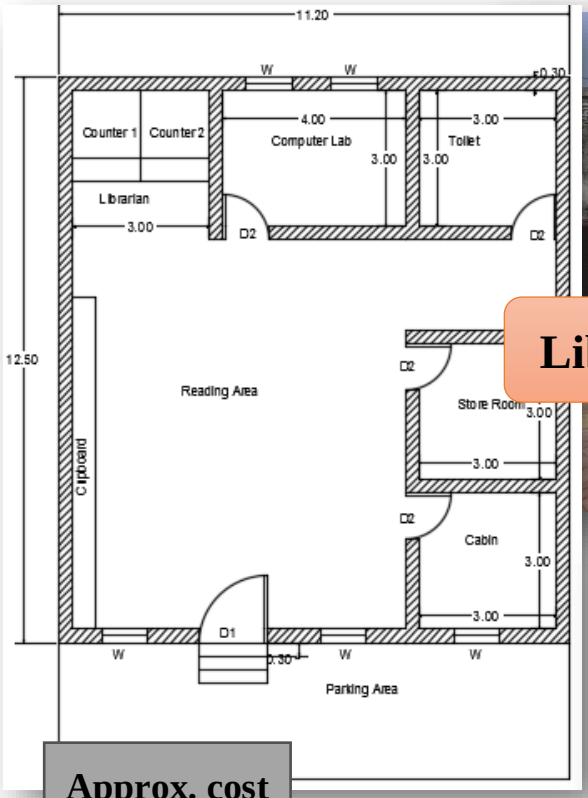
School



Approx cost 17.7 Lacs

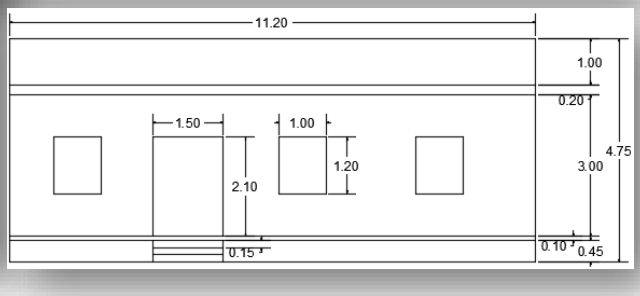






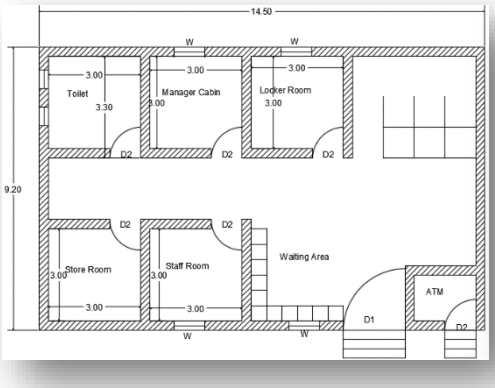
Library

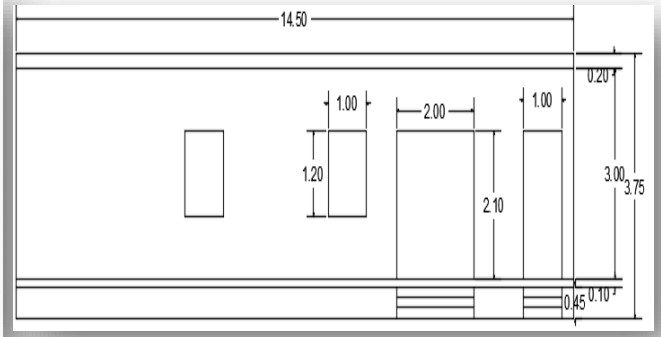
Existing



Approx. cost 18.6 Lacs

Design of Bank





Highlights

- In Part-I VY direct the study of ideal village and after
  that to study the allocated village to difference the situation.
- In Part-I Techno Economy Survey and Smart Village Survey Form had been Filled by the Student for Gap-Analysis And Data Collection Of The Village.
- In Part-II SAGY Questionnaire Form Filled By The Student For Data Collection Of Household.
- In Part-I & II Student have done Following Designed After Data Collection:
    - Public Toilet
    - Community Hall
    - Medical Store
    - School
    - Bank
    - Library
    - Clinic…etc.

Conclusion

The problem observed in rural areas, preventive and renewable measures are suggested. Implementation of improvement will reduce the problem in the area and improve the standard of living of village people. This can be resulted in improving the social and economic effect of rural areas on the economy of the country and it may result in more efficient use of infrastructure.

Designing these amenities will be helpful to the people to the latest environment and grow bit more fast than previous. 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.