DETAIL PROJECT REPORT

VISHWAKARMA YOJANA: VIII
AN APPROACH TOWARDS
RURBANISATION NAKARAVADI VILLAGE

RAJKOT District

PREPARED BY

STUDENT NAME	BRANCH NAME	ENROLLMENT NO
NAIMISH N. MEHTA	CIVIL ENGINEERING	180543106056
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DARSHAN INSTITUTE OF ENGINEERING & TECHNOLOGY

NODAL OFFICER: -

Prof. Rakesh M. Fataniya

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 Engineering successfully submitted

Detail Project Report for,

VILLAGE: - NAKARAVADI

DISTRICT: - RAJKOT

Under

Vishwakarma Yojana: Phase-VIII

in partial fulfillment of the project offered by

GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA

during the academic year 2020-21.

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

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Date of Report Submission:	**16/12/2020**
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Internal(Evaluator) Guide Name and Signature:	Prof. Rakesh M., Fataniya
College Name:	**DARSHAN INSTITUTE OF ENGINEERING & TECHNOLOGY**
College Stamp:	

ABSTRACT

Vishwakarma Yojana project and how you do your vision project:

We're Grateful that we got an opportunity in Vishwakarma Yojana, this provides benefit of project Closest to reality & We can apply our technical knowledge for the development of village.

Rurbanisation is the concept of providing villagers the basic amenities required along with keeping the village soul alive. This project includes design proposals for the village which can decrease migration & increase the aesthetics of Village.

About your village description:

According to Census 2011 information the location code or village code of Nakaravadi village is 512937. Nakaravadi village is located in Rajkot Tehsil of Rajkot district in Gujarat, India. It is situated 12km away from Rajkot, which is both district & sub-district head quarter of Nakaravadi village. As per 2009 stats, Nakaravadi village is also a gram panchayat.

About existing village condition:

Nakaravadi Village is located in Rajkot District & Rajkot's Development will directly benefit the village. Village right now lacks many basic necessities but some development can be proved vital as village comes between many trip inviting Roads.

About your proposed designs your view for village development:

We've provided some helpful design to the village which can reduce migration to city & crucial for better living standard of life. We've made Health Centre, Public Toilet, Community Hall, Public Library, Bus Stop.

About future scope of the village development:

Nakaravadi can be developed well if the road network between Rajkot & Kankot is widened & it can reduce a lot of distance between them.

Key Words: Rural Development, Geographical Importance

ACKNOWLEDGEMENT

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

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

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

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

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We are also thankful to our **Prof. (Dr.) R.G. Dhamsaniya** Principal, faculties of our college for their encouragement and support to complete this project work.

An act of gratitude is expressed to our internal guide / Evaluator **Mr. Rakesh Fataniya**, **Darshan Institute of Engineering and Technology** for their invaluable guidance, constant inspiration and active involvement in our project work.

We are also thankful to all the experts who provided us their valuable guidance during the work. We express our sincere thanks to, **Dr. Jayesh Deshkar, Hon'ble Director, Prof. G.A.Patel, GEC, Patan, Prof. Y.B.Bhavsar, VGEC, Chandkheda, Prof. K.L.Timani, VGEC, Chandkheda, Prof. Paresh Nimodiya, GEC, Patan** for providing us technical knowledge throughout the project work.

We are also thankful to **Ms. Darshana Chauhan, Project Co-ordinator, Vishwakarma Yojana**, for all support during our work. We therefore, take this opportunity for this project work expressing our deep gratitude and sincere thanks to her that without whose help and cooperation, it might not have been possible for us to produce this project work in the present form.

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

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Chapter 1 – Ideal village visit from District of Gujarat State

1.1
Background: -

- According to Gandhiji, the making of an ideal village is very simple.

  He says: "An ideal Indian village will be so constructed as to lend itself to perfect sanitation. It will have cottages with suffi

  cient light and ventilation built of a material obtainable within a radius of five miles of it. The village lanes and streets will be free of all avoidable dust. It will have wells according to its needs and accessible to all.

- Ideal village is a concept adopted by national, state and local governments of India, as an focused on holistic rural development, derived from Mahatma Gandhi's vision of Adarsh Gram (ideal village).

Study Area Location: -

- According to Census 2011 information the location code or village code of Kankot village is 512972. Kankot village is located in Rajkot Tehsil of Rajkot district in Gujarat, India. It is situated 9km away from Rajkot, which is both district & sub-district headquarter of Kankot village. As per 2009 stats, Kankot village is also a gram panchayat.

Figure 1 Base Map

Table 1 Ideal Village Detail

VILLAGE	KANKOT
TALUKA	RAJKOT
DISTRICT	RAJKOT
STATE	GUJARAT
LANGUAGE	GUJARATI, HINDI ,ENGLISH
TIME ZONE	IST (UTC+5:30)
PINCODE	363621

1.2 Concept: Ideal Village, Normal Village: -

Mahatma Gandhi had once said that 'The future of India lies in its villages'. Even today, villages are like the backbone of a country where almost seventy percent of our population dwell. In order to call a village an ideal one, it should have the following traits:

1.2.1 Objectives: -

- **Villagers or Inhabitants**

A village is formed, governed and maintained by its villagers. The People of an ideal village should be honest and hard-working. They should possess qualities like tolerance to every faith and religion, brotherhood and unity. They should live like a large family and help one another in the hour of need. They should have a sense of discipline and a spirit of service before self. They should keep themselves abreast of not only the happenings of the village but also of the country and the world as a whole. They should always be active and cheerful. Simple living and high thinking should be their motto in life.

- **Basic Infra-structures**

Besides the people, an ideal village should have the following basic infra-structures:

- **Good Connectivity**

Good connectivity is one of the most essential requirements of an ideal village. The village should be well-connected to other parts of the country by roads and also by rails, if possible. The streets and lanes of the village should also be well maintained so that people can easily commute from one part to another.

- **Houses**

The houses should be neat and clean. They should be well-ventilated to allow free flow of light and air. There should be good arrangement for proper sanitation and drainage system.

- **Sufficient sources of potable water**

An ideal village should have good supply of clean drinking water. There should be enough wells, tube-wells and even submersibles to meet the needs of the villagers. It would help everyone get good drinking water. There should also be separate ponds for villagers to take bath and to get water for their cattle.

- **Proper sanitation and drainage facilities**

An ideal village should have good system of sanitation and drainage so that dirty water and waste can be easily drained out. It would help the village keep clean and free from many diseases caused by filthy water. It would also save the villagers from water-logging during the rainy season.

- **Pasture land for cattle**

Almost every villager living in a village keeps cattle. There should be enough paster land for grazing of their cattle. Generally, it should be within the village, at a distance from the houses or just outside the village

- **Food and fodder**

The villagers grow food and vegetables not only for themselves but also for the urban people. They also grow fodder for their cattle. They also produce dairy, poultry and other products for their own consumption as well as for supply to urban areas. There should be proper arrangements in the village itself to provide them with good seeds and all assistance related to their produces.

- **Wholesale market within the village**

Most of the people living in villages are farmers by profession. They grow food crops, cash crops and fodders in their fields. While they consume the food crops for themselves and the fodder for their cattle, the cash crops the other surplus products are sold in the market to meet their other requirements. There should be provision for wholesale market in the village itself so that the villagers can sell their surplus products there at reasonable rates and get good return. This would save them from the hands of the middle men and bring prosperity.

- **Healthcare Centers and hospitals**

Besides food, the other most important aspect of human life is health. An ideal village should have proper facilities taking care of the health of the villagers as well as of their cattle and poultry. There should be one-two healthcare centers depending upon the population of the village. A small hospital also adds to the quality of such a village. Besides health centers for the villagers, veterinary dispensaries should also be there to take care of their live-stock.

- **Educational facilities**

An ideal village should have proper arrangements of education for the children. There should be Primary schools and High schools so that the little children need not go out of the village for education. Primary education should be free and compulsory for every child up to a certain age. There should also be soft skills training centers and preferably an adult education centre for the elders who want to get education.

In addition to the above, some other facilities like a post-office, college, playground for children and a meeting place for elders should also be part of an ideal village.

- **Conclusion**

In a nutshell, an ideal village should have all possible provisions and basic intra-structures for the all-round development of the people living there. The life in such a village would be such as would never lure a person to leave his home and dowel in an urban area.

1.2.2 The idea of Smart Village: -

Smart Village is a concept adopted by national, state and local governments of India, as an initiative focused on holistic rural development, derived from Mahatma Gandhi's vision of Adarsh Gram (I11deal Village) and Swaraj (Self Reliance)

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

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

Rural electrification is seen as a key mechanism to: improve living standards. Increase income through 'income generating activities' and improve community services such as education and healthcare. However, to date, mechanisms to implement rural electrification projects are far from perfect as problems with dissemination and sustainability in rural areas have not abated. As puts it "rural electrification is a complicated issue because of user affordability, rural inaccessibility and remoteness, low population densities and dispersed households, low project profitability, fiscal deficit, scarcity of energy resources, population growth, lack of professionalism, and over-dependence on subsidies."

Ancient/ Existing Civil concept study as a Literature Review for village development: -

Ancient Indian Technology: The Indus Valley Civilization was situated in a resourcefully rich area. This area was noteworthy for its early application of city planning and sanitation technologies. Cites in the Indus Valley, offer some of the first incidences of closed gutters, public baths, and communal granaries.

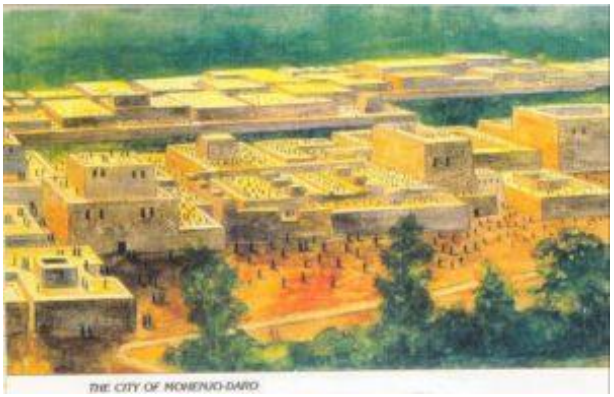
Ancient Indian Technology Civil Engineering Water Management

Ancient Indian Technology: The Indus Valley Civilization was situated in a resourcefully rich area. This area was noteworthy for its early application of city planning and sanitation technologies. Cites in the Indus Valley, offer some of the first incidences of closed gutters, public baths, and communal granaries.

Ancient Indian Technology

Ancient India was quite similar to that in modern times. This was because even during the ancient times, India was at the forefront of different areas of technology. For instance, in seafaring technology – a panel traced at Mohenjo-Daro, which indicates the possibility of a sailing craft.

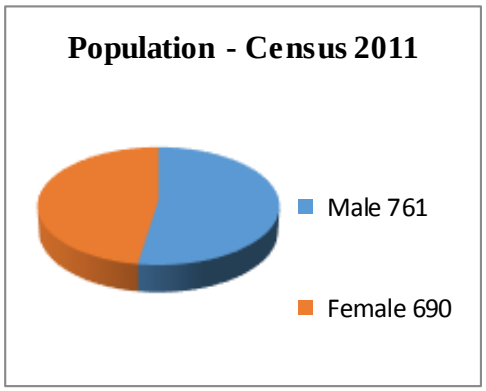
Ancient Indian Technology: Civil Engineering



From complex Harappa towns to Delhi's Qutub Minar, India's indigenous technologies were highly sophisticated. They included the design and planning of water supply, traffic flow, natural air conditioning, complex stonework, as well as construction engineering.

The Harappa Civilization was the world's first to build planned towns with underground drainage, civil sanitation, hydraulic engineering, and air-cooling architecture. While the other ancient civilizations of the world were small towns with one central complex, this civilization had the distinction of being spread across many towns. These towns covered a region about half the size of Europe.

1.3 Detail study of Ideal Village: -



Demographical Detail: -

Total Population 1451 with total house holds 257

Socio Economic: -

Name of three major occupation groups in village	Farming/Agriculture
	Private Job
	Industrial Work

Table 2 socio economic data

Infrastructures details:

Figure 2. Public School, Kankot

Figure 3 Kankot Lake (Nyari 1)

Figure 3 Our Interaction with Sarpanch

1.4 SWOT analysis of ideal village: -

Strength	Weaknesses	Opportunities	Threats
Proper drainage facilities	Improper disposal of waste	Improving in waste management	Lack of awareness of villagers about cleaning
Transportation facilities	Improper layout of village	Woman empowerment	Lack of awareness of villagers about educations
Sanitation facilities	No facilities for higher secondary Education	Educational awareness	Lack of funds and technical knowledge in agricultural fields

Table 3 SWOT analysis of ideal village

1.5 Future prospects of village: -

From our visit we saw that even ideal village lacks some basic facilities like Public Toilet, Hospital & Garden. But the nearness to city like Rajkot is a big boon for Kankot as the rapid growing nature of Rajkot can give overall development to Kankot.

1.6 Benefit of the visit of Ideal Village: -

From our visit we got a chance to interact with villagers, Sarpanch & Tehsil of village & it was very lucky of us to physically see the state of amenities & understanding requirements of an *IDEAL VILLAGE*.

1.7 Electrical /Civil aspects required in Ideal Village: -

- Public Toilet
- Hospital
- Medical shop
- Bank & ATM facility
- Public Garden
- Overhead Tank

Chapter 2. Village Literature Review

2.1 Introduction: Urban and Rural: -

Urban Area	Rural Area
An urban area is a human settlement with high population and infrastructure facilities of built environment. Urban areas are created through urbanization and are categorized as cities, towns, or sub urban settlements are proper, planned settlements built up according to a process called urbanization. According to census 2011, there are 7,935 towns, 4,041 statutory town and 3,894 census towns.	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 on the basis of natural vegetation and fauna available in a region. According to census 2011, there are 6, 40,867 villages in India. The area where more than 75% of male population is associated with agricultural activity is known as rural area

Table 4 urban and rural introduction

2.2 Importance of Rural Development: -

Rural development is important not only for the majority of the population residing in a rural area but the growth of rural activities is necessary to stimulate the speed of overall economic expansion of the nation.

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

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

2.3Ancient Village / Different Definition of Rural Urban: -

Village:

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 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:
   - A minimum population of 5,000;
   - At least 75 per cent of the male main working population engaged in non-agricultural pursuits.

2.4 Scenario: Rural / Urban village of India population Growth

The report speculates that by 2050, the urban population will have increased to 87.7 million and the rural population will account for 78.3 million people. However, this overhaul will take place somewhere after 2045 itself, suggests the data.

The urban population of India has seen a rise from 17.1 per cent to 29.2 per cent between 1950 and 2015. Meanwhile, the rural population declined from 82.9 per cent (in 1915) to 2015's 67.2 per cent. The speculation for the year 2050 suggests that the urban-rural segregation will be 52.8 and 47.2 with a difference of 5.6 per cent.

The population growth rates in both urban and rural areas suggest a similar story. The urban rate has consistently overpowered the total population growth rate over the last seventy years. This trend is set to continue for the next 30 years.

There was a clear increase in the population growth rate from 1950 to 1975. But, the growth rate took a hit as a result of the forced sterilization program under the Indira Gandhi government.

Though the effect was not as evident in rural parts, the overall rate of population growth declined in those years. It came down to 1.23 from the all-time high figure of 2.31 during 1975-80.

The urban population saw a steep decline following the implementation of the sterilization program with the growth rate decreasing to 3.35 from 3.84 in the year 1975.

The report suggests that the rural population growth rate will turn negative in the next fifteen years. Thus, in 2050, it is expected to be 1.06, in contrast to the urban growth rate of 1.54.

The report suggests that the rate of urbanization, which has been increasing since 1950, is expected rise further till 2035. It is supposed to start decreasing slightly in the next few years.

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

As per 2011 census, Gujarat's total population has reached 6.03 crore in 2011 year, while the urban population has raised 6% during last two censuses, this figure is shows that, Gujarat is one of the fastest growing state in India in terms of urbanization. During 2001-2011 Gujarat's population has

increased by 97, 12,611 at the growth rate of 19.17 %. Here we notice that the decadal growth of population of the state is declined by 3.49% from 22.66% as compared to previous decades. In view of comparison of Indian states, in terms of total population, Gujarat is stood at 10th place. Its share proportion is 5% in population and 6 % in geographical area of the country. According to Census 2011, total population of Gujarat state is 6, 03, 83,682 with 3, 14, 82,282 males and 2, 89, 01346 females.

Year	Gujarat			India		
	Urban Population	Share of Urban	Decadal Growth	Urban Population	Share of Urban	Decadal Growth
1951	4.43	27.23		62.4	17.29	
1961	5.31	25.74	19.64	78.9	18	26.44
1971	7.49	28.06	41.05	109.1	19.91	38.22
1981	10.6	31.1	41.52	159.5	23.7	46.23
1991	14.24	34.47	34.34	217.2	25.71	36.09
2001	18.93	37.36	32.94	285.4	27.78	21.35

Table 5 scenario of rural/urban village of Gujarat as per census 2011 and latest

2.6 Rural Development Issues - Concerns – Measures: -

Related to People: -

- Traditional way of thinking.
- Poor understanding.
- Low level of education to understand developmental efforts and new technology.
- Deprived psychology and scientific orientation.
- Lack of confidence.
- Poor awareness.
- Low level of education.

Agriculture Related Problem: -

- Lack of expected awareness, knowledge, skill and attitude.
- Unavailability of inputs.
- Poor marketing facility.
- Insufficient extension staff and services.
- Multidimensional tasks to extension personnel.
- Small size of landholding.

Economic Problems

- Unfavorable economic condition to adopt high cost technology.
- High cost of inputs.
- Under privileged rural industries

Leadership Related Problem

- Leadership among the hands of inactive and incompetent people.
- Self-interest of leaders.

Administrative Problems

- Political interference.
- Lack of motivation and interest.
- Unwillingness to work in villages.
- Improper utilization of budget.
- No proper monitoring of programs and lack in their implementation.

2.7 Various infrastructure guidelines/Norms for Villages for the provisions of different infrastructure facilities: -

Norms for village for the provisions of different infrastructure facilities

Facilities	Planning Commission/UDPFI Norms	Required as per Norms
Education		
Anganwadi	Each Village	1
Primary School	Each Village	1
Secondary School	Per 7,500 Population	2
`	Per 15,000 Population	0
College	Per 125,000 Population	0
Tech. Training Institute	Per 100,000 Population	0
Agriculture Research Centre	Per 100,000 Population	0
Medical Facility		
Gov./Panchayat Dispensaryor Sub PHC or Health Centre	Each Village	1
PHC & CHC	Per 20,000 Population	0

Child Welfare and MaternityHome	Per 10,000 Population	1
Hospital	Per 100,000 Population	0
Transportation		
Pucca Village Approach Road	Each Village	
Bus/Auto Stand Provision	All Villages connected by PT (ST Bus or Auto)	1
Drinking Water		
Water Facilities		
Over Head Tank	1/3 of Total Demand	1.6 lac cap
U/G Sump	2/3 of Total Demand	3.2 lac cap
Public Latrines	Each Village	60
Cremation Ground	Per 20,000 Population	1
Post Office	Per 10,000 Population	1
Gram Panchayat Building	Each individual/group Panchayat	1
APMC	Per 100,000 Population	0
Fire Station	Per 100,000 Population	0
Police Station	Per 15,000 Population	0
Community Hall	Per 10,000 Population	1

Table 6 infrastructure guidelines

2.8 Other Projects / Schemes: -

Followings are the schemes or projects by govt. sector:

1. Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)
2. Pradhan Mantri Gram SadakYojana (PMGSY)
3. Indira AwasYojana (IAY)
4. Swachh Bharat Mission (Gramin) (SBM)
5. Saansad Adarsh Gram Yojana (SAGY)
6. Pradhan Mantri Awas Yojana (Rural)
7. Integrated Watershed Management Programme(IWMP)
8. National Rurban Mission.

Chapter 3: Smart Village Concept as per your Idea & its Visit

3.1 Concept, definition and Practices: -

Concept: -

Smart Village is a concept adopted by national, state and local governments of India, as an initiative focused on holistic rural development, derived from Mahatma Gandhi's vision of Adarsh Gram.

Definition: -

Smart Village refers to a concept developed in rural area that provides solutions to problems occurred and improves the quality of life. The main problems faced by rural areas are cover poverty, low level of education, and limited access to technology.

3.2 Vision-Goals, Standards & Performance Measurement Indicators:-

In India there are 6,00,000 villages out of them 1,25,000 villages are backward so there is a need for designing and building the village as a smart village. With modernization and urbanization people migrate from one place to another place for different facilities such as education, employment and affinity of people towards the locality or city. Village is main criteria for development of nation. So, develop the village in such a way that which is self-dependent in providing the services, employment and well connected to the rest of the world i.e. smart village. The smart village corrects the social oversight by providing accommodations for sustainable family relationships without disturbing the lifestyle of different generations. The vision of smart village is that modern energy access can act as catalyst for development in education, health, productive enterprise, clean water, sanitation, environmental sustainability and participatory democracy which helps to support further improvement in access to energy. Initially the concept of development of village is of Mahatma Gandhi i.e. swaraj and suraj village. But, now days it is newly termed as smart village. We know that, India is a developing nation, with the help of smart village we can make India as a Developed nation. Now days, our government also gives strong focus on smart village. Government implements so many schemes on smart village.

CITY keys provide a validated, holistic performance measurement framework for monitoring and comparing the implementation of Smart City solutions, with the objective of speeding up the transition to low carbon, resource-efficient cities.
The indicators are arranged in an extended triple bottom line sustainability framework, including the themes people, planet, prosperity, governance and propagation, and completed with specific

smart city indicators. Under the main themes, subthemes conforming to major policy ambitions have been identified.
All indicators have been described in detail, with an indication of expected data sources. As such the indicators are ready for use. The first use of the indicator sets was in the testing of the indicators in smart city projects or cases in the CITY keys partner cities.

3.3 Technological Options: -

Smart infrastructure:
Having a smart infrastructure means that a city can move forward with other technologies and use the data collected to make meaningful changes in future city plans.
Smart transportation:
A smart city supports multi-modal transportation, smart traffic lights and smart parking. By making parking smarter; people spend less time looking for parking spots and circling city blocks. Smart traffic lights have cameras that monitor traffic flow so that it's reflected in the traffic signals.
Smart energy:
Both residential and commercial buildings in smart cities are more efficient, using less energy, and the energy used is analyzed and data collected. Smart grids are part of a development of a smart city, and smart streetlights are an easy entry point for many cities, since LED lights save money and pay for themselves within a few years.

3.4 Road Map & Safe Guards:

New avenues

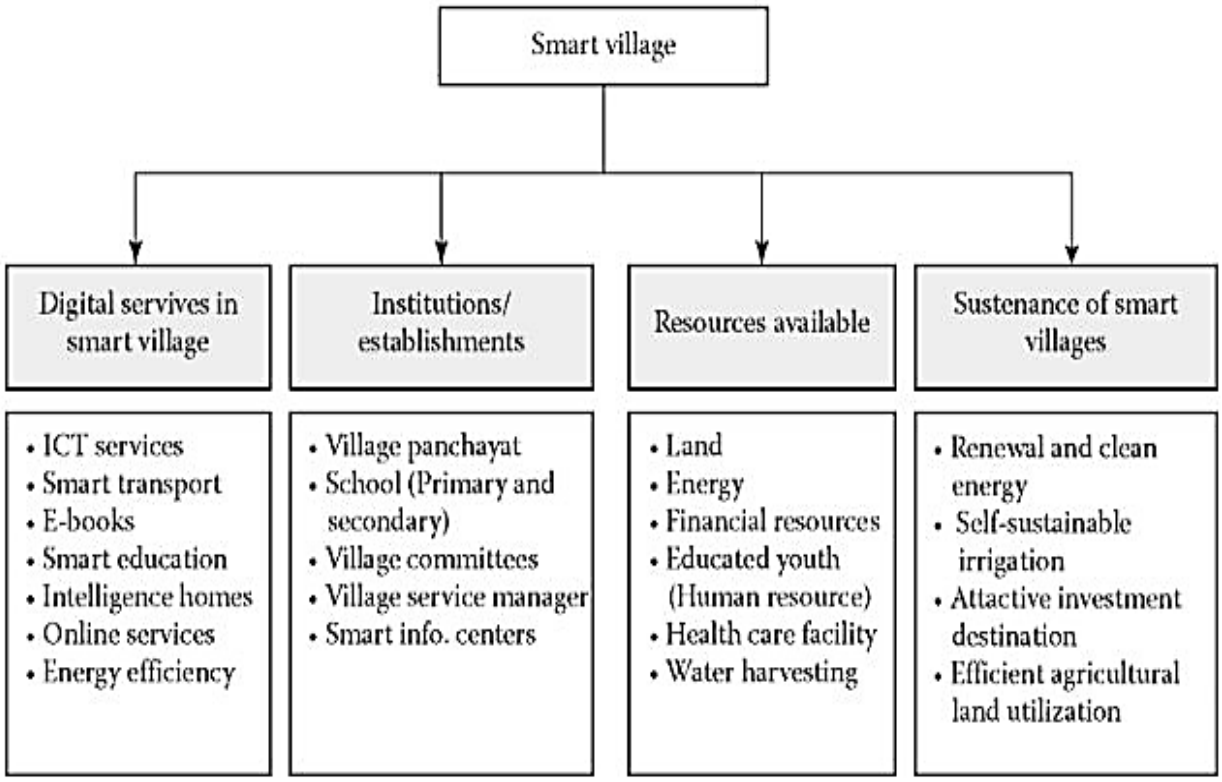
Like any other field agriculture needs to be viewed with a new prism to make it economically rewarding. Most of the initiatives targeted to transform agriculture have always been seen as philanthropy gestures, not as a sustainable business model in India. The country is supporting start-up culture to give boost to entrepreneur skills among youngsters. There must be some provision where government bodies support the idea of reviving agriculture through various transformative solutions like opening up of market for agriculture produce in strategically targeted locations for greater economic output, providing technical and financial support to the new ideas of marketing and innovation.
For example: a growing demand in cities for organic and chemical-free food was driving a spurt in online and offline stores that sell such products. Many social enterprises were being formed and the concept was being widely discussed to enable villagers to market their goods to cater to this demand. Even Prime Minister Narendra Modi has promoted the idea in many of his election speeches in north eastern states. Rural Development Ministry must take this into account.

Government Initiatives

Pradhan Mantri Gram Sadak Yojana (PMGSY) has proved to be a transformative scheme. Thousands of villages which were cut-off from the outside world were connected. The national rural road construction program has built paved roads to over 100,000 villages since its launch

in 2000. *A* research report 'Market Access and Structural Transformation: Evidence from Rural Roads in India' by Sam Asher and Paul Novosad examines the labor market consequences of high rural transport costs by estimating the causal effects of a USD 37 billion rural road construction program, which has provided over 100,000 Indian villages with paved connections to the wider road network. It states, "These effects are driven by villages close to large cities, where a new rural road represents a larger proportional decrease in total transportation costs to external demand for rural labor and production." Similarly, the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) has brought significant improvement in employment generation in rural India. The scheme that is termed the biggest poverty reduction scheme provides jobs to over 50 million households. However, the government needs to find out some innovative ways through which rural workforce can be provided skills and improve their employability in the evolving markets in rural India.

3.5 Issues & Challenges:



Budget Constraints

There is a huge issue of budget constraints, which essentially has limited innovative thinking and created obstacles for many other initiatives. The budget constraints have created many hindrances for a lot of smart initiatives that if properly nurtured could be more cost- effective and efficient

Smart Technology

It is considered that smart technology for these smart villages is still in the pre-commercial or in some cases the conceptual stage. And since the technology is in the pre-mature or conceptual stage, it generates uncertainties regarding return on investment as far as financial parameters are concerned. This also results in apprehension of a long payback period, and investors are unwilling to invest, which contributes to financial uncertainties for smart technology initiatives (Hirst et al., 2012).

Lack of Knowledge

The other challenges related to smart village initiatives in India is the lack of knowledge of the people using modern technology. The citizens' experience of these smart technology initiatives has largely not been good for several reasons, one of which is due to the paucity of knowledge of the common people as to how to use modern digital technologies, Internet and other modern technology, and also the fact that there are very few people, especially in rural areas of India, as with other parts of the developing world, who know how to efficiently use and apply modern digital technologies, such as "smart meters" (Bracknell Forest Homes). There are other constraints that, though not so vital, also deserve mention, such as lack of technology-related skills, constraints on integration, and limited understanding and influence over the basic available services.

3.6 Smart Infrastructure – Intelligent Traffic Management

Smart Information and Communications Technology (smart ICT) has the potential to transform the way we plan and manage infrastructure. New developments in computer hardware, new applications and software are changing the face of the infrastructure sector, and society more generally; driving greater efficiency, increasing productivity, and greatly simplifying construction processes and life-of-asset maintenance.
Building information modelling (BIM) is a powerful new ICT tool that can achieve efficiencies in construction. According to many of the submitters to this inquiry, BIM brings the construction industry into the digital age. 2.6 The simplest definition of BIM is ‘a digital representation of the physical and functional characteristics of a building’. BIMcan provide a shared knowledge resource or single source of truth for all of the parties to a particular construction project.

3.7 Cyber Security:

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

3.8 Retrofitting

Retrofitting is the process of addition of new features to older buildings, heritage structures, bridges etc. Retrofitting reduces the vulnerability of damage of an existing structure during a near future seismic activity. It aims to strengthen a structure to satisfy the requirements of the current

codes for seismic design.

- Fiber Reinforced polymer(FRP) composites.
- External plate bonding.
- Near Surface Mounted FRP bars or Strips.
- Section enlargement.
- External post-tensioning.
- Grouting.
- Epoxy Injection.

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) plus a Pan-city initiative in which Smart Solutions are applied covering larger parts of the city. Below are given the deions of the three models of Area-based smart city development:

Redevelopment will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizens. For instance, a new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage. Two examples of the redevelopment model are the Saifee Burhani Upliftment Project in Mumbai (also called the Bhendi Bazaar Project) and the redevelopment of East Kidwai Nagar in New Delhi being undertaken by the National Building Construction Corporation.

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

Challenge: -

The global urban population is expected to nearly double to 6.4 billion by 2050, with about 90% of the growth in low-income countries. The predicted increase in the number of urban slum dwellers is to 2 billion in the next 30 years (Global Water Partnership, 2013). In India, the number of people living in urban areas is expected to more than double and grow to around 800 million by 2050. This will pose unprecedented challenges for water management in urban India. The Indian economy and society already face daunting challenges in the water sector, as we move into the second decade of the 21st century. The demands of a rapidly industrializing economy and urbanizing society come at a time when the potential for augmenting supply is limited, water tables are falling and water quality issues have increasingly come to the fore.

Solution: -

- Urban Groundwater Management in India
- Focus on Recycling and Reuse of Wastewater
- Less dependency of Industries on Fresh Water
- Protect and Prioritize Local Water Bodies
- Need to Shift Focus to Management and Distribution

3.11 Initiatives in village development by government:

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

3.12 Smart Initiatives by District Municipal Corporation:

Ahmedabad Parivartan, also known as the Slum Networking Programme (SNP), commenced in September 1995. It is a participatory approach towards achieving sustainable water and sanitation solutions in the slums of Ahmedabad city. The project was undertaken by the Ahmedabad Municipal Corporation (AMC) in partnership with the residents of the slums and chawls in the city and NGOs, with a view to enhance the quality of life and health in the slums through the provision of basic services of water and sanitation. This program encompasses various measures on basic water and sanitation infrastructure such as household connections for water supply and sewerage, storm water drainage, and solid waste management and includes social aspects such as community mobilization, institution building, and micro enterprise formation. It was a unique program where the beneficiaries directly participated in the project by contributing towards the costs and later managing the assets themselves, thereby creating an effective means to ensure ownership and sustainability of the project.

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

Migration to Urban area & Congestion in Urban area are problems to many countries. We need to form a portal or a website where we can share ideas of our implementation globally & take inspiration from other countries' rural development.

Exchange of Knowledge & Ideas is what require to develop altogether!

3.14 Electrical concept (Design Ideal and Prototype model) Ideal Electrical Design:

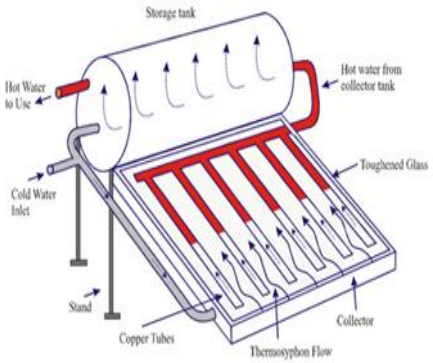
1) Smart Energy Meter:

A smart meter is an electronic device that records information such as consumption of electric energy, voltage levels, current, and power factor. Smart meters communicate the information to the consumer for greater clarity of consumption behavior, and electricity suppliers for system monitoring and customer billing.

2) Internet availability:

Yet, a major section of India is still ignorant and desperately seeks to partake in the benefits of digital and high-tech development. This section is the rural India. Many problems of the villages can be sorted easily with the full utilization of this technology and in some places with Internet introduction. The importance of internet facility in rural development cannot be denied. Let's look at some major requirements of the rural section that can be resolved through the internet service.

3) Solar Water Heater:



Solar water heating (SWH) is the conversion of sunlight into heat for water heating using a solar thermal collector. A variety of configurations is available at varying cost to provide solutions in different climates and latitudes. SWHs are widely used for residential and some industrial applications. A sun-facing collector heats a working fluid that passes into a storage system for later use. SWH are active (pumped) and passive (convection-driven). They use water only, or both water and a working fluid. They are heated directly or via light-concentrating mirrors. They operate independently or as hybrids with electric or gas heaters. In large-scale installations, mirrors may concentrate sunlight into a smaller collector.

Chapter 4: About Nakaravadi Village

4.1 Introduction:

4.1.1 Introduction to Nakaravadi:

According to Census 2011 information the location code or village code of Nakaravadi village is 512937. Nakaravadi village is located in Rajkot Tehsil of Rajkot district in Gujarat, India. It is situated 12km away from Rajkot, which is both district & sub-district headquarter of Nakaravadi village. As per 2009 stats, Nakaravadi village is also a gram panchayat.

4.2.2 Need Of Study:

By VishwakarmaYojana project government required technical result of the problem of villages at the engineering point of view.

The developmental work in villages that could under taken as per the need of the village includes,

- Socio- Cultural Facilities such as Community Hall, Public Library, Recreation Facilities, Assembly polling and other.
- Sustainable development: Rain water harvesting, Biogas plant, Eco friendly Toilets, Solar Street lights & other for effective development of Villages.
- Physical infrastructure facilities such as Water, Drainage, Road network, transport facility, Electricity, sanitation, Irrigation, Solid waste Management, Storm Water Network, Telecommunication & other,
- Social infrastructural facilities such as Health, education etc.

4.1.3 Study Area: Nakaravadi

Figure 4 Base map Nakaravadi village

Village	Nakaravadi
Tehsil	Rajkot
District	Rajkot
State	Gujarat
Location	12km from Rajkot
Telephone code	0281
Nearest Town	Rajkot (12km)

Table 7 Nakaravadi village details

4.1.4 Objectives of the study:

- To provide basic facilities in the village.
- To Reduce Migration.
- To provide the necessary designs of the public buildings which are not available in the village.
- Repair & maintenance of Existing Public Buildings like Gram Panchayat, Public Library, School Buildings, Health Center, and Public Toilet Block & Other.
- To promote integrated development of Munjka village with provision of required facilities, better connectivity, employment opportunities, etc.
- To develop the village such that it can be called a Smart Village.

4.1.5 Scope of Study:

The primary area to improve should be providing employment in rural areas and improving the productivity of the agricultural sector. Often villages in our countries are not in sync with the urban areas because of bad connectivity. Eventually, this leads to segregation and a social divide between urban and rural areas. In essence, the infrastructure of rural areas should drastically improve. Even after so many years of Independence, stigmas like the caste system still have a grip on rural people.

It can be easily concluded, that for the development of an economy in both rural and urban areas need to be focused upon. Rural areas need drastic changes in areas like infrastructure, credit availability, literacy, poverty eradication, etc. The schemes that are already in place with the aim of rural development need a new outlook and proper updating. Accordingly, the government needs to act for the upliftment of rural India.

4.1.6 Methodology/ Study Frame Work:

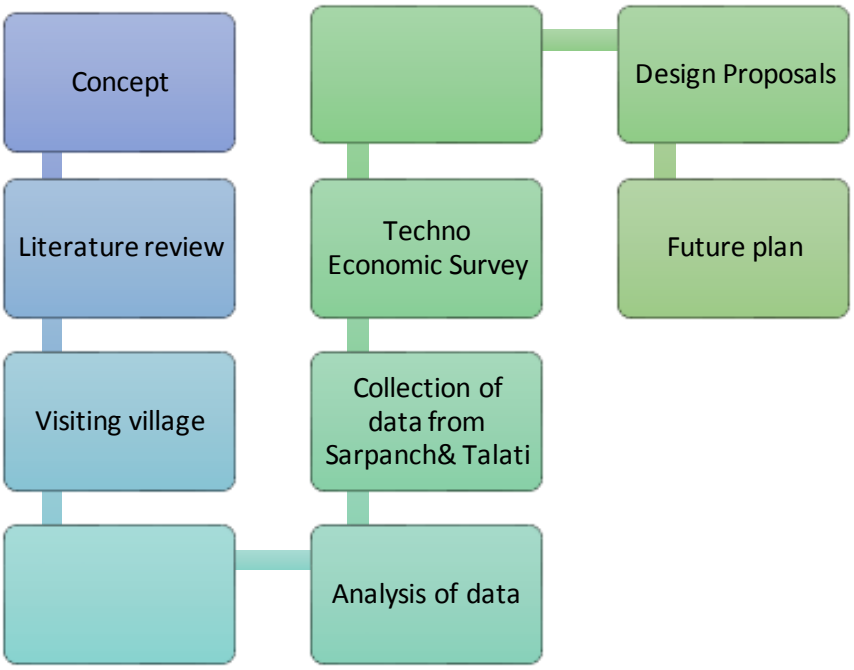


Table 8 methodology and study frame work

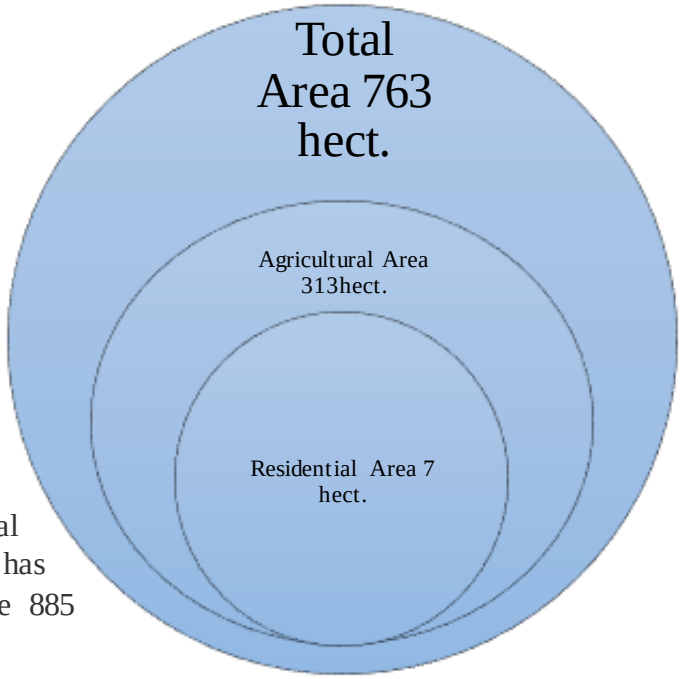
4.1.7 Available Amenities Related to Civil / Electrical:

- Piped Water Supply
- Bore Well
- C.C road
- Underground Drainage
- Electricity (24hrs)
- Anganwadi
- Gram Panchayat

4.2 Study Area Profile:

4.2.1 Study Area Location & Land Use Detail

Nakaravadi is a medium size village located in Rajkot Taluka of Rajkot district, Gujarat with total 325 families residing. The Nakaravadi village has population of 1750 of which 865 are males while 885 are females as per Population Census 2011.



Land use detail

Figure 5 area profile of Nakaravadi village

4.2.2 Base Location Map

Figure 6 location map of Nakaravadi village

Figure 7 satellite image of nakaravadi village

4.2.3 Physical & Demographical Growth:

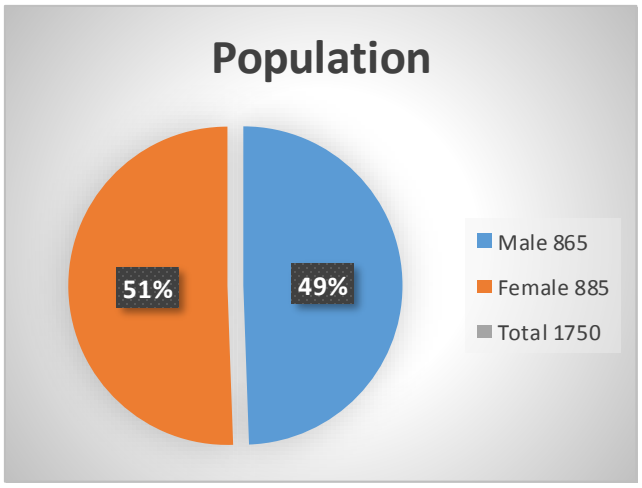


Figure 8 Population Chart Of Nakaravadi Village

Particulars	Total	Male	Female
Total No. of Houses	325	-	-
Population	1,750	865	885
Child (0-6)	348	163	185
Schedule Caste	15	10	5
Schedule Tribe	0	0	0
Literacy	77.67 %	85.75 %	69.57 %
Total Workers	950	524	426
Main Worker	650	-	-
Marginal Worker	300	116	184

Table 9 Demographical Detailes Of Nakaravadi Village

4.2.4 Economic Generation Profile:

People of Nakaravadi are mostly involved in Farming & agriculture. While of some of them are commuting to Rajkot for job. So overall it's a hardworking middle class people.

4.2.5 Actual Problems Faced by Villagers:

Waste Management of the village is very poor as there is no door to door collection system & not even a proper waste disposal system

Solution: Providing a Waste Storing Pit or Waste disposal system will be a best solution.

4.2.6 Migration Reasons:

People are migrating after better opportunities for job & education in Rajkot

4.3 Data Collection

4.3.1 Methods for data collection

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

4.3.2 Primary survey details:

Nakaravadi is a medium size village located in Rajkot Taluka of Rajkot district, Gujarat with total 325 families residing. The Nakaravadi village has population of 1750 of which 865 are males while 885 are females as per Population Census 2011

4.3.3 Geo Tagging of house:

Geo Tagging of house is not currently done. But Geo Tagging of Gram Panchayat, School is done.

4.3.4 No. of Human Being in one House:

On & Average 5 people lives per house in the Village Nakaravadi

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

Basic Food items are available in Village, as some of them are cultivated there. But most of the products are sourced from Rajkot.

4.3.6 Cast wise Population Details:

Schedule Caste (SC) constitutes 0.86 % of total population in Nakaravadi village. The village Nakaravadi currently doesn't have any Schedule Tribe (ST) population

4.3.7 Occupational Details:

There are 3 major occupations in Nakaravadi – Farmers, Farm Workers, Private job

4.3.8Agricultural Details:

Three Major Crops of the Village are – Groundnut, Cotton, Spinach

4.3.9 Physical Infrastructure Facilities:

There are no Industries / Ware House/ Manufacturing hub in the village

4.3.10 Tourism:

There's a Temple name Ranuja Temple which is nearby & famous Locally.

4..4 Infrastructure Details:

Figure 12 Nakaravadi Grampanchayat

Figure 11 Nakaravadi Village Anganvadi

Figure 9 Grampanchayat 2

Figure 10 Undergruond Water Sump

Figure 16 Primary School Nakaravadi

Figure 15 Secondary School Nakaravadi

Figure 13 Secoundry School Class

Figure 14 Secondary School Toilet's

4.5 Electrical Concept

4.5.1 Renewable energy source planning particularly for villages

The renewable sources of energy proposed to be put to use for improving the overall energy scenario include biomass, biogas and solar energy. Biomass can be produced from agro waste, mainly paddy in the case of this village, and can be utilized to generate electricity in a biomass plant.For some examples are included in particular are village

1.SOLAR ROOF TOP

2.SOLAR WATER HEATER

3.SOLAR STREET LIGHT

4.5.2 Irrigation Facilities

Irrigation helps to grow agricultural crops, maintain landscapes, and revegetate disturbed soils in dry areas and during periods of less than average rainfall. Irrigation also has other uses in crop production, including frost protection, suppressing weed growth in grain fields and preventing soil consolidation.

The different types of irrigation include,

1. Sprinkler irrigation

2.Surface irrigation

4.Sub-Irrigation

3. Drip Irrigation

5. .Manual irrigation

4.5.3 Electrical Facilities with Area

In our village Nakaravadi consider as a moderate electrical facilities.There are available electricity for everyday accept to wednesday has a 8 hour electricity are not available. If we considering particular Electrical Room so we can say that, An electrical room is a room or space in a building dedicated to electrical equipment. Its size is usually proportional to the size of the building or large buildings may have a main electrical room and subsidiary electrical rooms. Electrical equipment may be for power distribution equipment, or for communications equipment.
In large building complexes, the primary electrical room may house an indoor electrical substation.

Chapter 5: Technical Options with Case Studies

5.1.1 Advance Sustainable construction techniques / Practices and Quantity Surveying:-

For contractors, a strategy for saving time and materials can lead to higher profitability and the good feeling of not creating unnecessary waste. Here's a look at five techniques that are having the greatest impact on sustainable building construction.

1. Prefabricating Materials in Controlled Environments

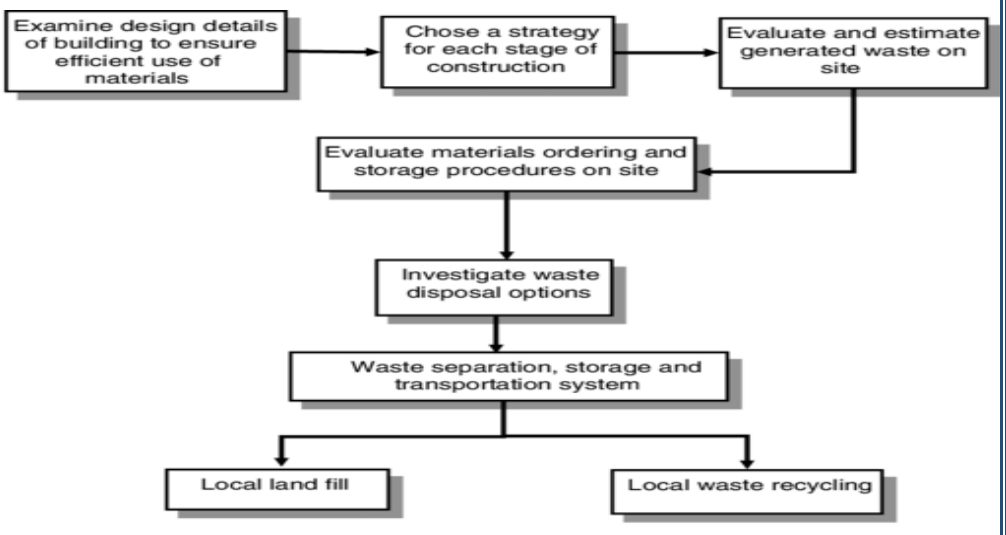
Constructing as much of a structure in a controlled environment as possible has improved the quality of buildings and resulted in less trash, says Spencer Finseth, principal of Minneapolis-based Greiner Construction.

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.

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" & can be extended to 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.

3. Managing the Site for Improved Environment

Stormwater pollution prevention has become a "big deal" to municipalities and the state and central government. "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.

4. Lean Manufacturing to Reduce Energy

"It's finding the wasteful activities we're doing and eliminating them."

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." "Those are lean practices but they are sustainable things, too, in a sense."

5. Material Selection

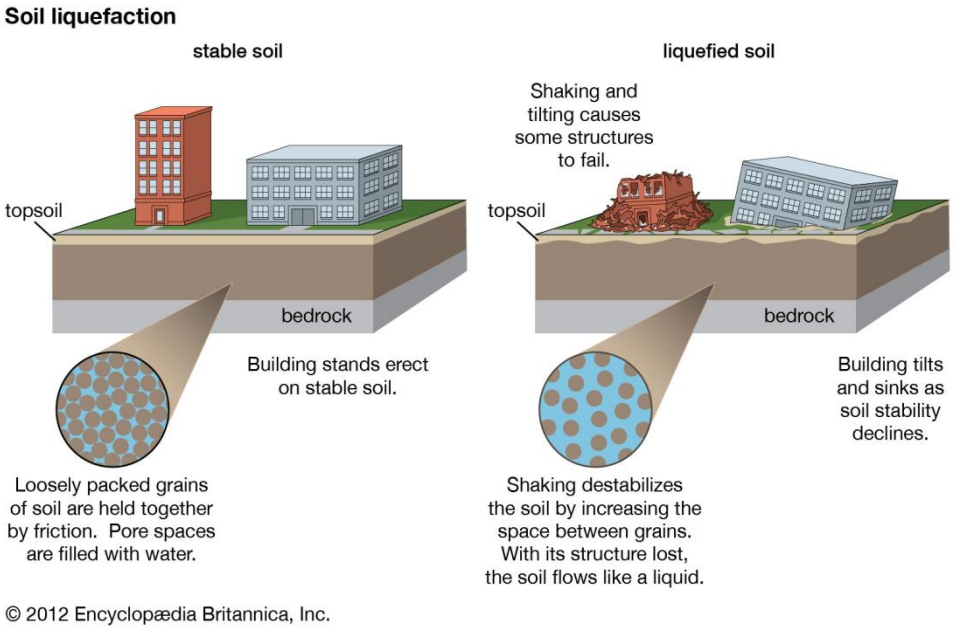
Architects and clients seeking LEED can achieve many points by selecting materials manufactured from recycled products and from local sources. The materials can be anything, from renewable products such as bamboo for floors, to wood from vendors approved by the Minneapolis-based Forest Stewardship Council.

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

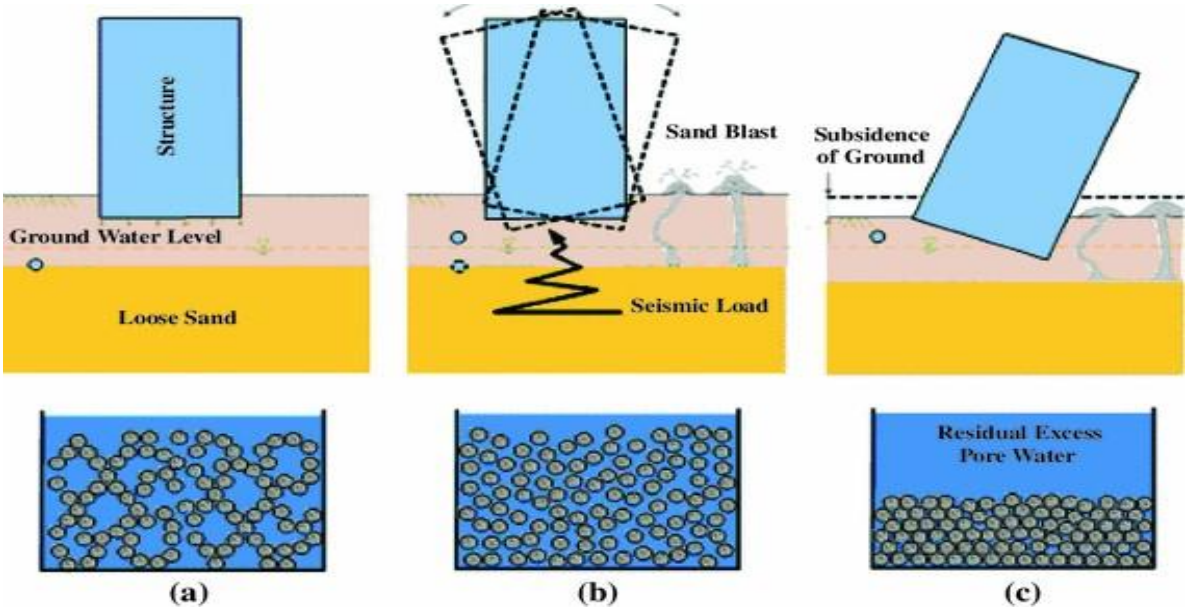
5.1.2 Soil Liquefaction :-

Soil liquefaction

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Liquefaction and related phenomena have been responsible for tremendous amounts of damage in historical earthquakes around the world.



Liquefaction occurs in saturated soils, that is, soils in which the space between individual particles is completely filled with water. This water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together. Prior to an earthquake, the water pressure is relatively low. However, earthquake shaking can cause the water pressure to increase to the point where the soil particles can readily move with respect to each other.



5.1.3 Sustainable Sanitation

Sustainable Sanitation:-

Conventional approaches to wastewater management that regard wastewater as a waste, and often are dysfunctional, have serious drawbacks. Source: CONRADIN (2010)

Sustainable sanitation recognizes that in order to be sustainable, a sanitation approach must be socially acceptable and economically viable. In this way, sustainable sanitation is a loop-based approach that differs fundamentally from the current linear concepts of waste water management, and that does not only recognize technology, but also social, environmental and economic aspects. Sustainable sanitation is an approach that considers sanitation holistically. It recognizes that human excreta and wastewater are not waste product, but valuable resources. This view is based on the fact that wastewater and excreta contain significant amount of energy plant nutrients and also water that can be recycled and reused, thus protecting natural resources.

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. In order to be sustainable, a sanitation system has to be not only economically viable, socially acceptable, and technically and institutionally appropriate, it should also protect the environment and the natural resources.

Today, the need for sustainability means that resource saving and protection of the environment are vital and there is a need for innovation and rethinking. This cannot be achieved by conventional methods. Also, in our emerging consumer and chemical societies it will not be enough that residents pay for sanitation and water services – they have to be partners to make sanitation sustainable.

Sustainable sanitation is a simple approach: the most basic principle is that is considers wastewater and excreta not as a waste, but as resources, that sanitation has to be socially acceptable and should be as economically viable as possible. There is no one- fit-all approach much rather, the most adequate solution has to be found from case to case, considering climate and water availability, agricultural practices, socio-cultural preferences, affordability, safety and technical prerequisites – just to name a few.

When improving an existing and/or designing a new sanitation system, sustainability criteria related to the following aspects should be considered:

• Health and hygiene: includes the risk of exposure to pathogens and hazardous substances that could affect public health at all points of the sanitation system from the toilet via the collection and treatment system to the point of reuse or disposal and downstream populations. This topic also covers aspects such as hygiene, nutrition and improvement of livelihood achieved by the application of a certain sanitation system, as well as downstream effects.

• Environment and natural resources: involves the required energy, water and other natural resources for construction, operation and maintenance of the system, as well as the potential emissions to the environment resulting from its use. It also includes the degree of recycling and reuse practiced and the effects of these (e.g. reusing wastewater; returning nutrients and organic material to agriculture), and the protection of other non-renewable resources, e.g. through the production of renewable energies (such as biogas).

• Technology and operation: incorporates the functionality and the ease with which the entire system including the collection, transport, treatment and reuse and/or final disposal can be constructed, operated and monitored by the local community and/or the technical teams of the local utilities. Furthermore, the robustness of the system, its vulnerability towards power cuts, water shortages, floods, earthquakes etc. and the flexibility and adaptability of its technical elements to the existing infrastructure and to demographic and socio-economic developments are important aspects.

• Financial and economic issues: relate to the capacity of households and communities to pay for sanitation, including the construction, operation, maintenance and necessary reinvestments in the system. Besides the evaluation of these direct costs also direct benefits e.g. from recycled products (soil conditioner, fertiliser, energy and reclaimed water) and external costs and benefits have to be taken into account. Such external costs are e.g. environmental pollution and health hazards, while benefits include increased agricultural productivity and subsistence economy, employment creation, improved health and reduced environmental risks.

• Sociocultural and institutional aspects: the criteria in this category refer to the socio-cultural acceptance and appropriateness of the system, convenience, system perceptions, gender issues and impacts on human dignity, the contribution to food security, compliance with the legal framework and stable and efficient institutional settings.

5.1.4 Transport Infrastructure / system

Transport Infrastructure

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

Roads

A road is a paved surface to facilitate the movement of people or goods with Road_transport road transport means, such as as automobiles, bicycles, buses, vans or trucks.
Roads in itself are not an interesting security target, but blocking a road will cause problems with the traffic flow and reachability of certain parts of the city or area. This can be prevented by designing a Robustness robust road system and to detect a disruption and minimize the consequences, using Traffic_monitoring monitoring and Traffic_management traffic management.

Rails

Rails are the infrastructure for rail transport. A rail road which connects two locations is also called a rail line.
As for roads, rails on itself are not an interesting security target, but blocking a railroad will cause large problems with the rail transport.

Pedestrian / Bicycle paths

Delineated bicycle and pedestrian paths at roundabouts in The Netherlands
Pedestrian paths or sidewalks, curbs, pavements, footpaths or platforms are paths alongside a road designated for pedestrians. Bicycle paths comprises of several different forms of cycling infrastructure, from non-segregated pathways aligned next to the road to segregated cycle facilities.
Segregated cycle facilities are a form of cycling infrastructure consisting of marked lanes, tracks, shoulders and paths designated for use by cyclists and from which motorised traffic is generally excluded. The term includes bike lanes, cycle tracks, separated bike lanes, road shoulders and side paths located within a road right-of-way.

Urban waterways

Inter and intra urban transport over waterways such as canals, rivers or other waterways forms a smaller although still important aspect of the urban transport system. For port cities such as

Rotterdam, Antwerp or Hamburg the waterway system is of vital importance for their economic development.

Subway system

London Underground station

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

Bridges and fly-overs

A bridge is a structure built to span physical obstacles such as a body of water, valley, or road, for the purpose of providing passage over the obstacle. A flyover is a bridge, road, railway or similar structure that crosses over another road or railway forming a grade separation. Various different designs are possible depending on the length of the span and the conditions of the site.

Bridges and fly-overs form a vital and vulnerable element of a transport system since blocking can cause serious disruptions in the transportation system. Security risks are high since bridges and fly-overs are generally difficult to reach in case of emergencies.

Terminals

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

Terminals may be used both for interchange of passengers and cargo.

Examples of passenger terminals are airports, railway stations and bus stations.

Examples of terminals for cargo are warehouses, trucking terminals, refueling depots (including fueling docks and fuel stations), and seaports.

All terminals are important for security, since it are potential targets for terrorists. Damage will have a big impact, both economically, life danger of people and by hampering the transportation process heavily. Therefore it is recommended to have an extensive and robust transportation system towards and from the terminal and to locate terminals outside urban areas.

Airports

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

Train station

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

Amsterdam Central Station in The Netherlands.

Metro station

A metro station or subway station is a railway station for a rapid transit system, often known by names such as "metro", "underground" and "subway".
Metro stations are very vulnerable for terrorist attacks, as can be seen from this list with underground attacks attacks on the London underground.

Bus terminal

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

Freight terminal

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

Sea port

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

5.1.5 Vertical Farming:-

Vertical farming

In vertical farming, crops are grown indoors, under artificial conditions of light and temperature. Crops are grown indoors, under artificial conditions of light and temperature. It aims at higher productivity in smaller spaces. It uses soil-less methods such as hydroponics, aquaponics and aeroponics.

Vertical farming uses significantly less water and pesticides than traditional agricultural methods. Being indoors, the crops aren't subject to seasons and hence give high productivity year-round. Lettuces, tomatoes and green crops can be produced through this practice.

Japan has been one of the early pioneers in vertical farming. It holds the largest share in the global vertical farming market. In Japan, vertical farming is born out of necessity where traditional farming is losing it's face due to ageing population and rural migration.

Spread is one of the companies that makes a huge profit out of vertical farming. It annually produces almost 11 million heads of lettuce from it's factory in Kyoto. Around 30,000 heads of lettuce are produced daily in the factory, under artificial conditions and with less human intervention. Machines run the lettuces to areas with ideal light, temperature and humidity for every stage of growth.

These lettuces that grow without soil or pesticides will be collected at the end by employees.

5.1.6 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure

CORROSION PREVENTION AND PROTECTION METHODS FOR STRUCTURAL STEEL

Preventing corrosion on structural steel is essential to the overall integrity and aesthetics of the structure. Whether the structural steel supports a bridge, commercial building or plant, asset owners must be able to count on the infrastructure for the long haul. Corrosion is a risk to that infrastructure.

Asset owners and their corrosion engineer or project manager should evaluate the best ways to implement corrosion protection for the steel supporting the asset. Here we'll explain the role service environment plays in corrosion protection, then describe design methods and coating systems that will ensure the structural steel is protected from corrosion for decades to come.

Understanding structural steel's exposure:-

Before setting up a corrosion prevention system for structural steel, asset owners should understand how much corrosion the steel will be up against. For example, a salt water bridge exposed to stagnant moisture and electrolytes faces higher corrosion risk than an internal structural beam in a commercial building. Both need corrosion protection, but at different levels.

Asset owners want the highest protection available, but going overboard with an intense corrosion prevention system when only mild corrosion protection is needed will cost extra money and time that could be spent elsewhere. Evaluate the corrosion risk the asset will face (using a resource such as SSPC's Environmental Zones) and protect at that level, but not over.

Steel selection and design considerations for corrosion prevention

Before a coatings team applies a single component, asset owners can implement corrosion prevention methods with informed steel and design choices. Coatings alone are not effective at protecting structural steel from all forms of corrosion. For instance, coatings are effective at controlling uniform corrosion but are less effective at controlling localized attacks such as pitting. Use the following advice on steel selection and design considerations to set up a coating system for success.

Steel selection

The quality of the steel itself can have a bearing on corrosion prevention. High-alloy steel is naturally more corrosion-resistant than low-alloy steel (though it should still have protective

coatings applied) and is more expensive. If asset owners choose a more affordable low-alloy steel, it will likely need a more comprehensive coating system to effectively fend off corrosion. Corrosion control is just one part of the steel selection process. Asset owners should balance those needs with the steel member's end use, its initial cost and its future maintenance costs.

Design considerations

The design of structural steel can also prevent corrosion. These design factors won't play a part in coating or re-coating a structure that's already been constructed, but are important to know because failing to follow them leads to an increased risk of corrosion.
For a new structure, keep these design considerations in mind early in the process.

- Reduce exposure to the atmosphere. Any areas where exposure to the atmosphere can be limited (especially when the environment is particularly corrosive) will aid the overall corrosion prevention system.
- Stay away from dissimilar metals. Galvanic corrosion (one of many types of corrosion) is possible when two or more dissimilar metals are used in a structural steel system. Be conscious of metal choices to prevent this type of corrosion.
- Prevent water from building up. Water traps are intrinsically corrosion-prone because moisture accelerates corrosion. They are even more problematic if the environment contains dirt and debris because when trapped, they tend to retain moisture. Ensure no areas cause unnecessary water build up or stagnation.
- Avoid surface irregularities. These include crevices, sharp edges and inaccessible areas, are difficult to coat and inspect — and they are also at a high risk for corrosion. Not all irregularities can be avoided. For those that remain, pay careful attention to them while coating.

Protective coatings to defend from corrosion

Coatings — the first line of defense — play a major role in protecting structural steel from corrosion. Here we'll outline surface preparation standards, coating systems and application methods for an effective corrosion protection system.

Surface preparation standards for structural steel
The preferred surface preparation standards for structural steel are SP 5 white metal blast or SP 10 near-white blast. Hand tool cleaning or a brush blast are always options, but strict standards for this type of surface preparation need to be followed for desired system performance.

Coating options for varying levels of environmental exposure
The best-fit coating system is dependent on the corrosiveness of the environment. Here are the most fitting options for each type of environment.

Highly corrosive environments

For environments with high humidity, a chemical atmosphere or salt water exposure, a zinc-epoxy-urethane system is the most common choice. Zinc provides cathodic protection for the steel and will sacrifice itself before the substrate. Inorganic zinc primers provide better cathodic protection than organic zinc primers, but organic is more easily applied. The zinc primer is then coated with an epoxy intermediate, then a urethane topcoat for color retention and gloss.

Polysiloxane is a resin-type, two-component coating also suitable for highly corrosive environments. This option is more expensive, but is often used because it saves time and labor with the elimination of a coat. It also offers better color and gloss performance compared to urethanes and meets emissions regulations in strict environments.

Moderately corrosive environments

A wide variety of epoxy coating systems work well in service environments with moderate corrosion risk. The coating system will still provide corrosion protection (just not as well as a system with a zinc-rich coating) and is easy to apply. Epoxies are also surface tolerant, meaning they can be applied over a tightly adhering rusted surface that couldn't be blasted down to bare steel (making them a viable choice for re-coating jobs).

Lightly corrosive environments

In interior or controlled environments with little to no chemical or moisture exposure, single-component, water-based acrylics are an appropriate choice. They are low in odor, easy to work with and only require soap and water clean up. For minimally corrosive environments, this coating system would perform well (compared to a more extensive coating system that would be overdoing it).

The stand-by of an oil-based primer with an oil-based topcoat is available as an option. But this coating system is slower-drying, meaning time and VOCs are a concern, and future maintenance issues can arise depending on the exposure.

The role of application methods

Application methods — typically brush, roller or spray — should also be front of mind when deciding on a coating system. Certain coatings perform better when sprayed, but environmental restrictions may not allow field-applied spraying (to prevent overspray). Going in armed with the substrate's application limitations will prevent asset owners from picking the best-fit coating system, only to find out it can't be applied in its intended method.

A balanced corrosion prevention system

Corrosion prevention for structural steel isn't about just checking off one box — it's about an entire system that will protect the substrate for many years. A good system balances service environment, design and coating systems to obtain the desired performance and service life-cycle at the least cost.

For the best industry advice on corrosion prevention and protection methods for structural steel, consider purchasing Standards and Best Practices for Surface Preparation of Steel Substrates. Protecting structural steel is essential to maintaining the integrity of an asset, and this SSPC resource will share valuable industry knowledge for the next coating project.

5.1.7 Sewage treatment plant:-

Sewage Treatment Plant

Sr. No	Contaminant	Source	Environmental significance
1	Suspended solids	Domestic use, industrial wastes	Cause sludge deposits and anaerobic condition in aquatic environment
2	Biodegradable Organic	Domestic use , industrial wastes	Cause biological degradation
3	Pathogens	Domestic water	Transmit communicable disease
4	Nutrients	Domestic and industrial waste	Cause eutrophication
5	Refractory organics	Industrial waste	Cause taste and odour Problems

Table 10 Characteristics Of Sewage Water

According to the Planning Commission's report on water sector for Five Year Plan (2012-17), the cost of STP per MLD is between Rs 30 lakh and Rs 1 crore.

Step 1: Screening and Pumping

The incoming wastewater passes through screening equipment where objects such as rags, wood fragments, plastics, and grease are removed. The material removed is washed and pressed and disposed of in a landfill. The screened wastewater is then pumped to the next step: grit removal.

Step 2: Grit Removal

In this step, heavy but fine material such as sand and gravel is removed from the wastewater. This material is also disposed of in a landfill.

Step 3: Primary Settling

The material, which will settle, but at a slower rate than step two, is taken out using large circular tanks called clarifiers. The settled material, called primary sludge, is pumped off the bottom and the wastewater exits the tank from the top. Floating debris such as grease is skimmed off the top and sent with the settled material to digesters. In this step, chemicals are also added to remove phosphorus.

Step 4: Aeration / Activated Sludge

In this step, the wastewater receives most of its treatment. Through biological degradation, the pollutants are consumed by microorganisms and transformed into cell tissue, water, and nitrogen. The biological activity occurring in this step is very similar to what occurs at the bottom of lakes and rivers, but in these areas the degradation takes years to accomplish.

Step 5: Secondary Settling

Large circular tanks called secondary clarifiers allow the treated wastewater to separate from the biology from the aeration tanks at this step, yielding an effluent, which is now over 90% treated. The biology (activated sludge) is continuously pumped from the bottom of the clarifiers and returned to the aeration tanks in step four.

Step 6: Filtration

The clarified effluent is polished in this step by filtering through 10 micron polyester media. The material captured on the surface of the disc filters is periodically backwashed and returned to the head of the plant for treatment.

Step 7: Disinfection

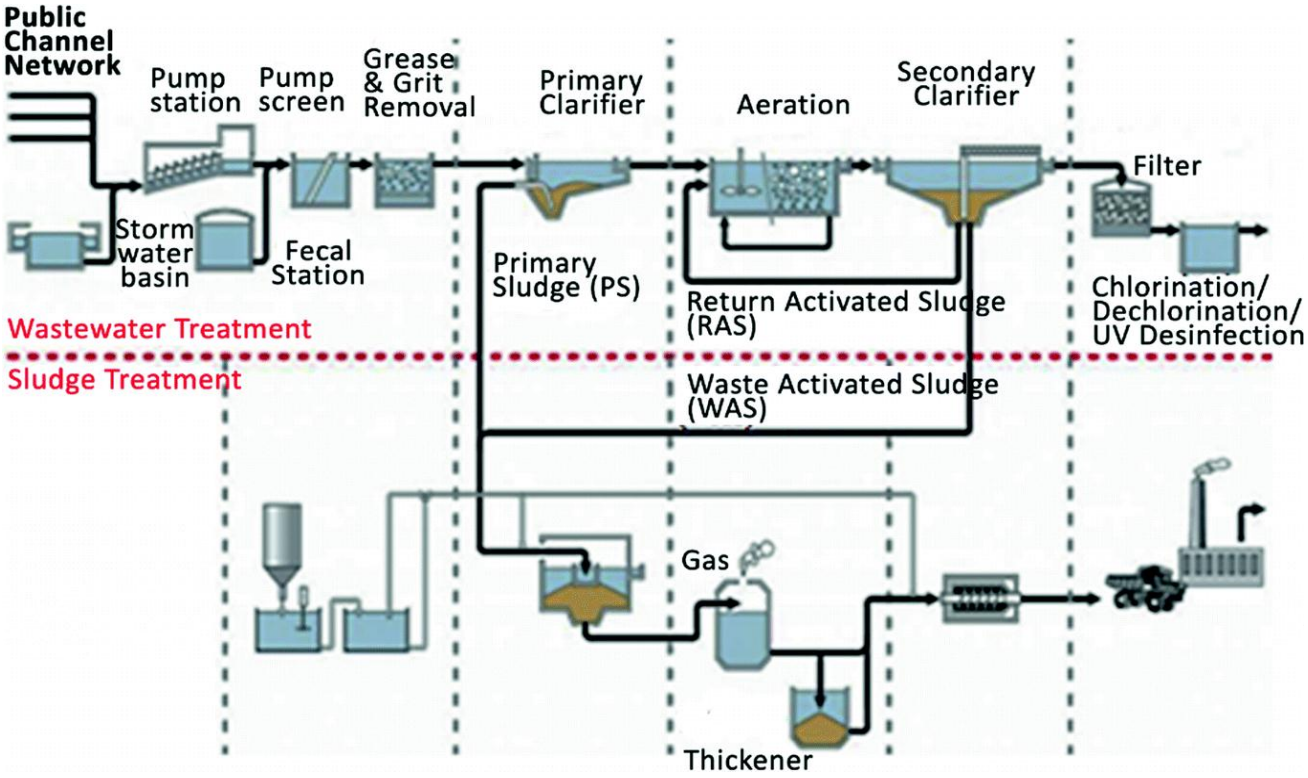
To assure the treated wastewater is virtually free of bacteria, ultraviolet disinfection is used after the filtration step. The ultraviolet treatment process kills remaining bacteria to levels within our discharge permit.

Step 8: Oxygen Uptake

The treated water, now in a very stabilized high quality state, is aerated if necessary to bring the dissolved oxygen up to permit level. After this step, the treated water passes through the effluent outfall where it joins the Oconomowoc River. The water discharged to the river must meet stringent requirements set by the DNR. Pollutant removal is maintained at 98% or greater.

Sludge Treatment

The primary sludge pumped from the bottom of the primary clarifiers in step three, along with the continuous flow of waste activated sludge from the aeration / activated sludge process in step four, must be treated to reduce volume and produce a usable end product.



5.2 Concept (Electrical)

5.2.1 Programmable Load Shedding

Fig: Programmable Load Shedding

In today's world, there is a continuous need for automatic appliances with the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. The project is designed to operate an electrical load multiple number of times as per the program. It overcomes the difficulties of switching the load ON/OFF manually. This proposed has an inbuilt real time clock (RTC) to keep tracking the time and thus to switch ON/OFF the load accordingly. Load shedding is what electric utilities do when there is a huge demand for electricity that exceeds the supply. Thus in a distribution system it needs to be precisely controlled for specific period of time. Programmable load shedding time management system is a reliable circuit that takes over the manual task of switch ON/OFF the electrical devices with respect to time. It uses real time clock (RTC) interfaced to a microcontroller of 8051 families. 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. A matrix keypad helps to enter the time.

Aim: -

The main aim of this work is to build a microcontroller based device the on/off a power supply whenever there is excess load on the system.

Purpose: -

This project is required for load shedding time management which is used when the electricity demand exceeds the supply and there comes a need for manually switching ON/OFF the electrical devices in time. However, the purpose of the system is to eliminates the manual operation by automatically switching the load ON/OFF.

Significance: -

1.Prevents overloading and damage of the power generators
2.Prevents instability and system collapse of the electrical generation and distribution systems
3.Ensures that consumers or parts of the network have power as opposed to a total blackout.
4.The planned schedules ensure that available capacity is shared fairly and each consumer gets power at one time or another.
5.It serves as a warning to the utility hence forcing them to increase capacity, and efficiency so as to meet the demand.

Disadvantages of Load Shedding: -

1. One another major problem in our society created by load shedding is safety. Even though this point looks farfetched it is a dangerous problem. People in our society not only work

at day but have night shifts as well. These people face serious threat from attackers at night specially walking down dark narrow lanes with no light. They can be easy prey to any thieves or robbers.

2. The other disadvantage is that the students are going to have a hard time studying without light. Our country's future looks dark if the students who are to lead the country in future are deprived of the basic infrastructure which helps them move forward. Load shedding not only stops them from reading and writing but blocks the path to them getting knowledge through internet, television etc.

3. Other disadvantages can be people and hospitals having problems with their day to day activities. Offices not being able to run properly, people not being able to do their work on time. These are only branches of a huge problem our country faces. The root problem could lead to financial breakdown and an economic misbalance in the country with all the importing of electricity and everything.

- The utilities may not increase the output.
- Restoring the load may cause more instabilities.

5.2.2 Railway Security System using IOT

Fig: Railway Security System using IOT

Railways is considered as one of the widely spread mode of transportation all over the globe. Nowadays there is an enormous increase in road and railway traffic. This rapid growth has given rise to more and more accidents at the level crossings. This is a serious concern for both railway and road traffic users. There are no easy ways for tackling this problem, but the main concern is regarding its feasibility for the fluctuating environmental conditions. In this paper, we are proposing an IOT based technique as an alternative and efficient solution for manned and unmanned level crossings. To implement this technology, we are fixing two Infrared Sensors at a pre-calculated distance to calculate the speed of train and time taken by the train to reach level crossings. With this data we are trying to automate closing and opening of gates at level crossings and to regulate road traffic users waiting time. This real time information is sent to database server with the help of Wi-Fi module through Internet of Things (IOT). With

the help of GSM module, we send the intrusion detection information to the concerned train driver, station master and control room for efficient monitoring. View less

5.2.3 Management through Energy Harvesting Concept

Wireless sensor networks, WSNs, are large networks composed of small sensor nodes, SNs, with limited computer resources capable for gathering, data processing and communicating. Energy consumption represents a barrier challenge in many sensor network applications that require long lifetimes, usually an order of several years. Sensor nodes, as constituents of wireless sensor networks, are battery driven devices and operate on an extremely frugal energy budget. Conventional low-power design techniques and hardware architectures only provide partial solutions which are insufficient for sensor networks with energy-hungry sensors. This paper surveys several techniques used in today's wireless sensor networks with order to surpass the problem of energy consumption, power management and energy harvesting. It provides an insight into how various power reduction techniques can be used and orchestrated such that satisfactory performance can be achieved within a given energy budget.

5.2.4 Moisture Monitoring System

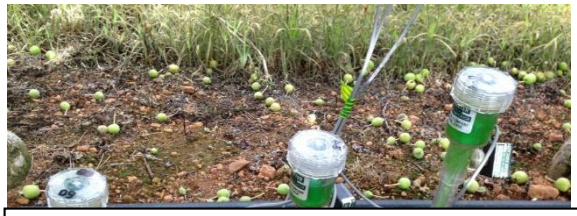


Fig: Moisture Monitoring System

Working: -

Small charge is placed on the electrodes and electrical resistance through the sensor is measured. As water is used by plants or as the soil moisture decreases, water is drawn from the sensor and resistance increases. Conversely, as soil moisture increases, resistance decreases.

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners.

Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potential. These sensors are usually referred to as soil water potential sensors and include densitometers and gypsum blocks.

5.2.5 Home Automation using IOT/any other methodology

Fig: Home Automation using IOT

OBJECTIVE:

The objective of this project is to implement a low cost, reliable and scalable home automation system that can be used to remotely switch on or off any household appliance, using a microcontroller to achieve hardware simplicity, low cost short message service (SMS) for feedback and voice dial from any phone to toggle the switch state.

Components used:

- Microcontroller Arduino Uno
- DTMF Decoder
- Electromagnetic Relay
- De-multiplexer IC
- Resistors
- Capacitors
- Transistors
- Cables and Connectors
- Diodes
- PCB
- LED Transformer/Adapter
- Push Buttons Switch IC
- IC Sockets Lamps

Microcontroller Arduino Uno:

Microcontroller	Atmel ATmega328
Operating Voltage (logic level)	5 VDC
Input Voltage (recommended)	7-12 V
Input Voltage (limits)	6-20 V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	8
DC Current per I/O Pin	40 mA
Flash Memory	32 KB (ATmega328) of which 2 KB used by bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz
Dimensions	0.73" x 1.70"

ARDUINO UNO SPECIFICATION:

DTMF Decoder:

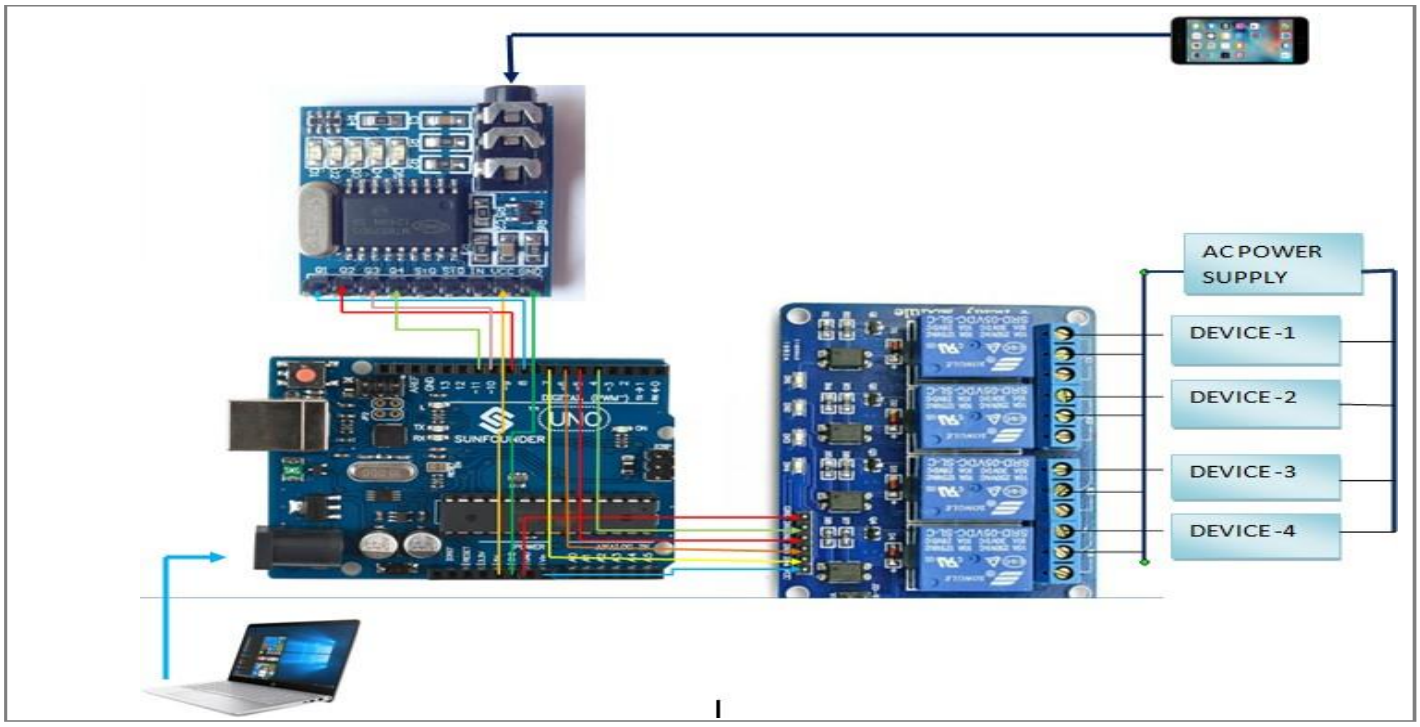
Features:

- Complete DTMF Receiver
- Low power consumption
- Internal gain setting amplifier
- Adjustable guard time
- Central office quality
- Power-down mode
- Inhibit mode
- Backward compatible with MT8870C/MT8870C-1

Applications

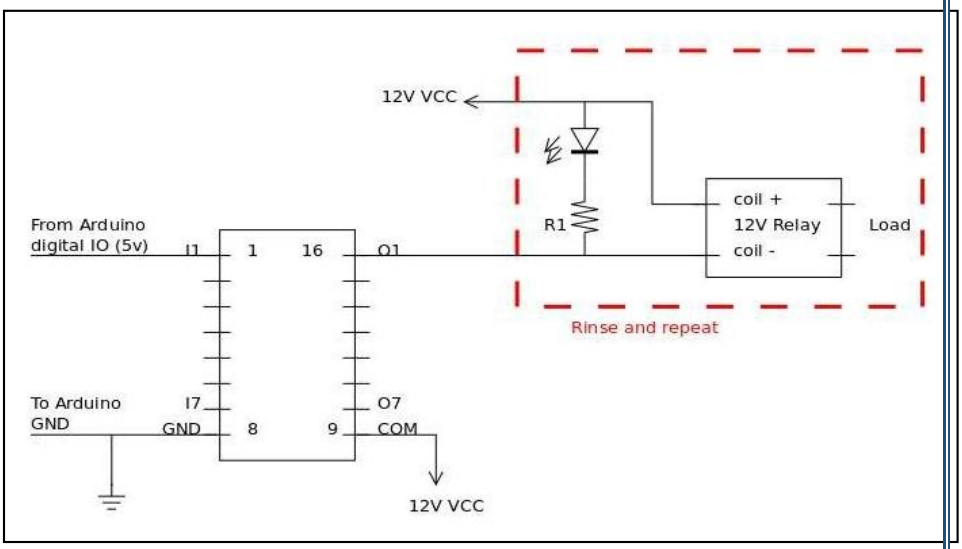
- Receiver system for British Telecom (BT) or CEPT Spec (MT8870D-1)
- Paging systems
- Repeater systems/mobile radio

- 0 Credit card systems
- Remote control
- Personal computers
- Telephone answering machine



Connection of Relay and Uno:

Here, below figure show the connection circuit of Relay and Uno.



Connection Layout Of The Hardware:

Here, below figure show the connection layout of the home automation circuit.

Physical Connection of system(Prototype):

Here, below figure show the connection circuit of physical prototype.

Figure: Physical Connection of system (Prototype Model)

Advantages

- It is a robust and easy to use system.
- There is no need for extra training of that person who is using it.
- All the control would be in your hands by using this home automation system
- One can control home appliances from anywhere.
- It reduces wastage of electricity if someone forgets to switch off any appliance connected to the system if we were away.
- It is very low cost compared to other technologies like GSM.

Conclusion:

- DTMF Based Home Automation has been designed and setup.
- It has been possible to control all home appliances automatically using our own mobile phones.
- The control of all appliances is possible even from a wide range.

Cost Detail:

Table : Costing of home automation system

Sr no.	Component	Price in Rs.
1	Microcontroller Arduino Uno	350
2	DTMF Decoder	130
3	Electromagnetic Relay	640
4	De-multiplexer IC	20
5	Cables and Connectors	110
6	IC sockets lamp	40
7	PCB	40
8	Others	170
	Total Cost	**1500/-**

5.2.6 PC Based Electrical Load Control

Fig: PC Based Electrical Load Control

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

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

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

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

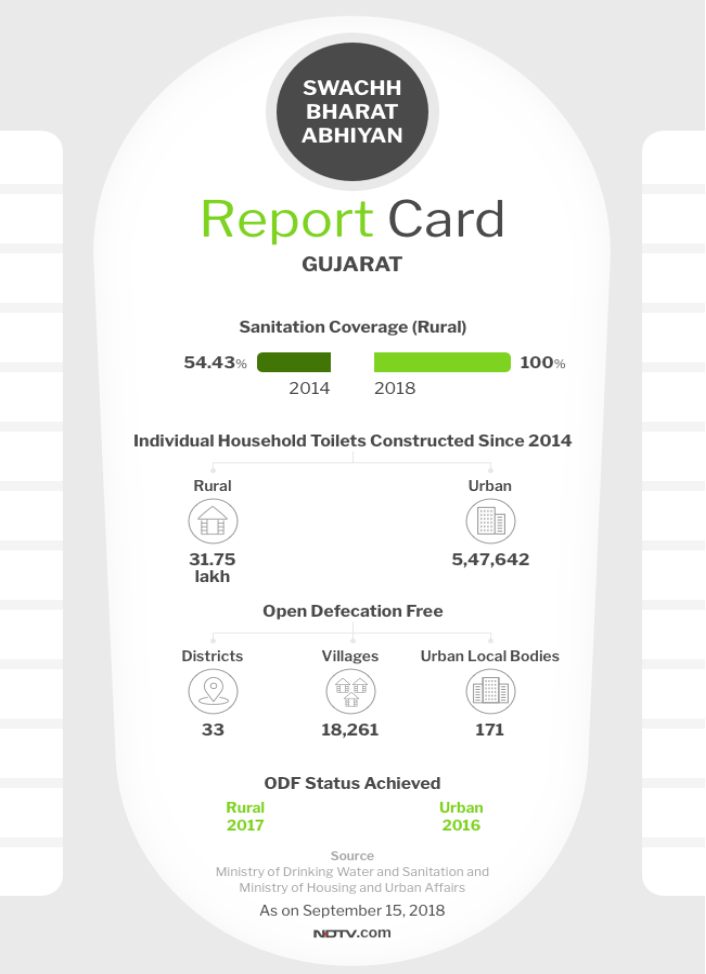
Chapter 6: Swachh Bharat Abhiyan

Swachh Bharat Abhiyan (SBA) (or Swachh Bharat Mission (SBM) or Clean India Mission is a campaign in India that aims to clean up the streets, roads and infrastructure of India's cities, smaller towns, and rural areas. The objectives of Swachh Bharat include eliminating open defecation through the construction of household-owned and community- owned toilets and establishing an accountable mechanism of monitoring toilet use. Run by the Government of India, the mission aims to achieve an Open-Defecation Free (ODF) India by 2 October 2019, the 150th anniversary of the birth of Mahatma Gandhi, by constructing 12 million toilets in rural India at a projected cost of Rs. 1.96 lakh crore.

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

Overview :-

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



Swachh Bharat Mission (Gramin) (SBM-G), previously called Nirmal Bharat Abhiyan (NBA), is a Community-led total sanitation program initiated by Government of India (GOI) and is being implem ented in the State since 2004-05. It is a demand-driven and people-centered sanitation program. The Govt. of India and State Govt. share the funding pattern in the ratio of 75:25 approximately

6.1 Swachhta Needed in Allocated Village:

Here the Situation is a bit poor of Nakaravadi as there is lack of facilities to the villagers to dispose waste. Collection of Total waste is done by RMC at regular intervals but the accumulation of waste is unhygienic for villagers & does not seem pleasant as well. Road side dustbins , Separation of solid waste & liquid waste will be a better solution to current situation.

Awards details of Gujarat State in Swachh Survekshan-2019

The state of Gujarat has won the following awards in Swachh Survekshan-2019.

Sr. No.	State/Cities Name	Awards Details
1	Gujarat State	Fastest Mover State
2	Ahmedabad Corporation	cleanest big city in India in the > 10 lakh category
3	Visavadar Nagarpalika	Fastest Mover city in West Zone
4	Upleta Nagarpalika	Fastest Mover city in West Zone (50 thousand to 1 lakh category)
5	Bagasara Nagarpalika	Fastest Mover city in West Zone(25 thousands to 50 thousands category)
6	Talala Nagarpalika	Fastest Mover city in West Zone(Under 25 Thousand category)
7	Surat Corporation	Best big city in Solid Waste Management
8	Ahmedabad Corporation	Garbage Free Cities 3 Star
9	Rajkot Corporation	Garbage Free Cities 3 Star
10	Surat Corporation	Garbage Free Cities 3 Star
11	Gandhinagar Corporation	Garbage Free Cities 3 Star

Model Cities of Gujarat

The concept of 'Sanitation' is an effective management. As per the rules of National Green Tribunal(NGT).Gujarat cities are working for waste collection, treatment and disposal or recovery, reuse or recycling of human waste, solid waste and Plastic Waste, as well as maintain the statues of ODF+ and ODF ++ cities. Gujarat three municipal corporation **SURAT**, **VADODARA**, **RAJKOT** and three small municipalities Like **PETLAD**, **VYARA**, **BAGSARA** become model cities of Gujarat.

Objective :-

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

6.2 Guidelines in Allocated Village :

(A) Intensive Sanitation Drive

As a part of Mahatma Gandhi Swachhta Mission, intensive sanitation drive will be undertaken by all Municipal Corporations and Municipalities of Gujarat in the during first three months with a view to giving momentum to this drive and for accomplishing this mission successfully, financial assistance of Rs. onecroreto each of the four small Municipal Corporations vig: Junagadh, Bhavnagar, Jamnagar, and Gandhinagar and Municipalitiesas per A,B,C, D Category will be given financial assistanceof Rs. 55,45,30 and 20 Lakhs respectively.

Special sanitation drive will be organized in Government Offices, Semi-Government Offices, Educational institutes, dispensaries and other public organizations.

(B) Public Sanitation

(1) Mahatma Gandhi Swachhta Mission will supervise implementation of the entire policy, structural organizational changes and activities. Task force will be created at Municipal Corporation and Municipality level.

(2) **Zero Waste Policy:** Bearing in mind the goal that cities of the State remain totally clean,environment be preserved in public places, cities and people get better facilities civic amenities. "Zero Waste" policy will be being formulated for implementation of "Zero Waste" policy, Comprehensive "Public Health Bye-laws" will be formed and enforced in all Municipal Corporations and Nagarpalika of the Sate. Because of public health bye-laws the process of cleanliness, sanitation and environment will get the impetus and legal backing for implementation of this policy.

(3) **Solid Waste:** 100 percent door-to-door collection of garbage will be planned and implemented for all cities. 100 percent transportation and scientific disposal of the collected waste would be done. It is planned to use waste as a resource for energy and not waste and to generate green power through public private partnership. Besides this, with the use of compost and other modern technology, it will help clean environment of cities simultaneously with economic gain.

(4) **Drainage:** Giving 100 percent house-to-house connections to all cities of the State, drainage facility is to be created. Re-purification of drainage water will be made through Tertiary Treatment or other technology, this water will be re-used, making rivers rivulets and tanks clean. Besides this water will be used for industry agriculture and for other uses, economic gain can be achieved. It is planned to accomplish this work by Public Private Partnership model (PPP).

(C) Public Well-being

(1) **Toilets:** It is planned to construct 3 lakh individual toilets by March-2015 providing toilet facilities to toilet-less houses with the object that public well-being of the people living in the cities may be maintained. Where individual toilets are not possible, it is planned to make community toilets / Pay and Use toilets. Collected the liquid waste will be treated in the sewerage treatment plants.

(2) **Free Health Check-up**: In order that the health of employees connected with cleaning and drainage work in Municipal Corporations and Nagarpalikas and are not infected by the diseases, the State Government has decided to undertake, twice in a year, free health checkup of all employees connected with this work.

(3) **Eco-friendly Crematorium:** In order to prevent pollution being caused by use of wood-fuel, Eco-friendly Crematoriums based on gas-electricity, will be planned in all Municipalities of the State under "Kailashdham Scheme".

(D) Assistance, Training and Strengthening Equipment Assistance:

As a part of intensive sanitation drive and a long term planning, besides giving financial assistance to Municipal Corporations and Municipalities by the State Government, as many as 75000 equipments will be provided at the cost of Rs. 100 crores.

(1) **Door-to-door garbage collection: in** order to ensure 100 percent door-to-door garbage collection in the cities, Financial assistance to the tune of 100 percent in the first year, 80 percent in second year, 60 percent in third year, 40 percent in forth year and 20 percent in the fifth year will be given in remaining areas.

(2) **Conservancy tax incentive scheme:** with a view to strengthening financial management of Municipalities in a better way, change is made in conservancy tax incentive scheme, norms of assistance will be as under:

(A) In case of less recovery of conservancy tax than 50 percent in Municipalities, 50 percent matching grant, in case of 50–75 percent recovery, 100 percent matching grant and in case of recovery more than 75 percent, 125 percent assistance will be given.

(B) Whenever existing conservancy tax rates are increased by Municipalities, equal matching grant (one time grant) will be provided by the State Government.

(E) Public Awareness and Public Participation

Public awareness is inevitable for maintaining cleanliness in cities. Simultaneously for creating understanding about this programme among the public, Public participation /public awareness will be ensure by maximal use of elite class /voluntary organizations as well as publicity media.

In public awareness and public participation drive, generally following work will be continuously under taken:

- Use of banners, hoardings, Kiosk as a communication strategy for publicity and dissemination of sanitation campaign.
- Intensive use of Street plays, Bhavai, Puppet shows debates, discussion, etc.
- Planning of publicity – dissemination by advertisements through FM radio, TV, and slide.
- Arrangement of effective publicity, dissemination be arranged through social networking such as Facebook, whats app, G-plus, twitter etc.
- Planning of awarding incentive prizes /certificates to societies giving significant contribution in Swachhta Mission. Municipal Corporations /Municipalities should reasonably fix the amount of prizes.
- To take action to levy fine/administrative charge from the person who makes filth.
- To create atmosphere so that the voluntary organizations /NGO and private institutions come forward for public participation.
- With the object of public awareness, opinions / suggestions of awakened persons form the public be obtained and taken into consideration for implementation of reasonable.

(F) Time bound implementation:

Block-wise programme of this drive shall be implemented.

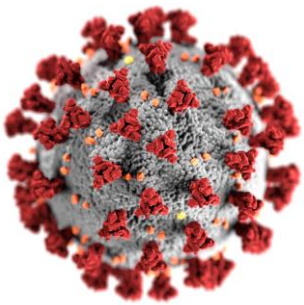
(G) Grading and prize with regard to sanitation of cities.

Under this programme, with regard to sanitation amongst the cities, it is planned to make grading of cities by the way of healthy competition raisiner there by excellent criteria. It is planned to give awards / prizes periodically to those who have done outstanding work.

6.3 Activities done by Students:

We were unfortunate as the Covid 19 pandemic hit it was difficult to even do a visit at our village & it was risky for villagers too as city residential operate closely to them.

Village condition due to Covid - 19



7.1 Taken Steps:

- Village was Sanitized by Sanitizer Sprayer Vehicle Frequently
- Hand sanitizers were placed at every public gathering place
- Thermal gun is used in offices
- Wearing Mask is Compulsory & very Strictly followed by the villagers
- Social Distancing is maintained from every individual

7.2 Steps Taken by Villagers

- Villagers are strictly following Social Distancing
- Schools & Tuitions are closed as per guidelines
- Villagers are avoiding to make unnecessary visits to city for any function / meet up

" We were unfortunate as the Covid 19 pandemic hit it was difficult to even do a visit at our village & it was risky for villagers too as city residential operate closely to them."

The picture can't be displayed.

Chapter 8 - Sustainable Design Planning Proposal – Part 1

8.1 Design Proposals:

From our visit to Nakaravadi we came to know that the village is lacking many primary amenities which are necessary in day to day life.

So we have made every design while keeping necessities of villagers in mind.

8.1.1 Our Design Proposals :-

Community Hall	-	Multi occasional use design , Provided with Fire exit
Public Toilet	-	Separate (M/F) Entry , Equipped with Bath
Health Centre	-	Spacious Health centre , With Admit Ward
Public Library	-	Aesthetic Design , Separate Reading Space
Bus stop	-	With sufficient seating Space , Parking Facility

8.1.1) COMMUNITY HALL:

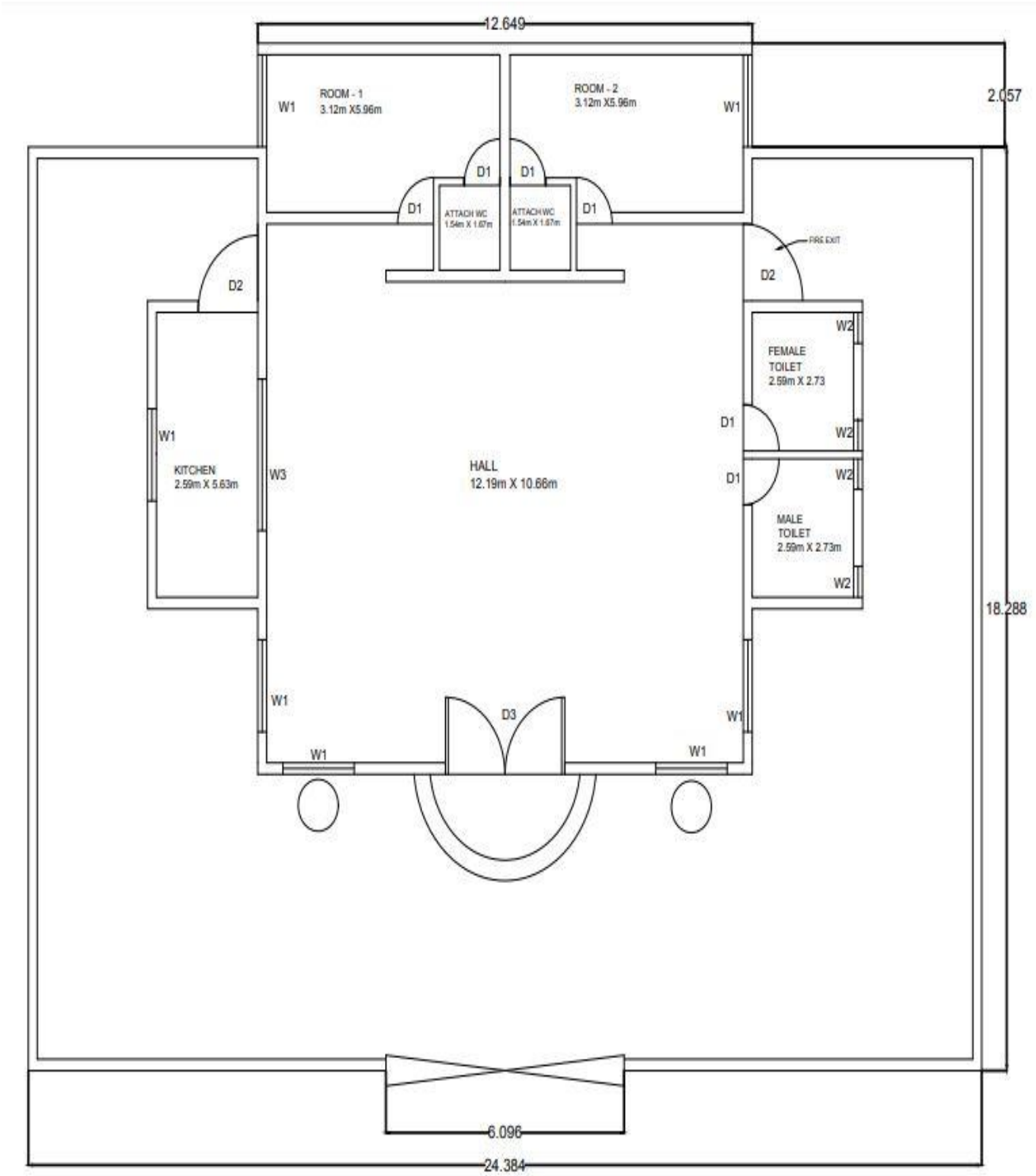


Figure 17 community hall floor plan

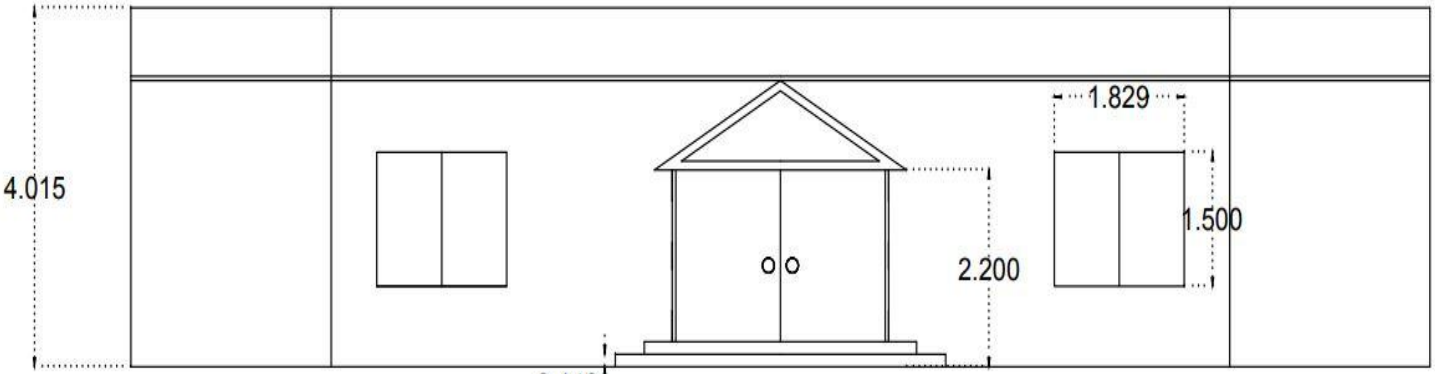


Figure 18 community hall elevation

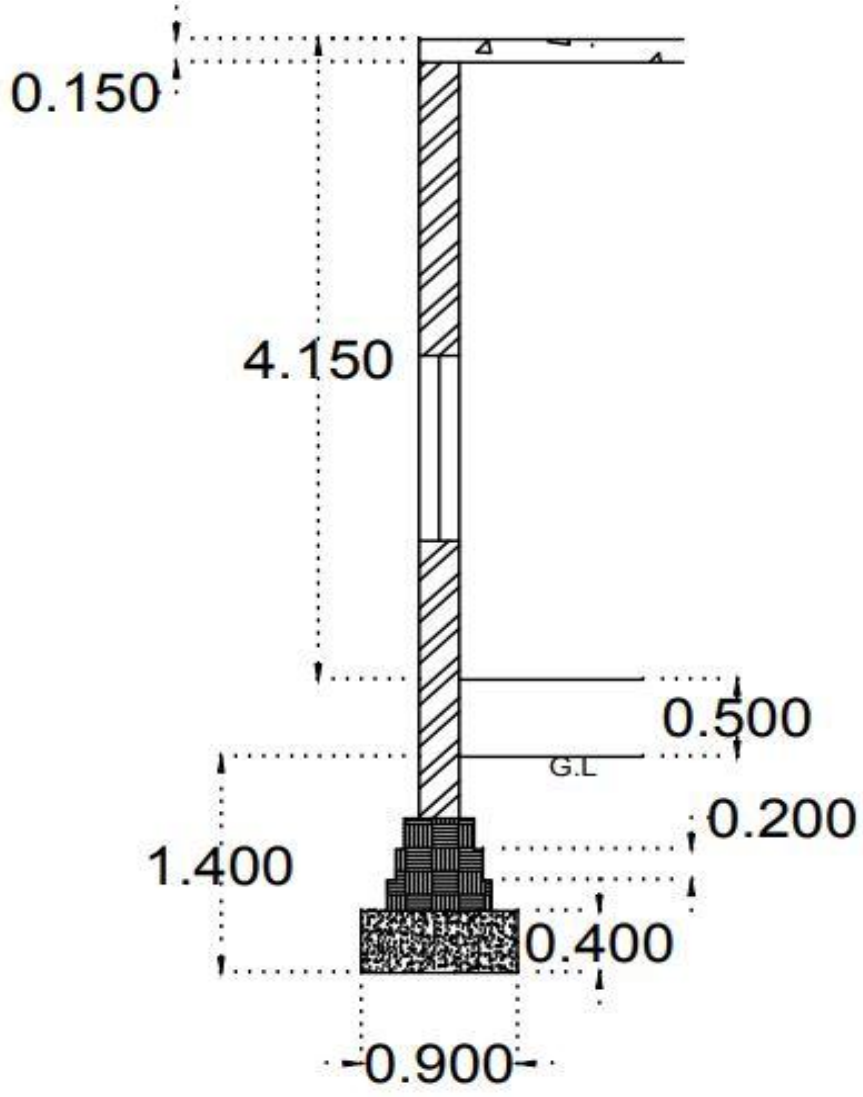


Figure 19 community hall wall section

COMMUNITY HALL QUANTITY SHEET

Sr. No.	Item	No.	L	B	H	Quantity	Total
1	**Excavation** Hor. Wall = 94.253 Ver. wall = 82.194 Total = 176.447	1	176.447	0.9	1.4	222.323	**222.323 m^3**
2	**B.B.C.C (1:6:12) in Foundation**	1	176.447	0.9	0.4	79.401	**63.251 m^3**
3	**First class brick masonry up to plinth in C.M. (1:6)**						
	Step 1	1	176.447	0.6	0.2	21.174	
	Step2		176.447	0.5	0.2	17.645	
	Step3		176.447	0.4	0.2	14.166	
	Step4		176.447	0.229	0.4	16.163	**69.148 m^3**
4	**Sand filling in plinth**						
	Hall	1	12.19	10.66	0.5	64.97	
	Room's	2	3.12	5.96	0.5	18.595	
	Attach w/c	2	1.54	1.67	0.5	2.418	
	Kitchen	1	2.59	5.63	0.5	7.291	
	Toilet's	2	2.59	2.73	0.5	7.071	**100.345 m^3**
5	**First class brick masonry in super structure in C.M. (1;6)**						
	Boundary walls :- Horizontal = 36.118 Vertical = 36.576 Total = 72.694	1	72.694	0.229	3.0	49.941	**49.941m^3**
	Internal wall's = 103.753	1	103.753	0.229	4	95.038	**144.979 m^3**
	Deduction in masonry						
	Door's						
	D1	1	6.096	0.229	2.5	3.490	
	D2	1	3.048	0.229	2.2	1.536	
	D3	2	1.524	0.229	2.2	1.536	
	D4	6	0.914	0.229	2.0	0.419	
	Window's						
	W1	1	3.002	0.229	1.8	1.237	

	W2	2	2.057	0.229	1.2	1.131	
	W3	5	1.829	0.229	1.5	3.141	
	Ventilator's	4	0.610	0.229	0.15	0.084	**12.574 m^3**
						Net	**132.405m^3**
6	**15 cm thick lintel with 2side 15cm bearing**						
	Door's						
	D2 = 3.048 + 0.3	1	3.348	0.229	0.15	0.115	
	D3 = 1.524 + 0.3	2	1.824	0.229	0.15	0.125	
	D4 = 0.914 + 0.3	6	1.214	0.229	0.15	0.250	
	Window's						
	W1 = 3.002 + 0.3	1	3.302	0.229	0.15	0.113	
	W2 = 2.057 + 0.0	2	2.057	0.229	0.15	0.141	
	W3 = 1.829 + 0.3	5	2.129	0.229	0.15	0.366	**1.110m^3**
7	**15 cm thick R.C.C. slab portion (1:1.5:3)**						
	Area of slab = 210.382	1	-	-	-	210.382	**210.382m^2**
8	**1.5 cm thick single coat cement plaster in C.M. (1:4)**						
	Room's	4	3.12	-	4.0	49.920	
		4	5.96	-	4.0	47.680	
	Hall	2	12.19	-	4.0	97.520	
		2	10.66	-	4.0	63.960	
	Kitchen	2	2.59	-	4.0	15.540	
		2	5.63	-	4.0	33.780	
	Toilet's	4	2.59	-	4.0	20.720	
		4	2.73	-	4.0	21.840	
	Attach w/c	4	1.54	-	4.0	12.320	
		4	1.67	-	4.0	13.360	**349.640m^2**
	Deduction						
	Door's						
	D2	1	3.048		2.2	6.706	
	D3	2	1.524		2.2	6.706	
	D4	6	0.914		2.0	10.968	
	Window's						

	W1	1	3.002		1.8	5.404	
	W2	2	2.057		1.2	4.937	
	W3	5	1.829		1.5	13.718	**48.438m^2**
						Net	**301.202m^2**
9	**double coat sun faced plaster to external wall's and boundary wall's**						
	External wall's						
	Vertical wall = 17.315	2	17.315	-	4.0	138.520	
	Horizontal wall = 12.191	2	12.191	-	4.0	97.528	
	= 2.361	4	2.361	-	4.0	37.776	**273.824m^2**
	Boundary wall's						
	Vertical wall = 18.288	4	18.288	-	3.0	219.456	
	Horizontal wall = 35.202	4	35.202	-	3.0	422.424	**641.880m^2**
						Net	**915.704m^2**
	Deduction						
	Door's						
	D1	1	6.096	-	2.5	15.240	
	D2	1	3.048	-	2.2	6.706	
	D3	2	1.524	-	2.2	6.706	
	Window's						
	W2	2	2.057	-	1.2	4.937	
	W3	5	1.829	-	1.5	13.718	**47.307m^2**
						Net	**868.397m^2**

COMMUNITY HALL ABSTRACT SHEET:

Sr. No.	Item	Quantity	Per	Rate (Rs.)	Amount (Rs.)
1	Excavation	222.323	m^3	220	48911.060
2	B.B.C.C (1:6:12) in Foundation	69.148	m^3	2620	181167.760
3	First class brick masonry up to plinth in C.M. (1:6)	81.219	m^3	3850	312693.150
4	Sand filling in plinth	100.345	m^3	3950	396362.750
5	First class brick masonry in super structure in C.M. (1:6)	132.405	m^3	1930	255541.650
6	15 C.M. thick R.C.C. lintel with 2 side 15 C.M. bearing	1.100	m^3	4100	4510.000
7	15 C.M. thick R.C.C. slab	210.382	m^3	4100	862558.000
8	15 mm thick single coat cement plaster in C.M. (1:4)	301.202	m^2	300	90360.600
9	Double coat sun faced plaster to external Walls	868.397	m^2	320	277884.800
10	Indian W.C. pans with a pair of foot rest	4	Nos.	3400	13600.000
11	Foot rest's	4	Pair	475	1900.000
12	P.V.C. flushing cistern for W.C.	4	Nos.	2900	11600.000
13	Urinal's for male toilet	3	Nos.	600	1800.000
14	P.V.C. automatic flushing tank for urinal	3	Nos.	2100	6300.000
15	Nahni trap's	4	Nos.	350	1400.000
16	Gully trap's	4	Nos.	450	1800.00
Total					2487563.43
Add 5% Contingencies					124378.1715
Grand total					2611941.60
Say					2611942rs

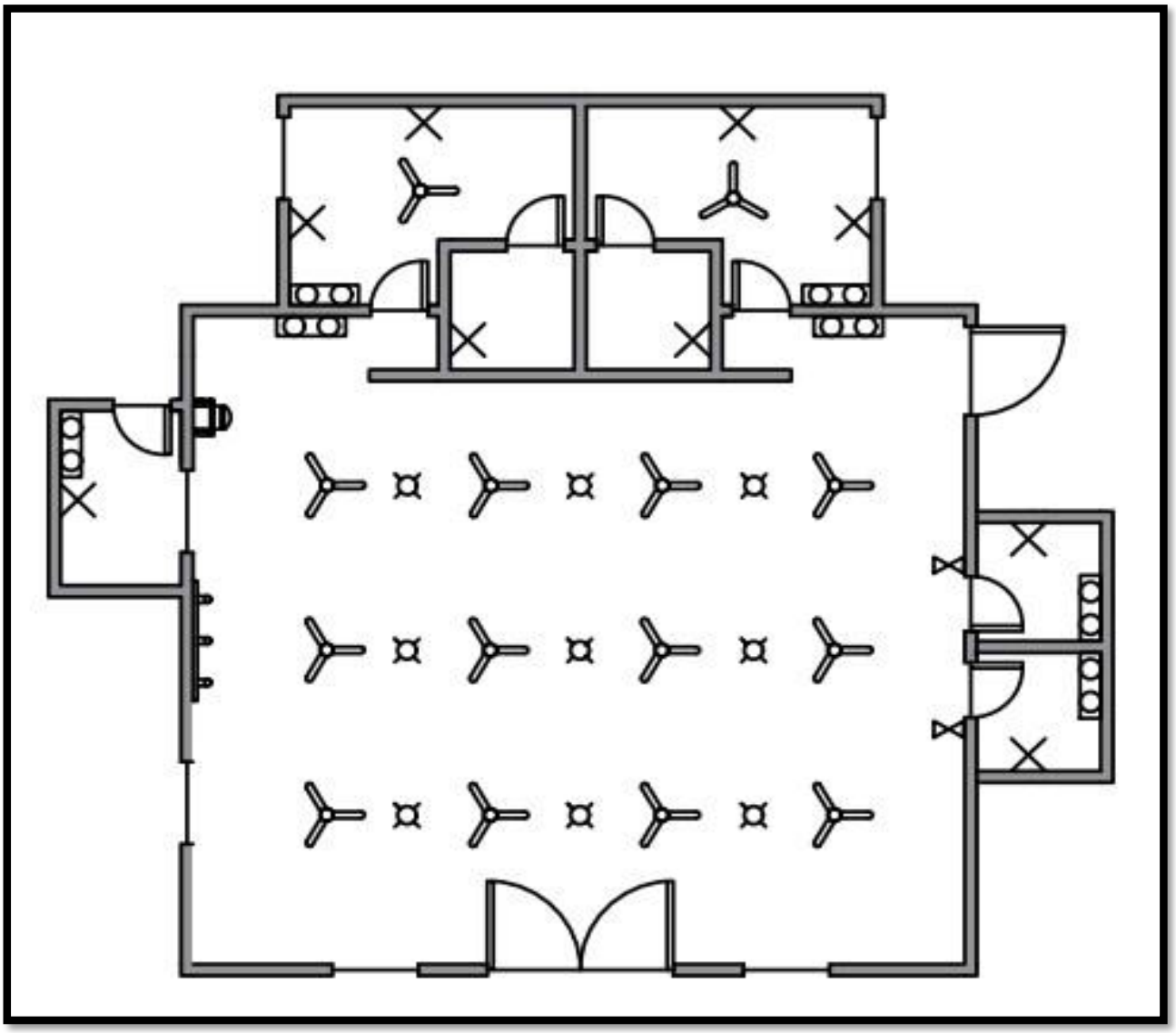
Design of Electrical Wiring in Community Hall with Plan view of new Community Hall

In Nakaravadi village community hall exist. That is small so People face many problems when there is any occasion. So we give new design of plan view (floor plan) of community hall with complete electrical wiring diagram with cost estimation.

Design of wiring diagram: -

- For design of wiring diagram of Community hall building first we show wiring layout of building with position equipments and switchboard.

Figure 20: Wiring layout of community hall



Wiring Diagram: -

- Here, below is a Wiring diagram with appropriate Symbols used in Wiring Diagram.

Figure: Wiring diagram of community hall

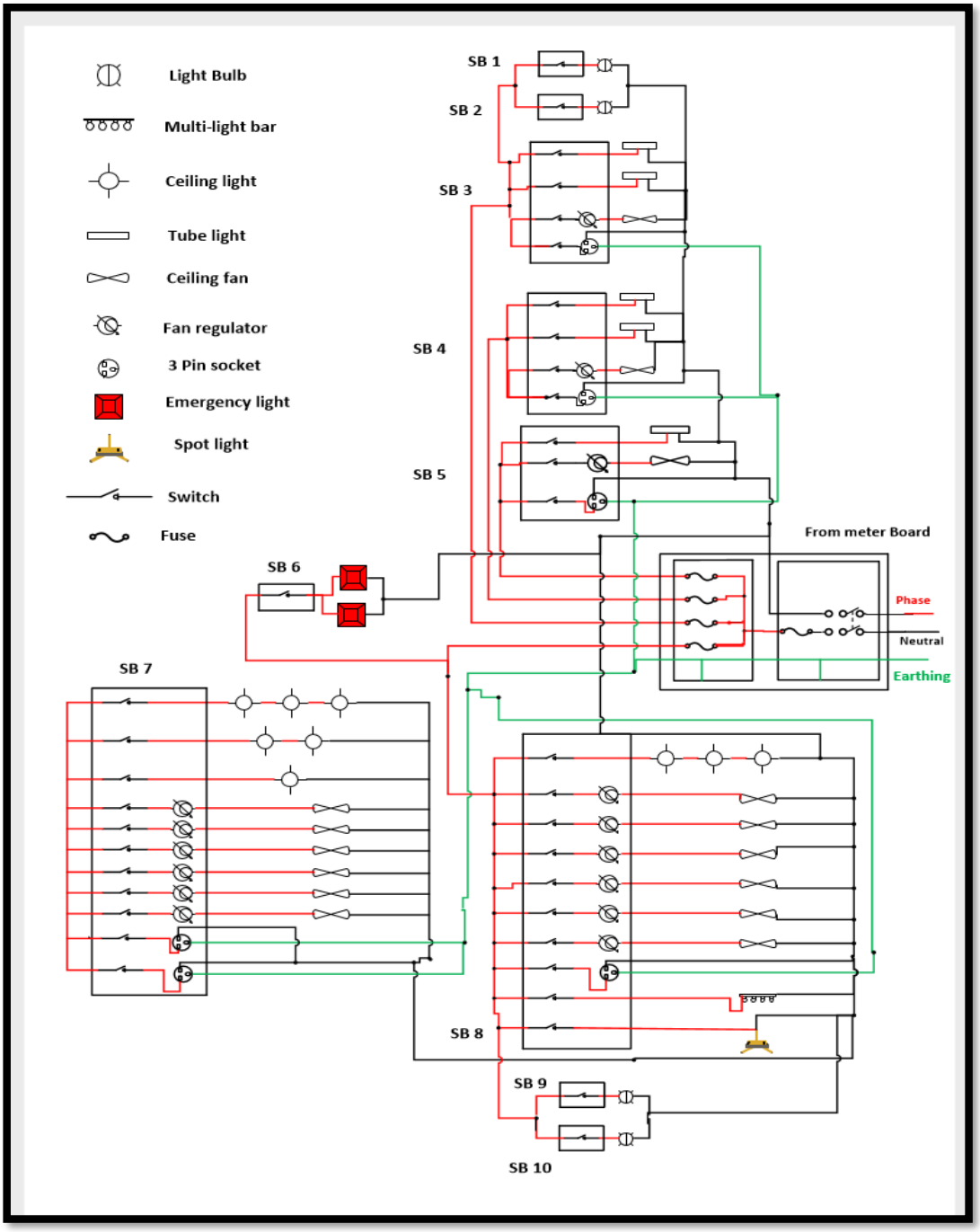
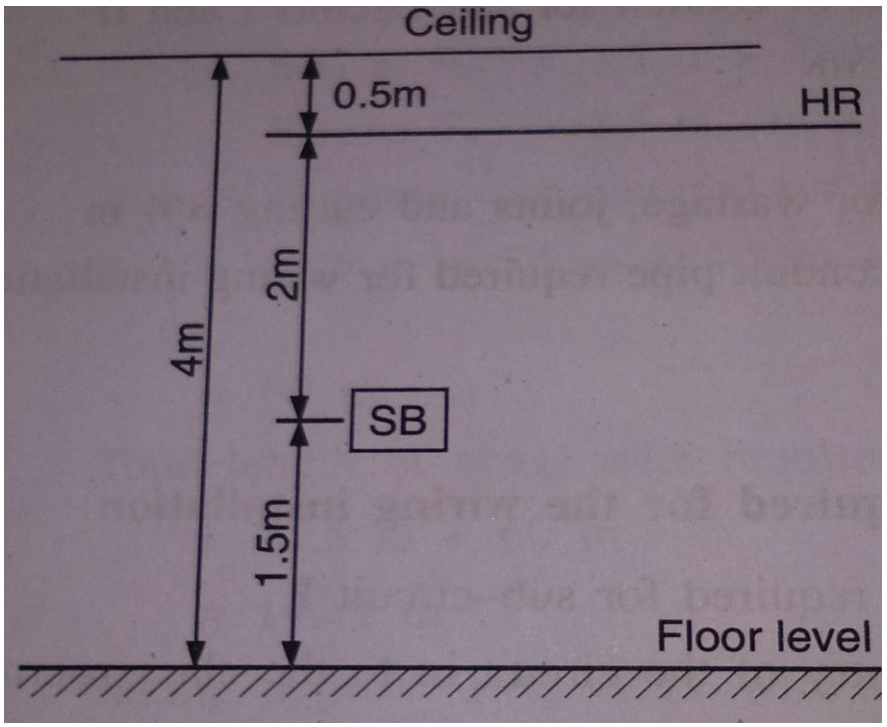


Figure: Position of switch board and batten in an electrical installation

- Ground level to switch board distance 5 feet
- Ground level to distribution board 8.0feet
- Thickness of wall1feet
- Ceiling to light point distance 2feet
- Ceiling to fan point distance 4feet
- Ceiling to switch board distance 7feet
- Switch board to light point distance 2.5feet



Number of sub-circuits

- Number of ceiling light points = 9
- Number of tube light points = 5
- Number of bulb points = 4
- Number of spot light points = 1
- Number of emergency light points = 9
- Number of multi-light bar points = 1
- Number of fan points = 15
- Number of plug sockets = 6

- Total 50 points

- Maximum load current for sub-circuit 1 = total connected load /voltage
  = 940W / 230V
  = 4.1 A
- Maximum load current for sub-circuit 2 = total connected load /voltage

= 937W / 230V

= 4.07 A

- Maximum load current for sub-circuit 3 = total connected load /voltage
  = 940W / 230V
  = 4.1 A
- Maximum load current for sub-circuit 4 = total connected load /voltage
  = 940W / 230V
  = 4.1 A

Calculation of sub circuit

Equipments	Nos.	Total Wattage
Emergency light	2 nos. = 2*50	100 W
Ceiling fan	15 nos. = 15*60	900 W
Tube light	5 nos. = 5*40	200 W
Ceiling light	9 nos. = 9*9	91 W
LED(yellow) bulb	4 nos. = 4*12	48 W
Focus light	1nos. = 1*100	100 W
Multi light	1nos. = 1*80	80 W
3 pin 15A Socket	2 nos. = 2*1000	2000 W
3 pin 5amp socket	4 nos. = 4*60	240 W
	Total watt	**3759 W**

Table Load Calculation of Community Hall

- Total load is more than 800 W therefore number of sub-circuits required is 4.
- Therefore, the minimum size of wire i.e. 1/1.40 mm (1.5 mm2) single core aluminum cable, 650 V grade PVC having current carrying capacity of 10 A will be used as phase and neutral wires in sub-circuit.
- And 1/1.80 mm (2.5 mm2) single core aluminium cable, 650 V grade PVC having current carrying capacity of 15 A will be used from supply meter to consumer's main board.

Rating of main switch selected: -

- 4 Nos., 250 V, 16 A, DPIC (double pole iron clad) with neutral link.
- 250 V, 24 A, 2-way, IC distribution board of MCB type will be used as MDB (main distribution board).

Calculation of length of PVC conduit required

- From SB8 to SB7= 15.9 feet + 15.9 feet = 31.8 feet
- From SB8 to Focus light = 22 feet + 5 feet + 2.5 feet = 29.5feet
- From Focus light to Multi light = 10feet
- From SB2 to fan-1 = 7 feet + 11 feet + 7.5 feet = 25.5feet
- From fan-1 to fan-2 = 7.5feet
- From fan-2 to fan-3 = 7.5feet
- From SB8 to Ceiling yellow lamp-1 = 7 feet + 8 feet + 7.5 feet = 22.5feet

- From Ceiling yellow lamp-1 to Ceiling yellow lamp-2 = 7.5feet
- From Ceiling yellow lamp-2 to Ceiling yellow lamp-3 = 7.5feet
- From SB8 to fan-4 = 7 feet + 11 feet + 7.5 feet = 25.5feet
- From fan-4 to fan-5 = 7.5feet
- From fan-5 to fan-6 = 7.5feet

- From SB7 to Ceiling yellow lamp-4 = 7 feet + 8 feet + 7.5 feet = 22.5feet
- From Ceiling yellow lamp-4 to Ceiling yellow lamp-5 = 7.5feet
- From Ceiling yellow lamp-5 to Ceiling yellow lamp-6 = 7.5feet
- From SB7 to fan 7 = 7 feet + 11 feet + 7.5 feet = 25.5feet
- From fan-7 to fan-8 = 7.5feet
- From fan-8 to fan-9 = 7.5feet
- From SB8 to fan-10 = 7 feet + 11 feet + 7.5 feet = 25.5feet
- From fan-10 to fan-11 = 7.5feet
- From fan-11 to fan-12 = 7.5feet
- From SB7 to Ceiling yellow lamp-7 = 7 feet + 7.5 feet = 14.5feet
- From Ceiling yellow lamp-7 to Ceiling yellow lamp-8 = 7.5feet
- From Ceiling yellow lamp-8 to Ceiling yellow lamp-9 = 7.5feet

Hall to kitchen

- From SB8 to SB5 =26.94feet
- From SB5 to light-1 = 4.92 feet + 2 feet = 6.92feet

- From SB5 to fan = 4.3 feet + 13.62 feet = 17.92 feet

Hall to Room-1

- From SB8 to SB3 = 26.94 feet
- From SB3 to light- A= 3.61 feet + 5.15 feet = 8.76 feet
- From SB3 to light-B= 4.92 feet + 5.15 feet + 9.8 feet = 19.87 feet
- From SB3 to fan = 19.87 feet

Room-1 Toilet

- From SB1 to light= 4.92 feet + 3.6 feet = 8.52 feet

- From SB9 to SB10 =0.5 feet
- From SB9 to light = 13.72 feet
- From SB10 to light = 13.72 feet

Hall to Toilet

- From SB7 to SB9 = 23.52 feet

Hall to Room-2

- From SB7 to SB4 = 26.94 feet
- From SB4 to ceiling light-1=3.61 feet + 5.15 feet = 8.76 feet
- From SB4 to ceiling light-2= 4.92 feet + 5.15 feet + 9.8 feet = 19.87 feet
- From SB4 to fan = 19.87 feet

Room-2 Toilet

- From SB2 to light= 4.92 feet + 3.6 feet = 8.52 feet

Distribution board

- From main board to DB to SB7 = 4.92 feet + 4.1 feet + 35 feet = 44.02 feet

- From main board to DB to SB3= 25.34 feet + 20 feet + 35 feet + 15 feet = 95.54 feet
- From main board to DB to SB4 = 44.02 feet + 26.94 feet= 70.96 feet

- From main board to DB to SB5 = 35.14 feet + 15 feet + 8.6 feet +10.16feet = 68.9 feet

Total length of conduit

= 31.8 + 29.5 + 10 + (14*7.5) + (25.5*4) +(2*22.5) + 8.52 + (26.94*2) + (8.76*2) + (19.87*4) + (8.52*2) + 0.5 + (13.72*2) + 23.52 + 26.94 + 6.92 + 17.92 + 14.5
=606 feet = 185 meter

10% extra for wastage and for banding

= 185 meter + 18.5 meter
= 204 meter

Total Length of phase wire

=Total length of conduit + (25.5*4) feet + (22.5*2) feet + (7.5*14) feet + 13 feet + 10 feet + 12 feet
= 606 feet + (25.5*4) feet + (22.5*2) feet + (7.5*14) feet + 13 feet + 10 feet + 12 feet

= 606 feet + 102 feet + 105 feet + 45 feet + 35 feet

= 893 feet =273 meter

10% extra for wastage

= 273 meter + 27.3 meter
= 300 meter

Total length of neutral wire

= DB to SB3 +DB to SB4 +DB to SB5 +DB to SB 7 + SB8 to SB 7 + SB 7 to SB9 + SB 9 to SB 10 + (Distance between yellow light * 6) + (Distance between two fan * 12) + (Distance between common neutral to light * 6)
=21.62 meter + 41.9 meter + 21 meter+ 13.42 meter + 9.7 meter + 7.17 meter + 0.152 meter + (3.3*6) meter + (3.3*12) meter + (3.3*6) meter
=114.96 meter + 19.8 meter + 39.6 meter + 19.8 meter
= 194 meter

10% extra for Wastage

= 194 meter + 19.4 meter
= 213 meter

Total length of conductor = Total length of phase wire + Total length of neutral wire

= 300 meter + 213 meter
= 513 meter

Material and Costing

Sr. No.	Material	Quantity Req.	Unit	Rate		Total cost (Rs.)
1	Main Distribution Board	01	Nos.	400	Each	400
2	16 amp MCB	04	Nos.	375	Each	1500
3	PVC conduit with band Coupling and box	204	Meter	25	Meter	5100
4	650 V grade 1/1.40mm single core conductor	513	Meter	700	100 Meter	3591
5	Switch board	8 small 02 big	Nos.	50small 150 big	Each	700
6	3 pin socket	06	Nos.	20	Each	120
7	5/6 amp switch	37	Nos.	17	Each	629
8	Holder	04	Nos.	40	Each	160
9	Fan	15	Nos.	1800	Each	27,000
10	LED bulb (9W)	04	Nos.	150	Each	2000
11	Tube light	05	Nos.	200	Each	1000
12	Emergency light	02	Nos.	500	Each	1000
13	Multi light	01	Nos.	500	Each	500
14	Screw	04	Peck	150	-	600
Total						**44,300 Rs.**
Labor charge =Rs.320/-point Rs.[320*(20+6)] (6 point DB and SB installation)						**8320 Rs.**
Total Costing Amount			**52,620Rs.**			
Round off Amount			**52,650Rs.**			

Table: Costing of Electrical Wiring of Community Hall

8.1.2 LIBRARY

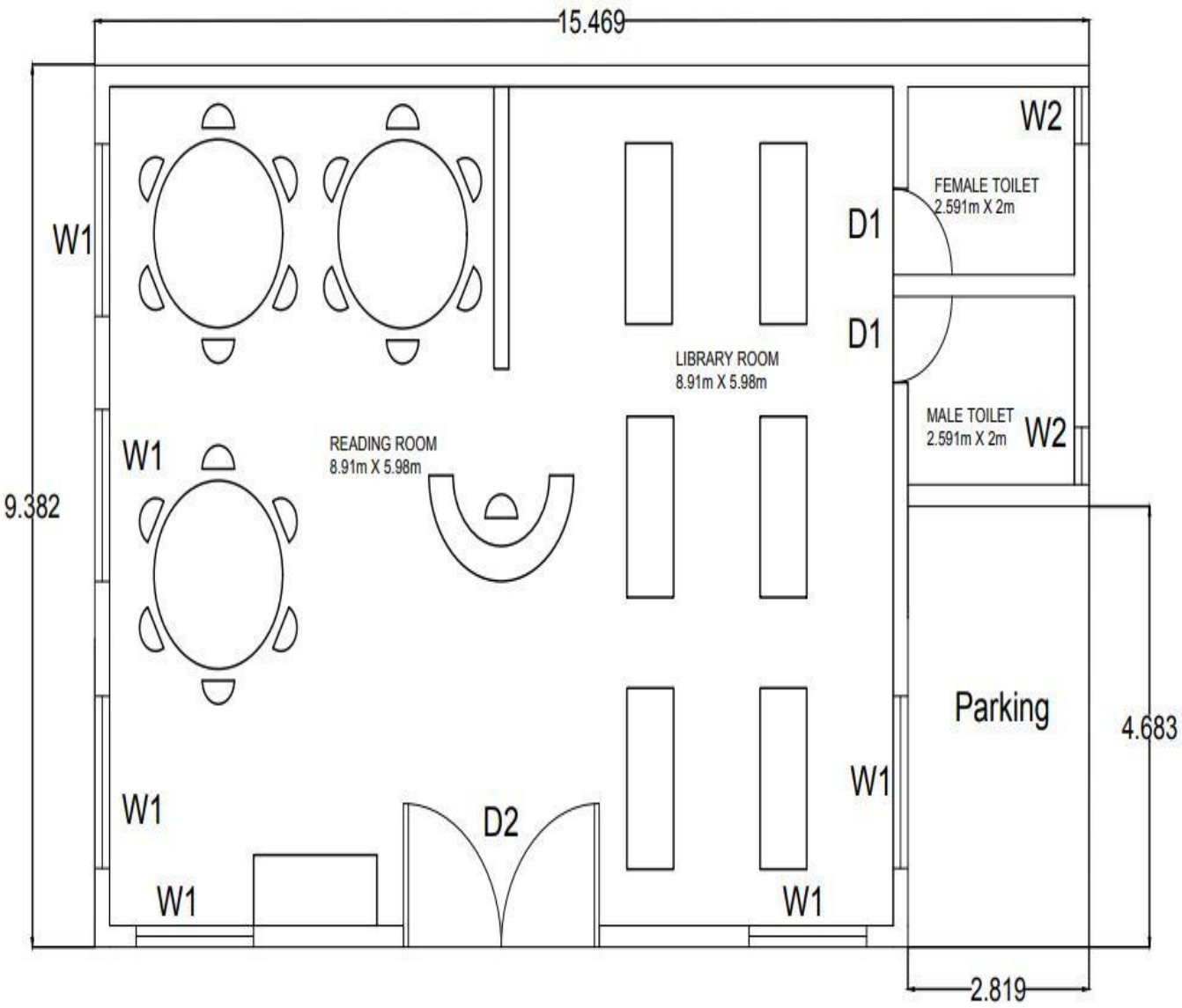


Figure 21 library

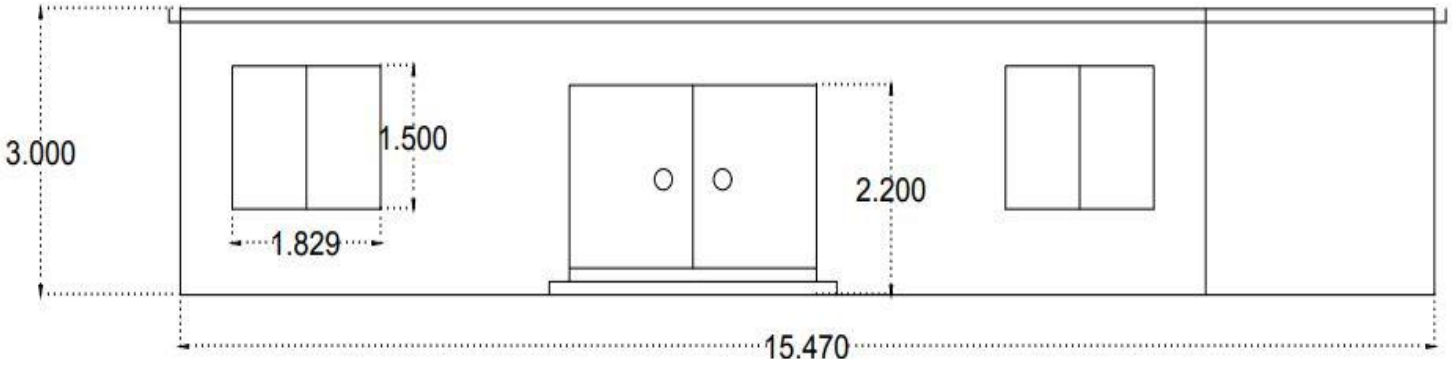


Figure 22 library elevation

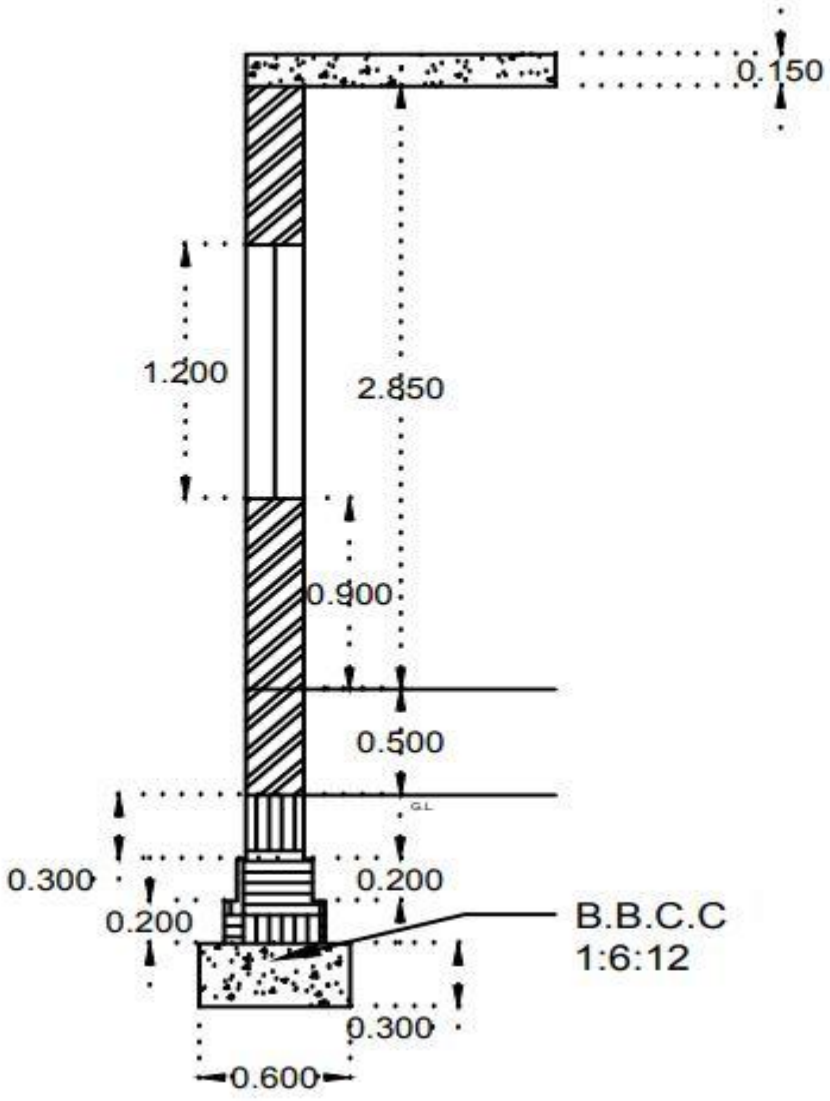


FIGURE 23 LIBRARY WALL SECTION

LIBRARY QUANTITY SHEET

Sr.No.	Item	No.	L	B	H	Quantity	Total
1	**Excavation** Hor. Wall = 26.433 Ver. wall = 14.782 Total = 41.215	1	41.215	0.6	1.0	24.729	**24.729m^3**
2	**B.B.C.C (1:6:12) in Foundation**	1	41.215	0.6	0.3	7.419	**7.419 m^3**
3	**First class brick masonry up to plinth in C.M. (1:6)**						
	Step 1	1	41.215	0.4	0.2	3.297	
	Step2		41.215	0.3	0.2	2.472	
	Step3		41.215	0.229	0.3	2.831	**8.600 m^3**
4	**Sand filling in plinth**						
	Reading room	1	5.98	8.915	0.5	26.656	
	Book self	1	5.98	8.915	0.5	26.656	
	Toilet's	2	2.591	2.000	0.5	5.182	**58.494m^3**
5	**First class brick masonry in super structure in C.M. (1;6)**						
	Boundary walls :- Horizontal = 26.433 Vertical = 14.782 Total = 41.215	1	41.215	0.229	3.0	28.315	**28.215m^3**
	Deduction in masonry						
	Door's						
	D1	1	3.048	0.229	2.2	1.536	
	D2	2	0.914	0.229	2.0	0.837	
	Window's						
	W3	6	1.829	0.229	1.5	3.770	
	Ventilator's	2	0.610	0.229	0.15	0.042	**6.185**
						Net	**22.030m^3**
6	**15 cm thick lintel with 2side 15cm bearing**						
	Door's						
	D1 = 3.048 + 0.3	1	3.348	0.229	0.15	0.115	
	D2 = 0.914 + 0.3	2	1.214	0.229	0.15	0.083	

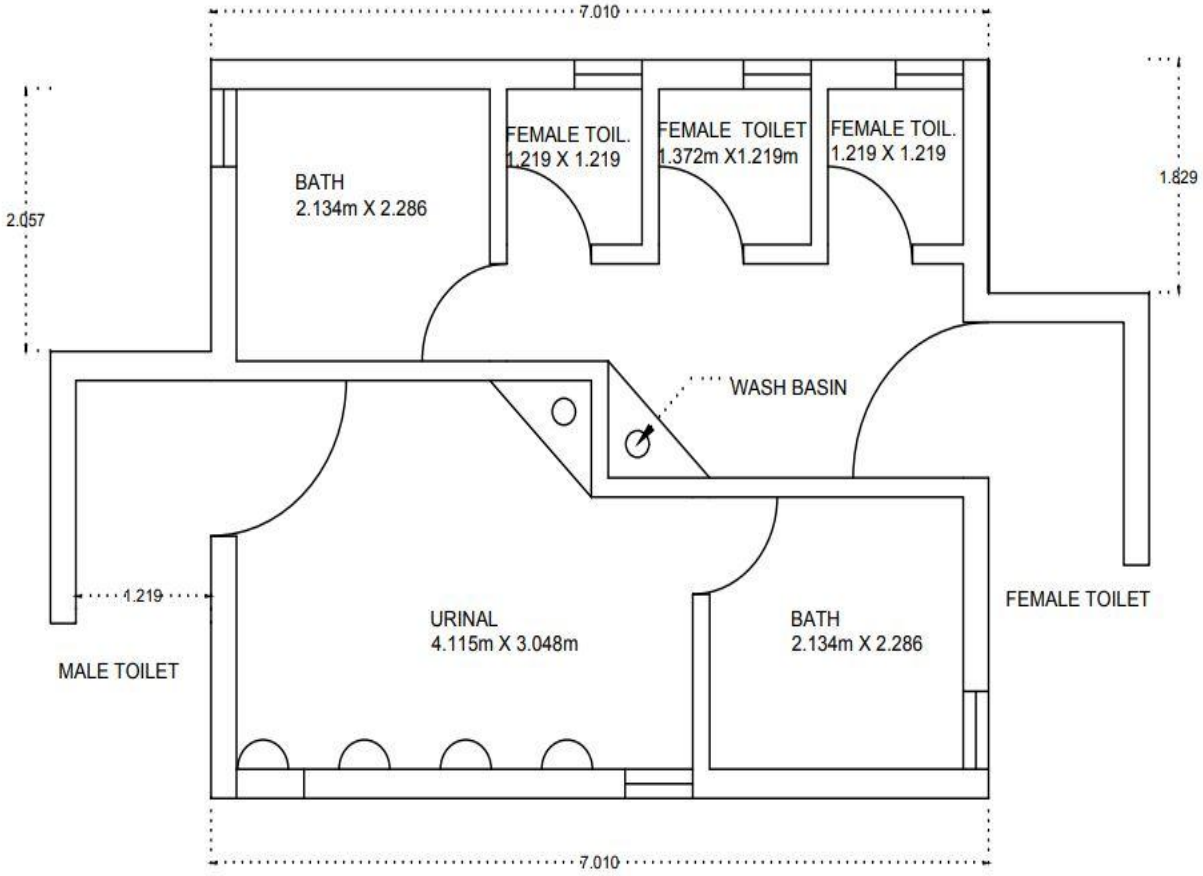
	Window's						
	W1 = 1.829 + 0.3	6	2.129	0.229	0.15	0.439	**0.637m^3**
7	**15 cm thick R.C.C. slab portion (1:1.5:3)**						
	Area of slab = 130.703	1	-	-	-	130.703	**130.703m^2**
8	**1.5 cm thick single coat cement plaster in C.M. (1:4)**						
	Reading area	2	5.981	-	3.0	35.886	
		1	8.915	-	3.0	54.490	
	Book self	2	5.981	-	3.0	35.886	
		1	8.915	-	3.0	26.745	
	Toilet's	4	2.591	-	3.0	31.092	
		4	2.000	-	3.0	24.000	
	Other	2	3.000	-	3.0	18.000	**226.099m^2**
	Deduction						
	Door's						
	D1	1	3.048		2.2	6.706	
	D2	2	0.914		2.0	3.656	
	Window's						
	W1	6	1.829		1.5	16.461	**26.823m^2**
						Net	**199.276m^2**
9	**double coat sun faced plaster to external wall's.**						
	Vertical wall's = 18.746	1	18.746	-	3.5	65.611	
	Horizontal wall's = 30.938	1	30.938	-	3.5	108.283	**173.894m^2**
	Deduction						
	D1	1	3.048		2.2	6.706	
	Window's						
	W1	6	1.829		1.5	16.461	**23.167m^2**
						Net	**150.727m^2**

LIBRARY ABSTRACT

Sr.No.	Item	Quantity	Per	Rate (Rs.)	Amount (Rs.)
1	Excavation	24.729	m^3	220	5440.380
2	B.B.C.C (1:6:12) in Foundation	7.419	m^3	2620	19437.78
3	First class brick masonry up to plinth in C.M. (1:6)	8.600	m^3	3850	33110.000
4	Sand filling in plinth	58.494	m^3	3950	231051.300
5	First class brick masonry in super structure in C.M. (1:6)	22.030	m^3	1930	42517.900
6	15 C.M. thick R.C.C. lintel with 2 side 15 C.M. bearing	0.637	m^3	4100	2611.700
7	15 C.M. thick R.C.C. slab	130.703	m^3	4100	535882.300
8	15 mm thick single coat cement plaster in C.M. (1:4)	199.276	m^2	300	49882.800
9	Double coat sun faced plaster to external Walls	150.727	m^2	320	48232.640
10	Indian W.C. pans with a pair of foot rest	2	Nos.	3400	6800.000
11	Foot rest's	2	Pair	475	950.000
12	P.V.C. flushing cistern for W.C.	2	Nos.	2900	5800.000
14	P.V.C. automatic flushing tank for urinal	2	Nos.	2100	4200.000
15	Nahni trap's	2	Nos.	350	700.000
16	Gully trap's	2	Nos.	450	900.000
Total					939827.120
Add 5% Contingencies					46991.356
Grand total					986818.476
Say					986817rs

8.1.3

Figure 24 PUBLIC TOILET



TOILET

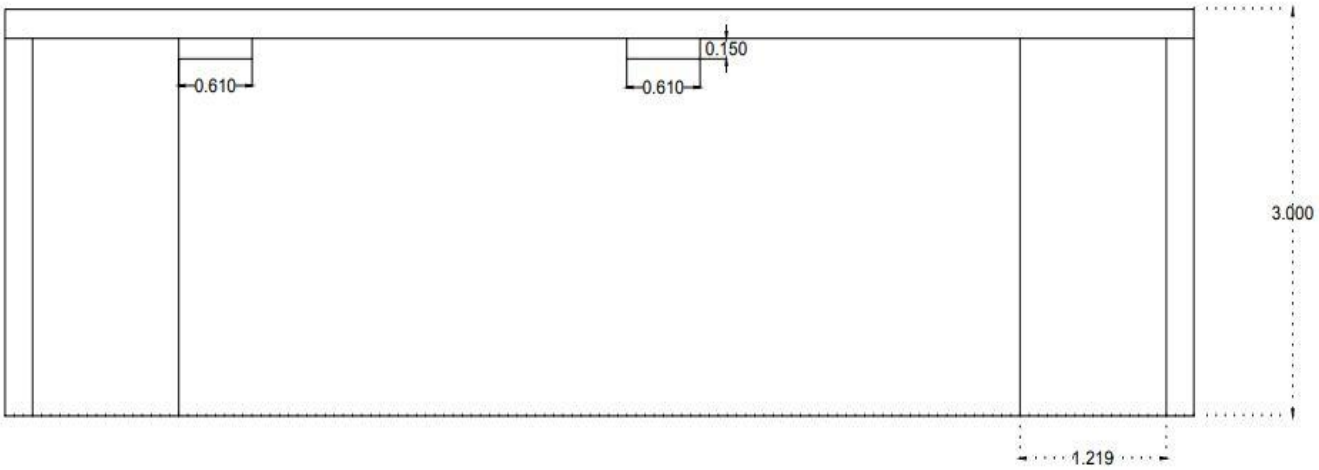


Figure 25 PUBLIC TOILET ELEVATION

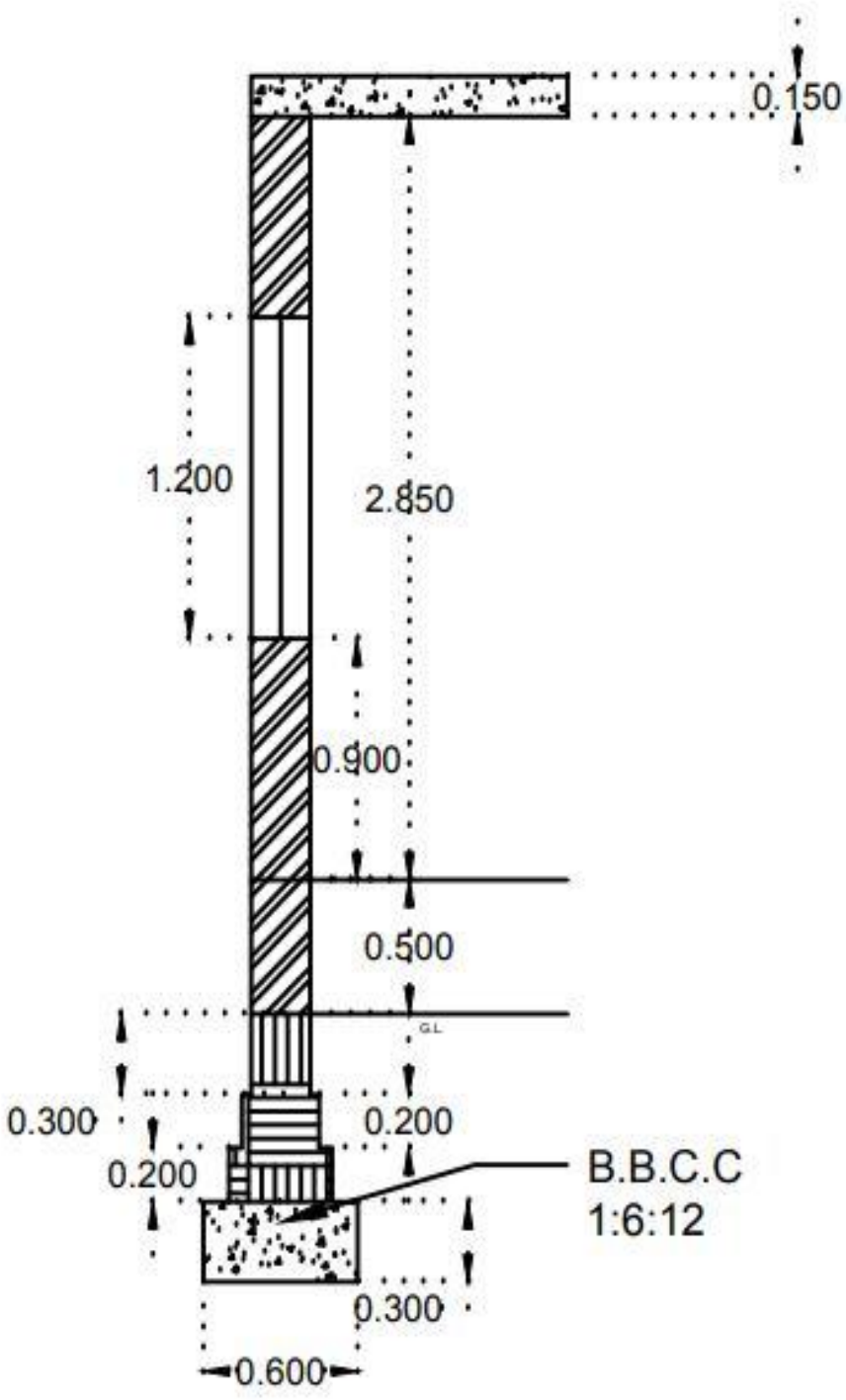


Figure 26 PUBLIC TOILET WALL SECTION

MEASUREMENT SHEET

Sr.no.	Item	No.	L	B	H	Quantity	Total
1	**Excavation** Hor. Wall = 16.916 Ver. wall = 11.426 Total = 28.342	1	28.342	0.6	1.1	18.706	**18.706m^3**
2	**B.B.C.C (1:6:12) in Foundation**	1	28.342	0.6	0.3	4.202	**4.202 m^3**
3	**First class brick masonry up to plinth in C.M. (1:6)**						
	Step 1	1	28.342	0.4	0.2	2.267	
	Step2	1	28.342	0.3	0.2	1.701	
	Step3	1	28.342	0.229	0.3	1.947	**5.915m^3**
4	**Sand filling in plinth**						
	Men's urinal	1	3.048	3.200	0.5	4.877	
	Men's & women's attach w/c	2	2.134	2.286	0.5	4.876	
	Men's passage	1	2.134	0.914	0.5	0.975	
	Women's passage	1	1.676	3.200	0.5	2.682	
	Women's urinal-1	2	1.219	1.219	0.5	1.486	
	Women's urinal-2	1	1.219	1.372	0.5	0.836	
	Women's passage -2	1	0.762	0.914	0.5	0.348	
	Outside passage	2	1.905	1.219	0.5	2.322	**18.402m^3**
5	**First class brick masonry in super structure in C.M. (1;6)**						
	Hor. Wall = 16.916 Ver. wall = 11.426 Total = 28.342	1	28.342	0.229	3.0	19.471	**19.471m^3**
	Deduction in masonry						
	Door's						
	D1	1	1..219	0.229	2.2	0.614	
	D2	5	0.762	0.229	2.0	1.745	
	Ventilator's	7	0.610	0.229	0.15	0.147	**2.506m^3**
						Net	**16.965m^3**
6	**15 cm thick lintel with 2side 15cm bearing**						

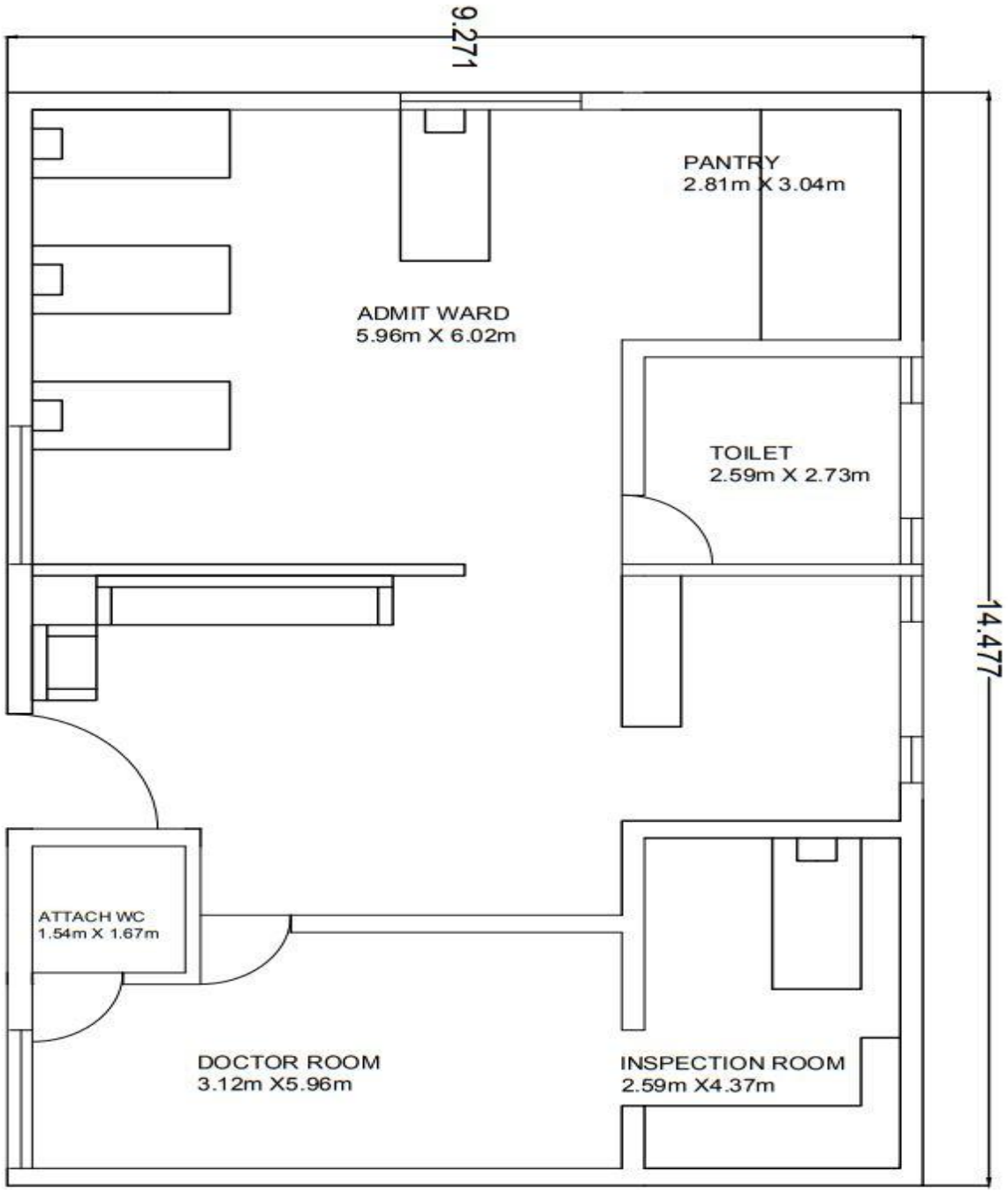
	Door's						
	D1 = 1.219 + 0.3	2	1.519	0.229	0.15	0.104	
	D2 = 0.762 + 0.3	5	1.062	0.229	0.15	0.182	**0.286m^3**
7	**15 cm thick R.C.C. slab portion (1:1.5:3)**						
	Area of slab = 37.405	1	-	-	-	37.405	**37.405m^3**
8	**1.5 cm thick single coat cement plaster in C.M. (1:4)**						
	Vertical wall' = 56.842 Horizontal wall's = 43.127 Total included outside plaster = 99.969	1	99.969	-	3.0	299.907	**299.907m^2**
	Deduction						
	Door's						
	D1	1	1.219	-	2.2	2.682	
	Ventilator's	7	0.610	-	0.15	0.641	**10.943m^2**
						Net	**288.964m^2**
9	Indian W.C. pans with a pair of foot rest	6					
10	Foot rest's	4					4Nos.
11	Urinal's	4					4Pair
12	P.V.C. flushing cistern for W.C.	6					6Nos.
13	P.V.C. automatic flushing tank for urinal	10					10Nos.
14	Nahni trap's	6					6Nos.
15	Gully trap's	6					6Nos.

ABSTRACT SHEET

Sr.No.	Item	Quantity	Per	Rate (Rs.)	Amount (Rs.)
1	Excavation	13.706	m^3	220	3015.320
2	B.B.C.C (1:6:12) in Foundation	4.202	m^3	2620	11009.240
3	First class brick masonry up to plinth in C.M. (1:6)	5.915	m^3	3850	22772.750
4	Sand filling in plinth	18.402	m^3	3950	72687.900
5	First class brick masonry in super structure in C.M. (1:6)	16.965	m^3	1930	32742.450
6	15 C.M. thick R.C.C. lintel with 2 side 15 C.M. bearing	0.286	m^3	4100	1172.600
7	15 C.M. thick R.C.C. slab	37.405	m^3	4100	153360.500
8	15 mm thick single coat cement plaster in C.M. (1:4)	288.964	m^2	300	86689.200
9	Indian W.C. pans with a pair of foot rest	6	Nos.	3400	20400.000
10	Foot rest's	4	Pair	475	1900.000
11	P.V.C. flushing cistern for W.C.	4	Nos.	2900	11600.000
12	Urinal's for male toilet	4	Nos.	600	2400.000
13	P.V.C. automatic flushing tank for urinal	10	Nos.	2100	21000.000
14	Nahni trap's	6	Nos.	350	2100.000
15	Gully trap's	6	Nos.	450	2700.000
Total					445549.960
Add 5% Contingencies					22277.498
Grand total					467827.458
Say					467828rs

8.1.4 HEALTH CENTRE

Figure 27 HEALTH CENTRE PLAN



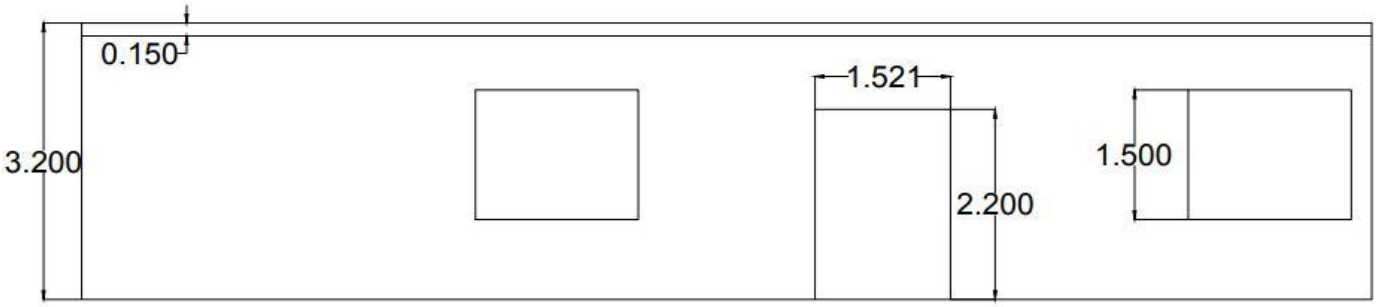


Figure 28 HEALTH CENTRE ELEVATION

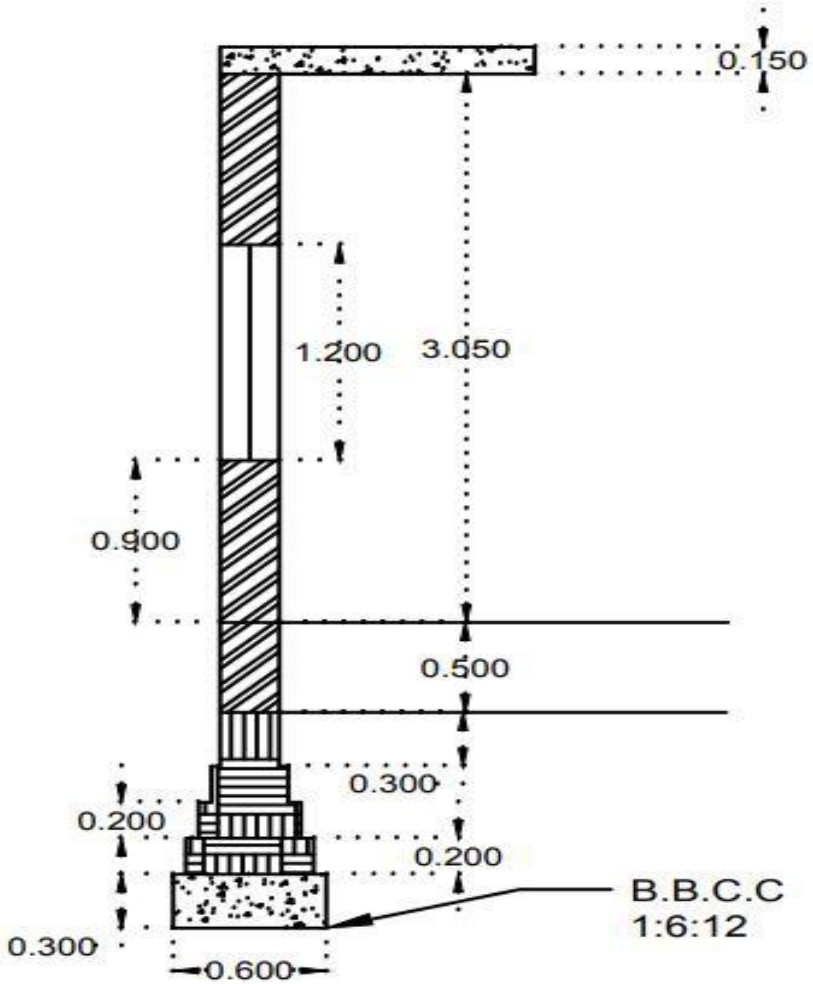


Figure 29 HEALTH CENTRE WALL SECTION

MEASUREMENT SHEET

Sr.No.	Item	No.	L	B	H	Quantity	Total
1	**Excavation** Hor. Wall =38.58 Ver. wall = 31.252 Total =69.832	1	69.832	0.6	1.2	49.559	**49.559m^3**
2	**B.B.C.C (1:6:12) in Foundation**	1	69.832	0.6	0.3	18.855	**18.855m^3**
3	**First class brick masonry up to plinth in C.M. (1:6)**						
	Step 1	1	69.832	0.5	0.2	8.380	
	Step2	1	69.832	0.4	0.2	6.983	
	Step3	1	69.832	0.3	0.2	5.587	
	Up to plinth	1	69.832	0.229	0.3	4.797	**25.747m3**
4	**Sand filling in plinth**						
	Admit word	1	5396	6.02	0.5	17.940	
	Pantry	1	2.81	3.04	0.5	4.271	
	Toilet	1	2.59	2.73	0.5	3.535	
	Doctor room	1	3.12	5.96	0.5	9.298	
	Inspection room	1	2.59	4.37	0.5	5.659	
	Attach w/c	1	1.54	1.67	0.5	1.286	
	Other area = 33.098	1			0.5	16.549	**58.538 m3**
5	**First class brick masonry in super structure in C.M. (1;6)**						
	Total = 69.832	1	69.832	0.229	3.2	51.173	
	Internal wall's	1	8.788	0.152	3.2	4.274	
		1	1.67	0.152	3.2	0.812	**56.259 m3**
	Deduction in masonry						
	Door's						
	D1	1	1524	0.229	2.2	0.768	
	D2	3	0.914	0.229	2.0	1.256	
	Window's						
	W1	3	1.829	0.229	1.2	1.508	
	Ventilator's	2	0.610	0.229	0.15	0.084	**3.616 m3**
						Net	**52.643 m3**

6	**15 cm thick lintel with 2side 15cm bearing**						
	Door's						
	D1 = 1.524 + 0.3	1	1.824	0.229	0.15	0.063	
	D2 = 0.914 + 0.3	3	1.214	0.229	0.15	0.125	
	Window's						
	W1 = 1.829 + 0.3	3	2.129	0.229	0.15	0.219	**0.417m^3**
7	**15 cm thick R.C.C. slab portion (1:1.5:3)**						
	Area of slab = 20.132	1	-	-	-	20.132	**20.132m^2**
8	**1.5 cm thick single coat cement plaster in C.M. (1:4)**						
	Admit word	2	6.969		3.2	44.602	
		1	6.20		3.2	19.840	
	Pantry	2	2.819		3.2	18.042	
		1	3.048		3.2	9.754	
	toilet	2	2.59		3.2	16.576	
		3	2.73		3.2	26.208	
	Doctor room	1	5.96		3.2	19.072	
		2	3.12		3.2	6.240	
	Inspection room	2	2.59		3.2	16.576	
		2	4.37		3.2	27.968	
	Attach w/c	2	1.54		3.2	9.856	
		2	1.67		3.2	10.688	
	Other area	2	8.788		3.2	56.243	
		2	3.245		3.2	20.768	
		2	1.144		3.2	7.322	**309.755m^2**
	Deduction						
	Door's						
	D1	1	3.048		2.2	3.353	
	D2	3	0.914		2.0	5.484	
	Window's						
	W1	3	1.829		1.2	6.584	**15.421m^2**
						Net	**294.334m^2**
9	**double coat sun faced plaster to external wall's.**						

	Vertical wall's = 14.477	2	18.746	-	3.7	65.216	
	Horizontal wall's = 8.813	2	30.938	-	3.7	107.346	**172.346m²**
	Deduction						
	D1	1	1.524		2.2	3.353	
	Window's						
	W1	3	1.829		1.2	6.984	**9.937m²**
						Net	**162.409m²**

ABSTRACT SHEET

Sr.No.	Item	Quantity	Per	Rate (Rs.)	Amount (Rs.)
1	Excavation	49.559	m^3	220	10902.289
2	B.B.C.C (1:6:12) in Foundation	18.855	m^3	2620	49400.10
3	First class brick masonry up to plinth in C.M. (1:6)	25.747	m^3	3850	99125.95
4	Sand filling in plinth	58.538	m^3	3950	112978.34
5	First class brick masonry in super structure in C.M. (1:6)	52.643	m^3	1930	207939.85
6	15 C.M. thick R.C.C. lintel with 2 side 15 C.M. bearing	0.417	m^3	4100	1709.70
7	15 C.M. thick R.C.C. slab	20.132	m^3	4100	82541.20
8	15 mm thick single coat cement plaster in C.M. (1:4)	294.334	m^2	300	88300.200
9	Double coat sun faced plaster to external Walls	162.409	m^2	320	51970.88
10	Indian W.C. pans with a pair of foot rest	1	Nos.	3400	3440
11	Foot rest's	1	Pair	475	475
12	P.V.C. flushing cistern for W.C.	1	Nos.	2900	2900
14	P.V.C. automatic flushing tank for urinal	1	Nos.	2100	2100
15	Nahni trap's	1	Nos.	350	350
16	Gully trap's	1	Nos.	450	450
Total					720273.480
Add 5% Contingencies					36013.674
Grand total					756287.154
Say					756288.00rs

8.1.5 BUS STOP

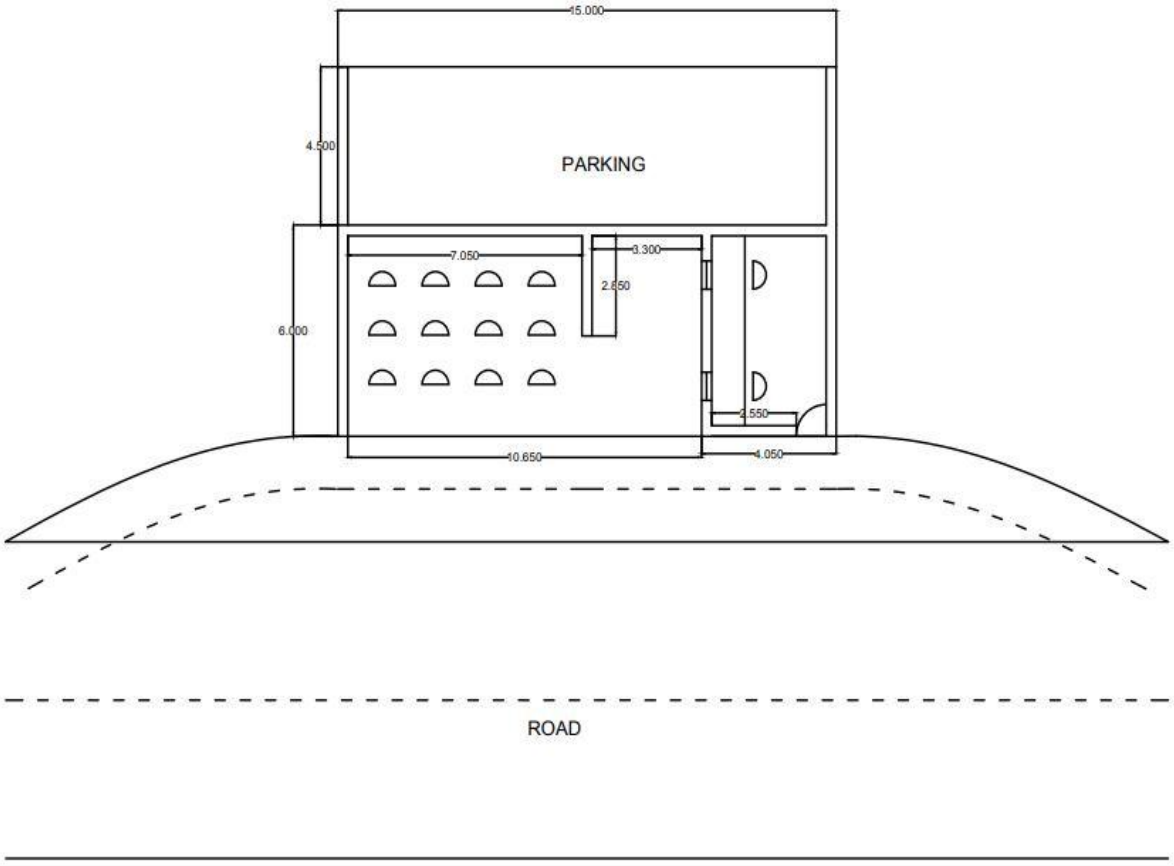


Figure 30 BUS STOP PLAN

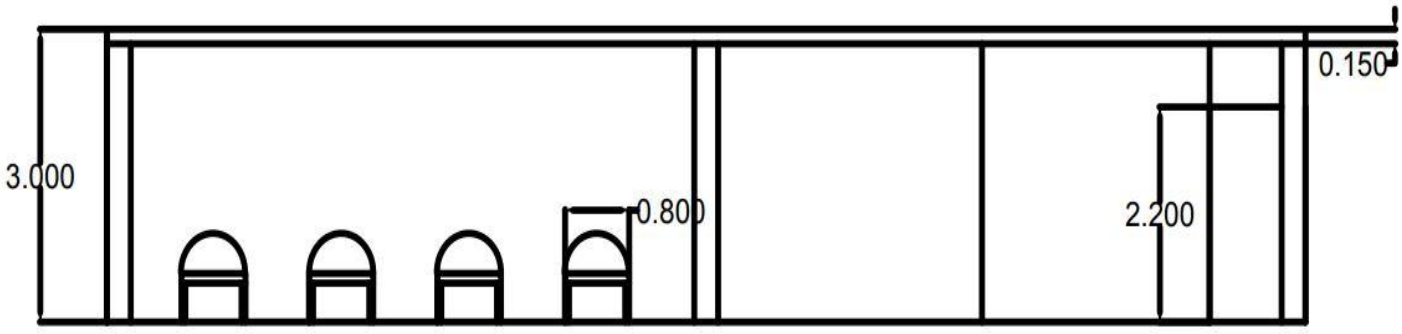


Figure 31 BUS STOP ELEVATION

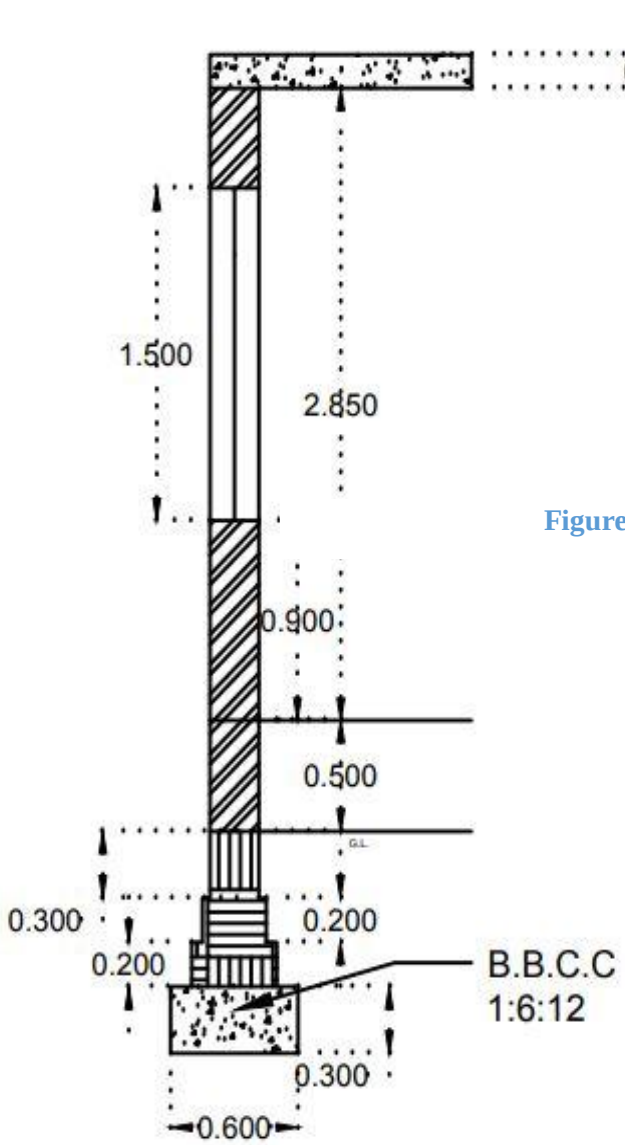


Figure 32 BUS STOP WALL SECTION

MEASUREMENT SHEET

Sr.No.	Item	No.	L	B	H	Quantity	Total
1	**Excavation** Hor. Wall = 26.433 Ver. wall = 17.852 Total = 44.285	1	44.285	0.6	1.1	29.228	**29.228**
2	**B.B.C.C (1:6:12) in Foundation**	1	44.285	0.6	0.3	7.971	**7.971**
3	**First class brick masonry up to plinth in C.M. (1:6)**						
	Step 1	1	44.285	0.4	0.2	3.543	
	Step2		44.285	0.3	0.2	2.657	
	Step3		44.285	0.229	0.3	3.042	**9.242m^3**
4	**Sand filling in plinth**						
	Sitting area	1	5.400	7.050	0.5	19.035	
	Water port	1	5.400	3.300	0.5	8.910	
	Ticket office	1	5.400	3.450	0.5	9.315	
	Parking area	1	4.500	14.542	0.5	32.517	**69.777m^3**
5	**First class brick masonry in super structure in C.M. (1;6)**						
	Excavation Hor. Wall = 26.433 Ver. wall = 17.852 Total = 44.285	1	44.285	0.229	3.0	30.424	**30.424m^3**
	Deduction in masonry						
	Door's						
	D1	1	1.200	0.229	2.2	0.605	
	Window's						
	W3	2	1.100	0.229	1.5	0.756	**1.361m^3**
						Net	**29.063m^3**
6	**15 cm thick lintel with 2side 15cm bearing**						
	Door's						
	D1 = 0.900 + 0.3	1	1.200	0.229	0.15	0.041	
	Window's						
	W1 = 0.800 + 0.3	2	1.100	0.229	0.15	0.076	**0.117m^3**
7	**15 cm thick R.C.C. slab portion (1:1.5:3)**						

	Area of slab = 90.00	1	-	-	-	90.00	**90.00m^2**
9	**double coat sun faced plaster to external wall's.**						
	Hor. Wall = 26.433	1	26.433	-	3.0	79.299	
	Ver. wall = 17.852	1	17.852	-	3.0	53.556	**132.855m^2**
	Deduction						
	Door						
	D1	1	0.900	-	2.2	1.980	
	Window						
	W1	2	0.800	-	1.5	2.400	**4.300m^2**
						Net	**128.475m^2**

ABSTRACT SHEET

Sr.No.	Item	Quantity	Per	Rate (Rs.)	Amount (Rs.)
1	Excavation	29.228	m^3	220	6430.160
2	B.B.C.C (1:6:12) in Foundation	7.971	m^3	2620	20884.020
3	First class brick masonry up to plinth in C.M. (1:6)	30.424	m^3	3850	117132.400
4	Sand filling in plinth	69.777	m^3	3950	275619.150
5	First class brick masonry in super structure in C.M. (1:6)	29.063	m^3	1930	56091.590
6	15 C.M. thick R.C.C. lintel with 2 side 15 C.M. bearing	0.117	m^3	4100	479.700
7	15 C.M. thick R.C.C. slab	90.00	m^2	4100	369000.00
8	Double coat sun faced plaster to external Walls	128.475	m^2	320	41112.000
Total					886749.020
Add 5% Contingencies					44337.451
Grand total					931086.471
Say					931085.00rs

8.1.6 DESIGN OF SOLAR WATER PURIFIER(SWP)

In Nakravadi village, water borne diseases are common because of scarcity of fresh water. Many people in Nakravadi village have to be compelled to use unsafe water. Energy crisis is another downside. Typical energy sources are restricted and that theycause environmental pollution. By using alternative energy sources like solar to purify water, these issues may be avoided.

Solar water purifier is associate degree innovation of current water purification system. Solar water purifier takes solar energy as power supply and stores energy in a rechargeable battery.

Main parts utilized in solar water purifier are electrical device, filtering unit, battery, heating coil, cooling condenser and several water containers. This setup uses filtering mechanism to get rid of dirt from water and boiling mechanism to kill organisms. Through this method, clean water is achieved.

Work Flow Diagram:-

Hear below we take a composite method and break down it into its smaller parts for batter understanding. This work flow diagram is shown in figure 1. It shows the flow of energy, material and signals to obtain a necessary output.so, basically we give here as an input impure water, electrical energy and solar energy to obtained our output in pure water and heat energy also some information signals.

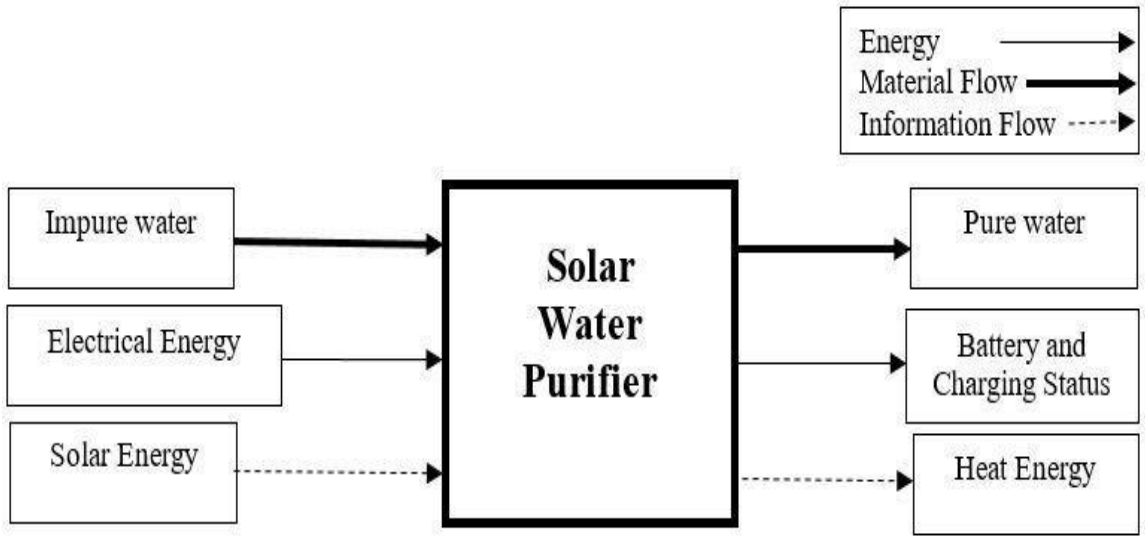


Figure 1: Work flow diagram

Apparatus:-
Main apparatus of SWP are solar panel, battery, AC heating coil, filtering unit, cooling condenser and some containers to store the water. Some secondary apparatus are inverter for conversion of DC to AC, charge controller, wheels for easy movement etc.

Components:-

- Solar Panel
- Battery
- Filtering Unit
- Boiling device
- Heating Coil
- Several Water Vessels

AuxilaryComponents:-

- Inverter
- Controller
- water tap
- wheels for mobility etc.

Energy Conversion and Storage device:-

- Solar energy is converted into electric energy by solar cell. Solar panel collects energy from sun and alters to electric power, this will charge the batteries. Inverter employed to convert DC current to AC current.
- Controller is used to forestall the battery to overcharge and prevent the solar panel to take charge from battery when voltage of battery is higher.

Filtering Unit:-

- A water filtration unit is employed for filtering purpose and construction of filtering unit is showed in figure 2. The first layer include rock gravel to sort out contamination which are visible grime or dirt, the second layer fine sand which strain out smaller impurities, corrosion and the third layer includes carbon or charcoal which has high contact area, that removes different types of chemical impurities and it eradicates tastes and odour-causing composites.

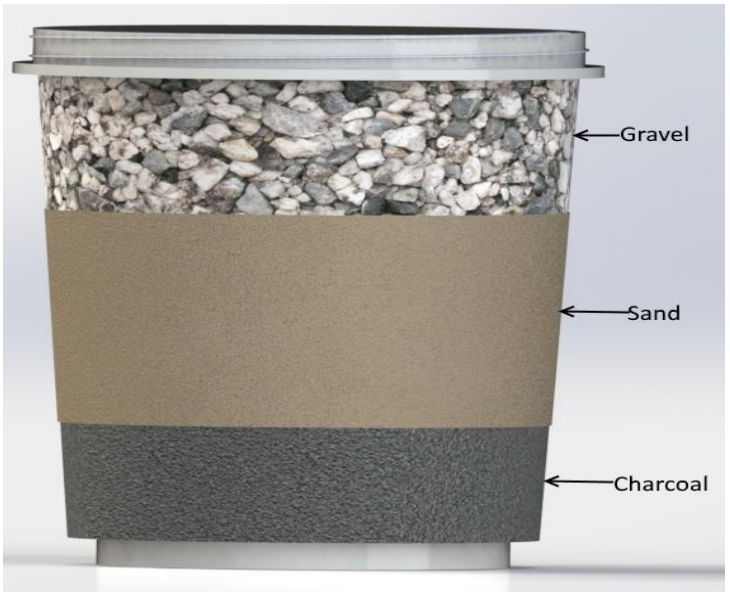


Figure 2: SolidWorksdesign of filtering unit

Heating Coil OR Boiling device:-

- An AC heating coil is used to increase water temperature. Boiling is the best process to kill all bacterias, for this AC heating coil is used. Temperature of water higher than 80˚ C kills all bacteria's within 40 minutes.

Double Layer Condenser:-

Figure 3: Double Layer Coil Condenser

- Here, above figure shows a double layer coil condenser. It is more efficient than other existing condensers. It has two layers which enables 2 times cooling than ordinary condenser. Besides, in this condenser, hot water passes through a coil. As a result, the contact period and space between hot and cold water is increased. So, better cooling is obtained.

Mechanism:-

- In this purifier, solar power is used as energy source and energy is stored in a battery. At first, water is filtered by filtering chalk to remove dirt and impurities. Then using stored energy, it boils water by using a heating coil. Water at room temperature is acquired after condensation by a double layer condenser. Through this process, pure drinking water is achieved. Energy stored in the battery can be used at night and cloudy days.
- Solar energy is used by this water purifier for the purification process. Water is purified through two stage purification processes, first filtering the water then boiling it. Filtering removes impurities from contaminated water and then boiling kills existing living organisms. Other mechanisms are temperature control mechanism and energy conversion and storage mechanism.

Filtering Mechanism:-

- activated charcoal. Filtering removes oil layer, visible dirt, leaf, rust etc. Activated carbon removes tastes and odor-causing compounds.

Energy Conversion and Storage Mechanism:-

- Solar energy is converted into electric energy by solar cell. Then this energy is stored in a battery which is used to boil water by converting electric energy into heat. An inverter is used to convert DC current to AC current and a controller is used to show the charging status of battery and restricts flow of electricity from battery to solar panel at night.

Boiling Mechanism:-

- Boiling is the most certain way of killing all microorganisms. Water temperatures above 203°F (95°C) kill all pathogens within 30 minutes.So in the time it takes for the water to reach the boiling point (212˚ F or 100˚ C from 203˚ F or 95˚ C), all pathogens will be killed, even at high altitude. A heating coil is used to rise water temperature to 95˚C.

Temperature Control:-

- In the solar water purifier, 95°C water is found after boiling. A cooling mechanism should be used to make it suitable for human consuming. A double layer coil condenser is used to reduce temperature in this water purifier.

Functional arrangement of SWP:-

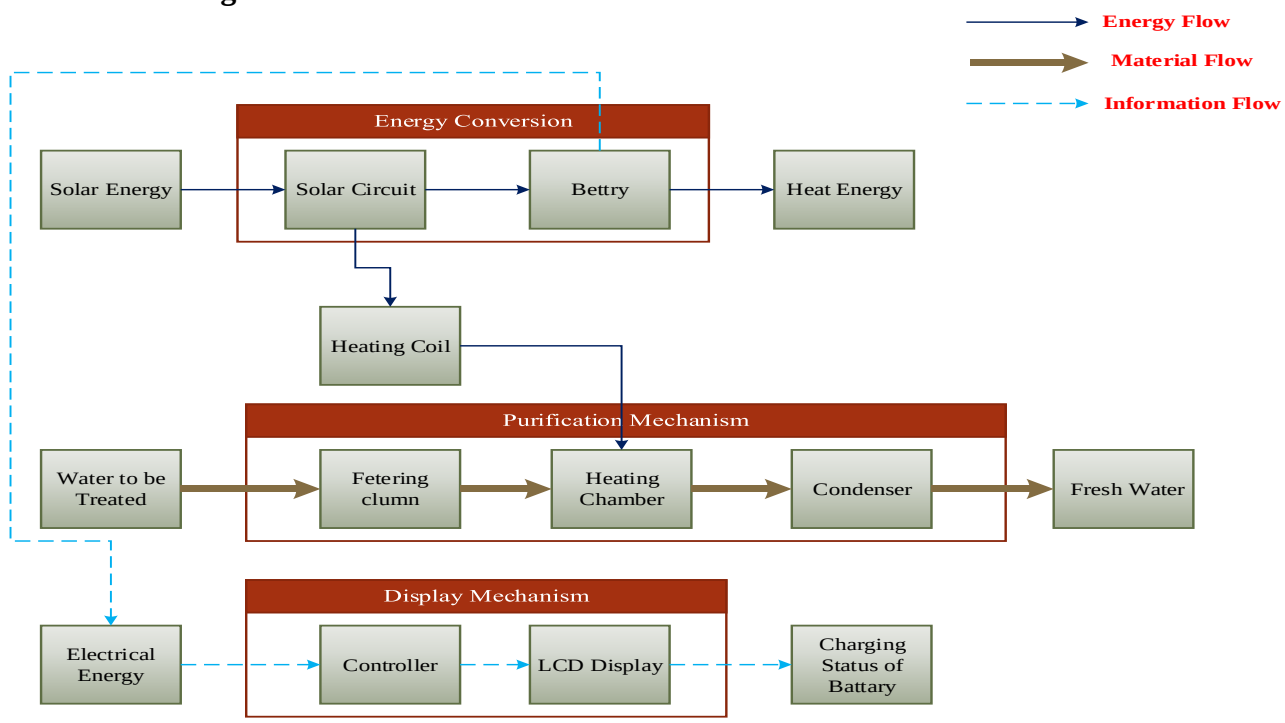


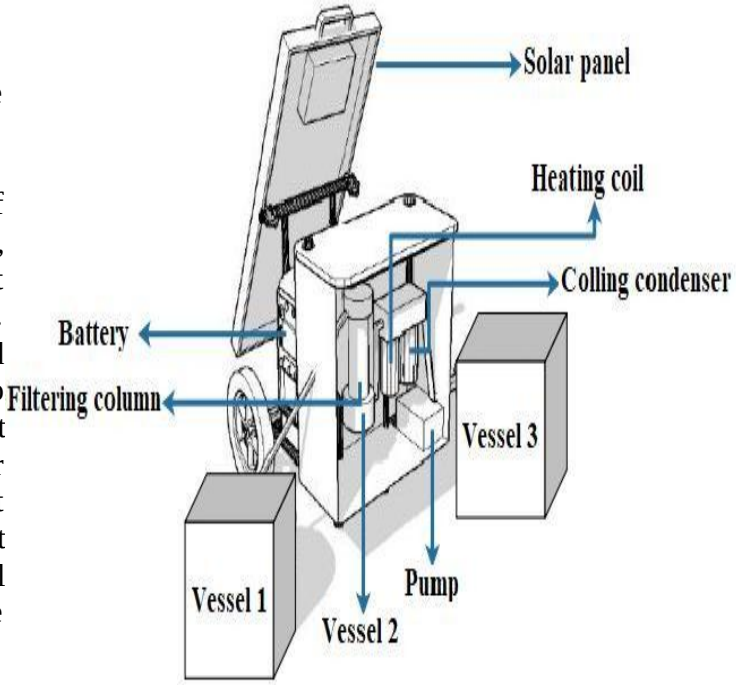
Figure 4: Cluster function of solar water purifier

- Above figure 4 shows cluster function of the product. Cluster function means mapping the whole product. Figure 4 shows interrelation among mechanisms and components of solar water purifier.

Construction:-

- Construction of a product is the trickiest part of developig a product. This step includes decision associated with material, production process and specification selection. Some critical decisions are specification of solar panel, battery and heating coil. These information defines the charging time of battery by solar panel and time to increase water temperature by heating coil.
- In solar water purifier, 225 W solar panel is used. Battery capaity is 80 AH and voltage is 12 V. A 300 watt AC heatig coil is used to boil water.

Figure 5: Solid Works Model of Solar Water Purifier Front View



- Final design of solar water purifier is done by SolidWorks and presented in figure 5.

- Also figure 5 nothing but front view of solar water purifier. In this water purifier, at first impure water is given in the first vessel which contains filtering column. After filtration, water flows to second vessel where water temperature is rised to 95°C with a heating coil. Then, water at 95°C flows through double layer condenser and temperature of output water is 40°C to 45°C. Finally, water at room temperature is stored in third vessel from where pure drinking water can be consumed.

Energy Calculation

- Energy calculation for capacity of solar panel and battery is shown in this paper to justify the design.

- Battery capacity is measured in Amp Hours (e.g. 17AH). It is needed to be converted to Watt Hours by multiplying the AH figure by the battery voltage (e.g. 12V).

Power available in battery (watt hours) = X (Battery size in AH) x Y (Battery Voltage) --------(1)

By applying equation (1), power in battery = 80 x 12 WH
= 960 WH
Time to charge the battery fully = power available in battery (Watt Hours) / power of solar panel (Watt) --------(2)

So, from equation (2), time to charge the battery fully by using a 225 Watt solar panel
= 960/ 225 Hours
= 4.26 Hours.

By substituting the value in equation (2), required time for charging the battery is 4.26 hours with the help of 225 Watt solar panel.

Now we calculate total heat energy to raise the temperature of 20 liter (0.02 m^3) water to 95^oC from normal room temperature. For that equation is,

$$Q_w = (V_w)\,(\rho_w)\,(C_{pw})\,(\Delta T_w) \qquad (3)$$

Where,
V_w is the volume of water in m^3 ρ_w is the density of water in kg/m^3
C_{pw} is the specific heat of in kJ kg^{-1} K^{-1}
And T is the temperature rise of water in ^oC or K For water value of,
ρ_w is 1000 kg/m^3
And C_{pw} is 4.18 kJ kg^{-1} K^{-1}

Therefore from equation (3), Qw = 0.02 * 1000 * 4.18 * 50 **= 4180 kJ**.

$$\text{Time needed to rise water temperature, t (min)} = \frac{Q_w \times 1000}{Power\ of\ heating\ coil \times 60}$$

Time required in minute = $\frac{4180 * 1000}{300 * 60}$

= 232 minute or 3 hour and 87 minute

So**,** time required raise the temperature of 20 liter (0.02 m^3) water to 80 ^oC from normal room temperature is **232 minute or 3 hour and 87 minute.**

Total time required for complete process:-

- Hear time calculation is done for 20 liter water.

Process	**Time required (mins)**
Filtration	50
Raising water temperature to 80 ^oC	232
Keeping 80 ^oC	25

Condensation in cooling condenser	32
Total time	**339mins**

Table: Table for time of different mechanisms

- So, time needed to purify 20 liter water by solar water purifier is 6 hours

Costing for one piece of SWP:-

Component	**Price (Rs.)**
12 V, 225 W Solar Panel	5625
12 V, 80 AH Battery	5800
Inverter	3000
Charge Controller	1500
Filtering Unit	50
300 W Heating Coil	1200
Condenser	950
Casing	350
Other Equipments	500
Total	**18,975Rs.**

Table: Price of different components

- So, cost of one piece SWP is only 18,975Rs. and it is capable to clean 20 liter water per day by using renewable solar energy.

8.1.7 Smart design of the Post Office Load Control using DTMF

The proposed of the system works on the basic concept of a DTMF tone signal received from any type of mobile or cell phone to operate remotely for controlling the 8051 controller and loads like domestic loads, post office, agriculture pump and other industrial loads, etc.

In many of industries, the different loads occupy over a large area or small area coverage's and therefore, operating of these loads can be also difficult in task. In the field of agricultural also, post office, water pumps and other loads are connected by over a huge of area and thus it not easy for activate all the loads and likewise for household loads.

Keeping these troubles in my mind, in this project has been designed by uses the DTMF technology to manage by the loads in remotely. A cell phone or mobile is connected to a dual tone multiple frequency decoder in the system from the output of an audio socket for getting toned instructions.

The receiving codes are changed into the programming to digital commands by using a DTMF decoder which will recognize by the frequency of the cell phone key paid and change that the frequency to its equal digital code which is then fed to a 8051 family microcontroller.

As per the instructions sent from the mobile or cell phone of the sender costumers, the 8051 microcontroller will send logical programming instructions through a buffer to activate the types of individual loads by switching the relays ON/OFF control.

The relays are used to provide the automatic system in the lighting connected loads. These relays are triggered by a relay driver IC connected to the 8051 microcontroller.

Further, in which the present days the best and high accuracy proposed system can be improved by using a GSM model, arduino, etc. where the different types loads can be restricted by sending and SMS. This will reduce the required of answering the call for the system towork.

Our effort towards building the home automation concept did not utilize the 8051 microcontroller concept. It is reliable only for 230v ac home, post office, and other equipment Using microcontroller in place of decoder will bring more control techniques towards homeautomation.

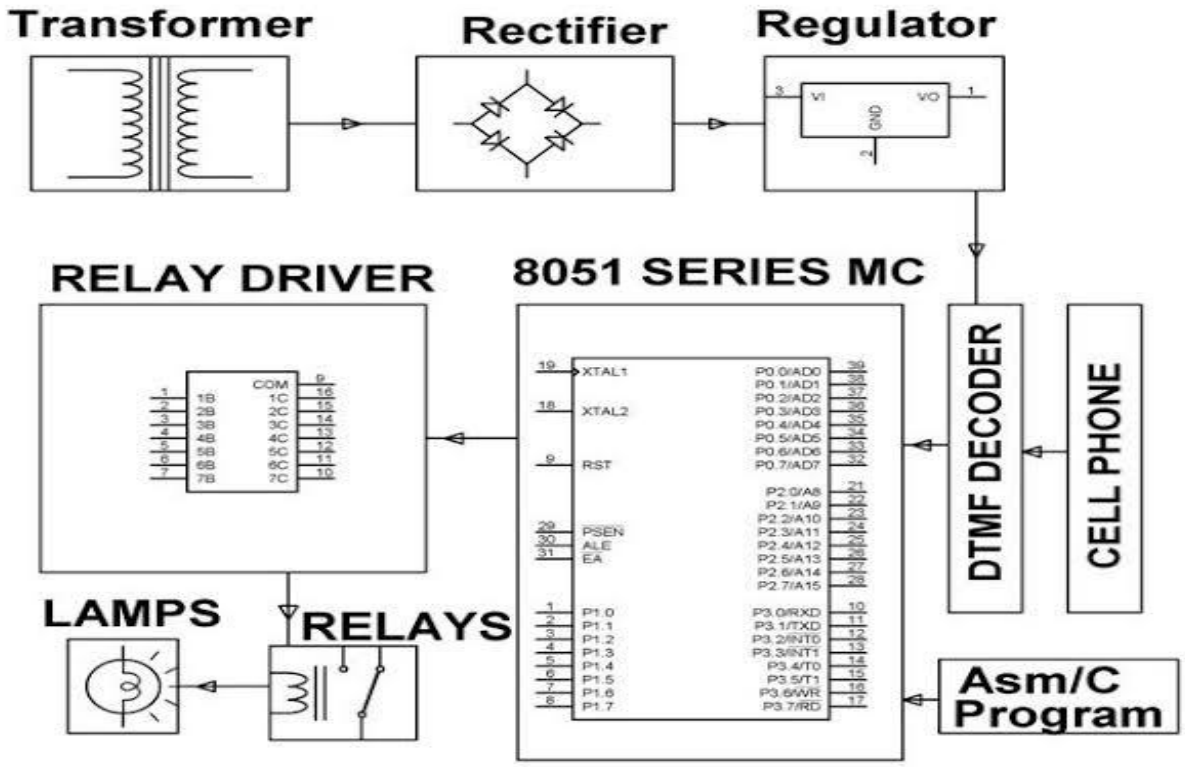
This project which can be further developed to the High voltage A.C Applications by changing the ratings of the Relay (rating is415v,ac,3-phase).We can control and monitor the high speed induction motors, stepper and servo motors as well as synchronous motors. This can be done in an economicalway.

We can also add some security and protection features in the electrical circuit. One of the ways is password or key protection. Through this only selected the people can access this control over the home appliances, as well as 1-phasesystem.

DTMF controlled home appliances, post office and other 1-phase system project works over mobile DTMF (dual tone multiple frequency) technology that exists in Dial tone. DTMF stands for the Dual Tone Multiple Frequency. There are some different frequencies cycles used to create or developed the DTMF tone.

In simple words by adding or mixing of two or more frequencies generates DTMF tone.

Figure Block diagram of DTMF based load control system



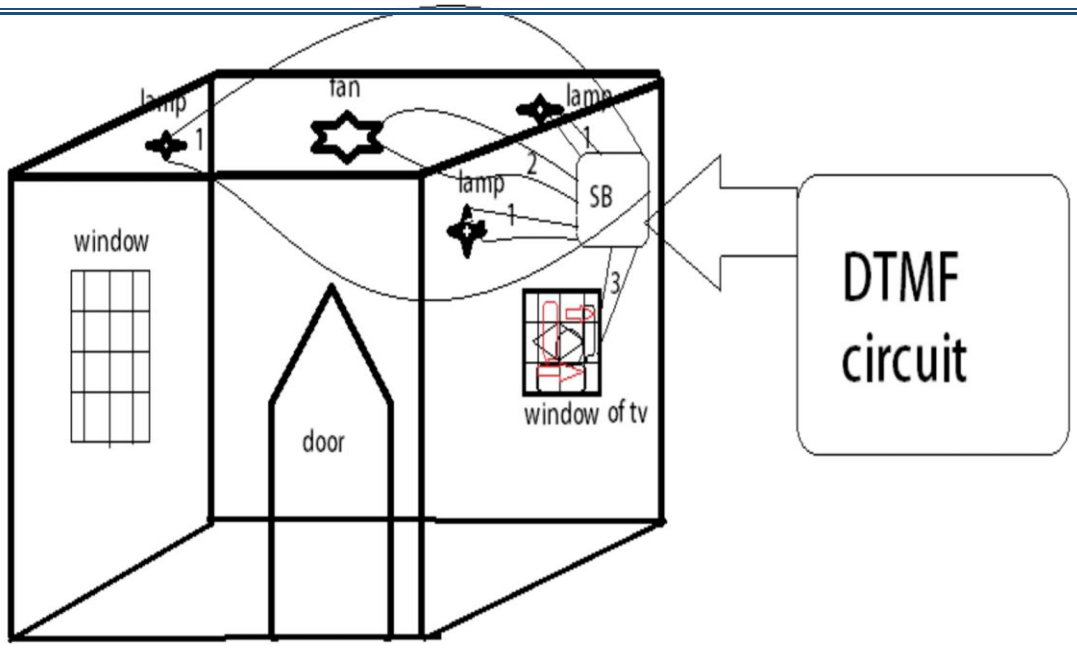


Figure plan layout of post office

Keyboard with different frequencies are shown in figure.

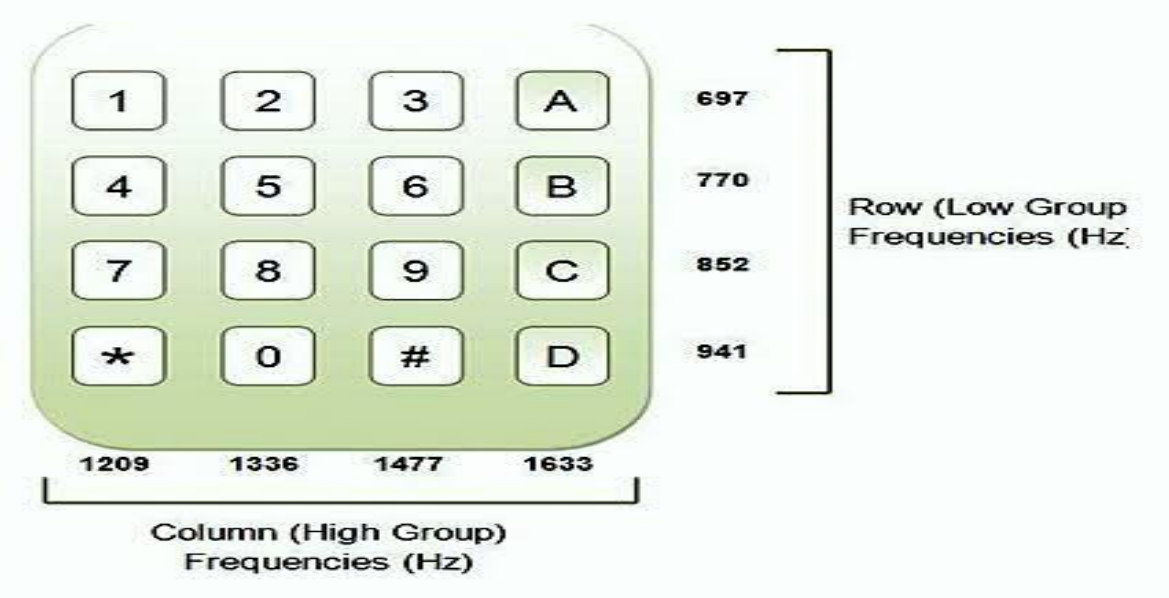


Figure Keyboard with different frequency

In Given figure we can see two or more groups of different type's frequencies cycle. When one upper and one lower frequencies mixed then a tone is created by that one tone we calls Dual Tone Multiple Frequency. In this project we control AC appliances, post office load, home application and other 1-phase appliances by pressing the dial pad keys like 1, 2, 3, 4, 5 and more.

Figure Step by step analysis of load control DTMF

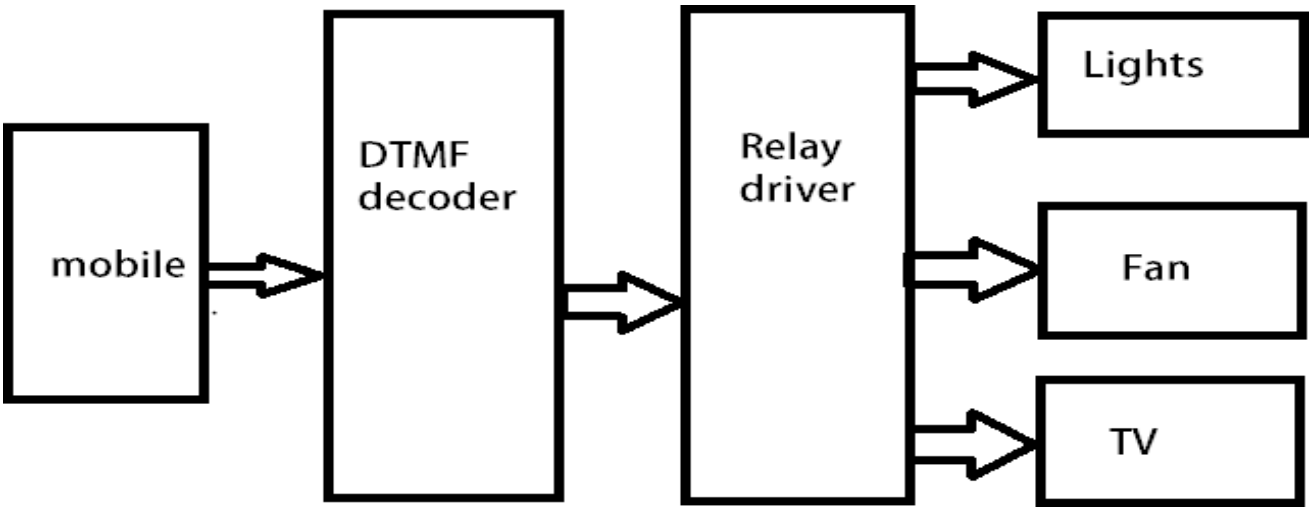


Table 40 Output control logic

In circuit diagram at Q1 LIGHT or load is connected, at Q2 FAN or load is connected and at Q3 TV or load is connected through relay driver IC. We have left Q4 load. Now when we press key 1 at the dial key pad of mobile phone or other cell phone DTMF decodes this tone and generated a digital output signals given in above table. Now According to the given output signal in table Q1 is HIGH logic and Q1 is connected with light so LIGHT turned ON at given frequency.

S.No.	key	Digital Output			
		Q4	Q3	Q2	Q1
1	1	0	0	0	1
2	2	0	0	1	0
3	3	0	0	1	1
4	4	0	1	0	0
5	5	0	1	0	1
6	6	0	1	1	0
7	7	1	1	1	1
8	8	1	0	0	0
9	9	1	0	0	1
10	0	1	0	1	0

If we want turned OFF the load or LIGHT, we need to press the keypad in the number 8. Because in the output signals of the key8, Q1, Q2 and Q3 LOW logic consider and Q4 only at HIGH logic and we have not used Q4. So it does not matter that Q4 is HIGH or LOW logic in system. But our operation has been performed because Q1 is LOW in key 8's output and rest of appliances notaffected.

Now is we want to the turned on the given 1-phase FAN or load so we need to press the keypad2 because by pressing keypad2 only Q2 load is activated and rest of the output are remain the same signals. Now if we to OFF the FAN then we need to press the key8 again like before for as LIGHT. Now if we want to TV so we need to press keypad4 and for tuning it OFF. We need to press 8keypad likebefore.

Now suppose turned ON all of the connected 1-phase appliances so we need to press keypad7 and for turning OFF the all key8. Now if we need to ON LIGHT and FAN.So we need to press the keypad3. And now we want to ON the TV load, so we need to press keypad7 not keypad4. Because we should keep remain turn ON previous appliances. Now if we want to turn OFF system only LIGHT so we need to the press keypad6.

Microcontroller Program

```
#include<stdio.h>
#include<reg51.h>
#include<string.h>
#include<Functions.h>
//Function Declaration
void main()......
```

Block diagram component

8051 seriesMicrocontroller:

There are two main parts in 8051 Microcontroller one for the program and other for data storage. As a result, it has two storage rooms for the both program and data of the 64K by 8 sizes. The storage memory RAM is very large to store the programming data and other instructions. The microcontroller comprises of 8 bit accumulator & 8 bit processing unit and in present days the 16-bit 8051 micro controller are available in market. It also consists of 8 bit B register as majorly charge functioning the blocks.

The 8051 microcontroller programming is done with by embedded C language or assembly or machine language using electronic communication based Keil and mat lab software. It also has a number of other 8 bit and 16 bitregisters.

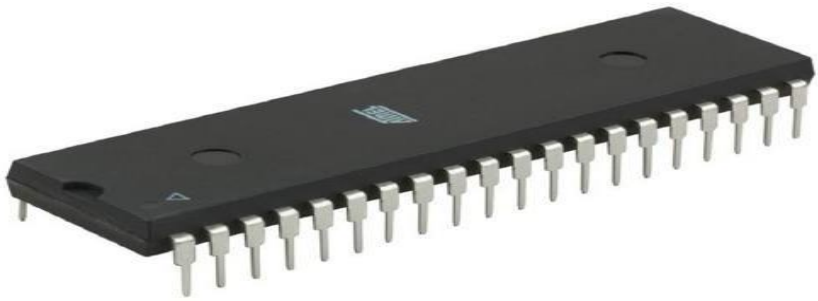


Figure 8051 Series Microcontroller

DTMF Decoder:-

DTMF keypad is placed out on a 4*4 matrices or 6*6 matrix, in the higher number of crosses are increase to very smooth and more reliable control provides the 8051 micro controller. In which each of row represents by the low frequency, each column represents by the high frequency with the DTMF and each key passed on a phone generates two tones of the specific frequencies one tone is generated from a high frequency tones and low frequency tone. These tones are converted by analog signals to digital signals from using DTMF decoder circuit and timer.

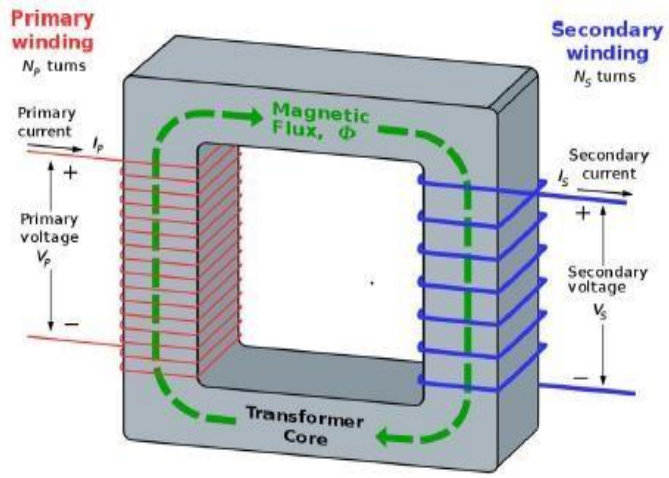
These codes are used an address of the destination by which is read and preceded by the computer that connects the caller to the destination. The DTMF decoder circuit used in the many electronics projects for the better connectivity to control the different types of 1-phase connected applications.

Transformer:-

A transformer is an electrical device that transfers electrical energy between two or more the circuits through electromagnetic induction and voltage level increased and decreased. A varying current in one coil of the transformer produces a varying magnetic field to increase the transformer core losses and iron losses. Power can be transferred by the two coils throughout the magnetic field, without a metallic connection between the two coil circuits. Transformers are used to increase or decrease the alternating voltage (ac voltage) in the electric power applications. This project the transformer is used in step down.

Figure 63 Transformer

Using this Dual Tone Multiple Frequency (DTMF) the loads can be operated from anywhere, the applications of the dual tone multiple frequency (DTMF) mainly included the industries, home, post office, agriculture and other 1-phase appliances etc.



The DTMF tones are used to at the telephone or mobile keypad switch centers for finding of the calls or dialed by number. These are used by a particular cable network application. These networks employ DTMF tones to indicate a local cable operator or network station when a local in distribution, this is known as localplacing.

Cost analysis of DTMF based load control component

Sr. No.	Component	PRICE IN RS.
1	Transformer	500
2	Rectifier	421
3	Relay	160
4	Microcontroller	50
5	DTMF decoder	130
6	Cell phone	700
7	lamp	350

Table 41 Cost analyses DTMF based load control component

Total= 2311 Rs.

The total cost of model = 2311+other cost
= 2311+1000

= **3311 Rs**.

Chapter 9. Future development of village

We've thoroughly gone through the requirements of Nakaravadi , we have given some of the designs which were to be provided under this project.

In Future we will provide design which will make life villagers easy & prosperous like

- Overhead tank to overcome water scarcity
- Waste management system
- Play ground
- Rain water harvesting system
- Effective Road network passing through Nakaravadi
- Gram Panchayat

(CURRENT STATE OF GRAM PANCHAYAT

Chapter 10. Conclusion

After Completion of Part I we feel that the lack of some basic amenities forces the villagers to migrate & this causes congestion in cities. The cycle continues, we will provide smart traffic solutions to overcome the congestion but why not to invest our effort in eradicating the problem for base.If the migrating people gets everything in his/her village, the rate of migration will come down drastically. Our efforts are to make Urban cities smart & in the race of it, we are killing the rural soul. As rural area is seeking for basic amenties like pure drinking water , toilets , roads, schools & In urban areas even if we are having basic amenities the efforts are much more than reuired.

We think , the people & Government both together should look deep into this as stats says – by 2036 there will be 70% increase in urban Population in India.

For our village we have tried to provide satisfactory designs to the villagers that includes,

- COMMUNITY HALL
- PUBLIC LIBRARY
- PUBLIC HEALTH CENTRE
- PUBLIC TOILET
- BUS STOP

Chapter 11. References

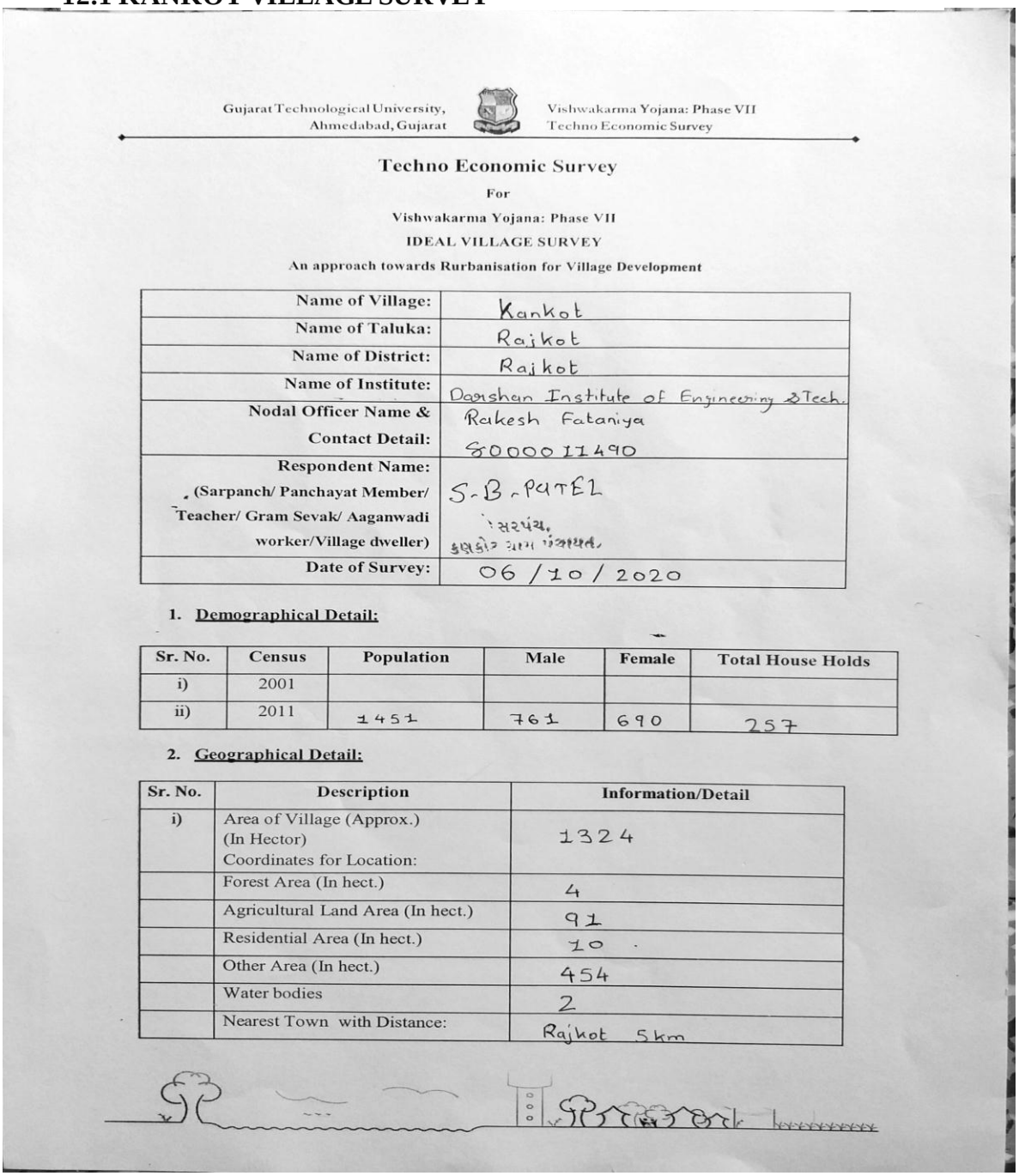
- https://www.prideindia.org/ideal-village/
- https://www.indiastudychannel.com/resources/172307-Characteristics-of-an-Ideal-Village.aspx
- https://www.mkgandhi.org/gandhionvillages/idealvillage.htm
- https://villageinfo.in/gujarat/rajkot/rajkot/kankot.html
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6515742/
- http://www.swaniti.com/wp-content/uploads/2015/03/Model-Village_Brief.pdf
- https://www.researchgate.net/publication/330406975_The_Development_of_Civil_Engineering_Projects_and_Village_Communities_in_Seventeenth-_to_Nineteenth-Century_Japan
- https://www.ijsr.net/conf/PARAS16/Civil_15.pdf
- https://www.hinduscriptures.in/vedic-knowledge/vedic-studies/engineering-and-technology/ancient-texts-on-civil-engineering
- https://indusscrolls.com/ancient-india-created-jaw-dropping-architectural-marvels-long-before-west-found-civil-engineering/
- http://theindianhistory.org/ancient-indian-technology-civil-engineering-water-management.html
- https://blogs.worldbank.org/sustainablecities/how-do-we-define-cities-towns-and-rural-areas
- https://censusindia.gov.in/2011-prov-results/paper2/data_files/kerala/13-concept-34.pdf
- https://www.nationalgeographic.org/encyclopedia/urban-area/
- https://byjus.com/commerce/meaning-of-rural-development/ -:~:text=Rural%20development%20is%20pretended%20to,in%20social%20and%20economic%20development.
- https://www.news18.com/news/india/number-of-people-in-indias-cities-will-overtake-rural-population-by-2050-says-report-2197025.html - :~:text=suggests%20the%20data.-,The%20urban%20population%20of%20India%20has%20seen%20a%20rise%20from,to%202015's%2067.2%20per%20cent.&text=The%20urban%20rate%20has%20consistently,over%20the%20last%20seventy%20years.
- https://www.worldwidejournals.com/paripex/recent_issues_pdf/2013/April/April_2013_1366122989_113f4_11.pdf
- https://www2.slideshare.net/anujtpic/important-issues-in-rural-development?qid=942cf506-b061-4a83-b517-6a1d16252445&v=&b=&from_search=11
- https://www2.slideshare.net/search/slideshow?searchfrom=header&q=rural+developet+issues
- https://sarkariyojana.com/gujarat/
- http://www.smartvillage.biz/
- https://www.weforum.org/agenda/2016/10/india-creates-first-smart-village/
- https://www.ijser.org/researchpaper/Study-and-development-of-village-as-a-smart-village.pdf
- https://www.springer.com/gp/book/9783030377939
- https://thelivinglib.org/smart-village-technology/
- https://aphrdi.ap.gov.in/documents/Trainings@APHRDI/2018/5_May/DTE/Smart CitiesVillages%e2%80%93 Technology and its potentials & public governance.pdf
- http://urbanupdate.in/roadmap-for-smart-villages/

- https://link.springer.com/chapter/10.1007/978-981-13-3804-5_12
- https://ebrary.net/103991/economics/issues_challenges_smart_villages_india -:~:text=Issues%20and%20Challenges%20of%20Smart,smarter%20people%2C%20governance%20and%20solutions
- https://atos.net/wp-content/uploads/2018/12/ATOS_SmartCities_TrafficManagement_FINAL.pdf
- https://www.sciencedirect.com/topics/social-sciences/smart-infrastructure
- https://digitalguardian.com/blog/what-cyber-security -:~:text=Cyber%20security%20refers%20to%20the,%2C%20damage%2C%20or%20unauthorized%20access.
- https://www.melbourne.vic.gov.au/business/sustainable-business/1200-buildings/building-retrofit/Pages/building-retrofit.aspx -:~:text=Retrofitting%20a%20building%20involves%20changing,reduce%20energy%20and%20water%20usage.
- http://www.internationaljournalssrg.org/IJCE/2015/Volume2-Issue3/IJCE-V2I3P103.pdf
- http://smartcities.gov.in/content/innerpage/challenges.php
- http://smartcities.gov.in/content/innerpage/strategy.php
- https://csrbox.org/India_CSR_Project_Arvind-Ltd.-Rural-Development-Initiatives-_5625
- https://en.wikipedia.org/wiki/Swachh_Bharat_Mission
- https://swachhbharatmission.gov.in/sbmcms/index.htm
- https://www.pmindia.gov.in/en/major_initiatives/swachh-bharat-abhiyan/
- https://www.sciencedirect.com/topics/economics-econometrics-and-finance/transport-infrastructure -:~:text=Transport%20infrastructure%20is%20composed%20of,%2C%20railway%20station%2C%20and%20airports.
- https://www.aboutcivil.org/corrosion-in-concrete-RCC-repair.html -:~:text=Repairs%20to%20Corroded%20Reinforced%20Concrete%20structures%3A&text=Then%20rub%20the%20surface%20with%20wire%20brush%20or%20hessian%20rope.&text=If%20the%20cleaned%20surface%20is,and%20prevent%20the%20further%20corrosion.
- https://chokhavatia.com/services/consultancy-services/sewage-treatment-plants/
- https://byjus.com/biology/sewage-treatment/
- https://www.researchgate.net/publication/324532324_INTRODUCTION_TO_SEWAGE_TREATMENT
- https://www3.epa.gov/npdes/pubs/bastre.pdf
- https://www3.epa.gov/npdes/pubs/bastre.pdf
- https://en.wikipedia.org/wiki/Sewage_treatment
- https://www.britannica.com/technology/wastewater-treatment/Primary-treatment
- Census of India
- http://www.giftgujarat.in/
- UDPFI (urban development plans formulation and implementation) norms 2014
- S.O.R. of Rajkot 2018-19
- http://www.mdws.gov.in/sites/default/files/Primer%20SLWM.pdf
- http://www.gramalaya.in/pdf/appropriateLowcost_toilet_technology.pdf

- http://www.swachhbharaturban.in:8080/sbm/content/writereaddata/SBM_Gui deline.pdf
- http://vy.gtu.ac.in-vishwakarmaliteratures
- Google Maps
- ESTIMATING, COSTING AND VALUATION (CHAROTAR PUBLICATION)
- http://www.gramalaya.in/pdf/appropriateLowcost_toilet_technology.pdf
- http://www.swachhbharaturban.in:8080/sbm/content/writereaddata/SBM_Guideline. pdf
- Treatment, disposal reuse, tata-McGraw Hill, New Delhi.
- IS 12647: 1989 (Solid waste management system- collection equipment- guidelines).
- http://www.cbgaindia.org/opinion/rural-infrastructure/
- http://web.worldbank.org/archive/website01291/WEB/0_CO-23.HTM
- https://readwrite.com/2019/07/27/5-key-technologies-of-a-smart-city/
- http://www.differencebetween.net/miscellaneous/difference-between-urban-and- rural/
- http://open.lib.umn.edu/socialproblems/chapter/14-4-problems-of-rural-life/
- http://rural.nic.in/sites/default/files/SRD_SWACHHATA_PAKHWADA.pdf
- https://www.mercycorps.org/sites/default/files/mcgoodgovernanceframework.pdf
- http://www.barc.gov.in/publications/tb/desalination.pdf 11.
- https://www.suratmunicipal.gov.in/Departments/ProjectsUnderExecution http://www.undp.org/content/undp/en/home/sustainable-development-goals.html
- Rate from market survey done in Rajkot region
- https://www.census2011.co.in/census/state/gujarat.html
- http://smartcities.gov.in/upload/uploadfiles/files/MethodologicalReportFinal.pdf
- http://www.udd.gujarat.gov.in/projects_gift.php

CHAPTER 12

12.1 KANKOT VILLAGE SURVEY



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VII
Techno Economic Survey

Techno Economic Survey

For

Vishwakarma Yojana: Phase VII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

Name of Village:	Kankot
Name of Taluka:	Rajkot
Name of District:	Rajkot
Name of Institute:	Darshan Institute of Engineering & Tech.
Nodal Officer Name & Contact Detail:	Rakesh Fataniya 9000011490
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	S.B. PATEL સરપંચ. કણકોટ ગ્રામ પંચાયત.
Date of Survey:	06/10/2020

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001				
ii)	2011	1451	761	690	257

2. **Geographical Detail:**

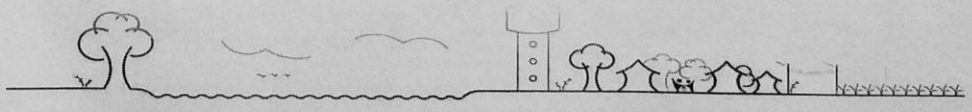
Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	1324
	Forest Area (In hect.)	4
	Agricultural Land Area (In hect.)	91
	Residential Area (In hect.)	10
	Other Area (In hect.)	454
	Water bodies	2
	Nearest Town with Distance:	Rajkot 5km

3. Occupational Details:

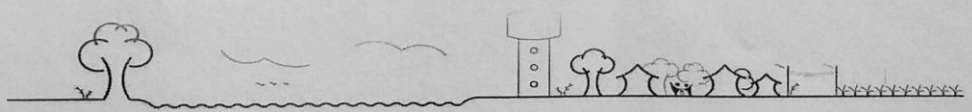
Name of Three Major Occupation groups in Village	1. Farming / Agriculture 2. Others 3. Industrial work

4. Physical Infrastructure Facilities:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
	• Tap Water (Treated/ Untreated) • RO Water • Well (Covered/ Uncovered) • Hand pumps • Tube well/ Borehole • River/ Canal/ Spring/ Lake/ Pond	Well (Untreated) Hand pump 2 nos.			
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: 0			
	Underground Sump	Capacity: 0			
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	Yes			
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open	Closed			
	If Open than Pucca / Kutchcha				
	Whether drain water is discharged directly in to Water bodies/ Sewer plants	Directly discharged in water Bodies			
Suggestions if any:					



E.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Yes			
	Main road	~~No~~ Yes			
	Internal streets	Yes			
	Nearest NH/SH/MDR/ODR Dist. in kms.	2km			
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No (Neanest 12k.ms)			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes			
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	~~No~~ Yes			
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes 24 hours			
	Power supply for Domestic Use	Yes 265			
	Power supply for Agricultural Use	Yes 105			
	Power supply for Commercial Use	No.			
	Road/ Street Lights	Yes			

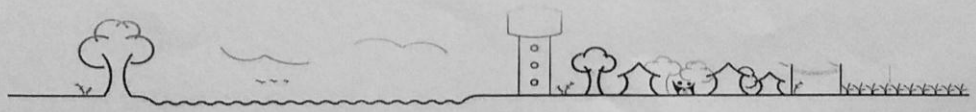


	Electrification in Government Buildings/ Schools/ Hospitals	Yes			
	Renewable Energy Source Facilities (Y/ N)	No			
	LED Facilities	Yes			
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	0			
	Location Condition				
	Community Toilet (With bath/ without bath facilities)				
	Solid & liquid waste Disposal system available				
	Any facility for Waste collection from road	No			
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Well 59 hec.			
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Pucca			

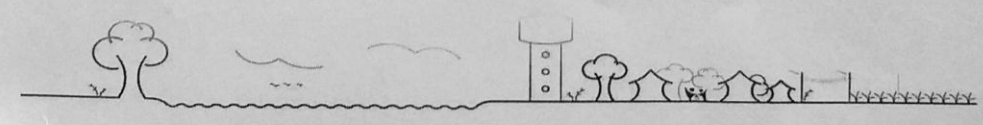
5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks

K.	**Health Facilities:**				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	No			
	Private Clinic/Private Hospital/ Nursing Home	No			
	If any of the above Facility is not available in village than approx. distance from village: .20...kms.				
Suggestions if any:					
L.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes 2			
	Primary School	Yes 2			
	Secondary school	No			
	Higher sec. School	Yes 2			
	ITI college/ vocational Training Center	No			Neanest 12kms
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	No			
	If any of the above Facility is not available in village than approx. distance from village: .12....kms.				
Suggestions if any:					
M.	**Socio- Culture Facilities**				
	Community Hall (With or without TV) Location:	Yes			



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



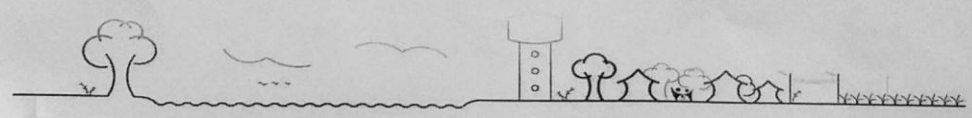
	General Market	Yes			
	Shops (Public Distribution System)	Yes			
	Panchayat Building	Yes			
	Pharmacy/Medical Shop	No			
	Bank & ATM Facility	No			
	Agriculture Co-operative Society	No			
	Milk Co-operative Soc.	No			
	Small Scale Industries	No			
	Internet Cafes/ Common Service Center/Wi Fi	No			
	Other 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	No			
P.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	No			
Q.	Any Other				

7. **Data Collection From Village**

Village Base Map ~~Available: Hard Copy/Soft Copy~~	



Recent Projects going on for Development of Village	Yes Road Projects etc.
Any NGO working for village development	No

8. **Additional Information/ Requirement:**

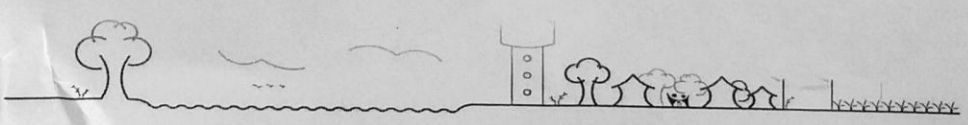
Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Repair & Maintenance of Existing Public Infrastructure facilities(School Building, Health Center, Panchayat Building, Public Toilets & any other)	No	
2.	Additional Information/ Requirement		

9. **Smart Village Proposal Design**

Sr. No.	Descriptions	Information/ Detail	Remarks
1.			

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

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



12.2 VIRDA VAJDI SURVEY

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

Techno Economic Survey

Vishwakarma Yojana: Phase VII

SMART VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

Name of District:	RAJKOT
Name of Taluka:	RAJKOT
Name of Village:	VIRDA VAJDI
Name of Institute:	Darshan Institute of Engineering & technology.
Nodal Officer Name & Contact Detail:	Sir. Rakesh Fataniya
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	તલાટી-કમ-મંત્રી, વાજડી વિરડા ગ્રામ પંચાયત
Date of Survey:	3. November, 2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2011	1486	779	707	~~750~~ 290
2.	2001	1367			

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	2.7810 Hector 471.07 hector
2.	Forest Area (In hect.)	0
3.	Agricultural Land Area (In hect.)	150 hector
4.	Residential Area (In hect.)	320 hector
5.	Other Area (In hect.)	
6.	Distance to the nearest railway station (in kilometers):	15km

7.	Name of Nearest Town with Distance:	Rajkot
8.	Distance to the nearest bus station (in kilometers):	Rajkot - 15km
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. farming
	2. Business
	3. Others

Major crops grown in the village:	1.
	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	Pipe to plot Tube 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**	Machi River Nyaari Dam			

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Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:			
	Underground Sump	Capacity:	50,000 ltrs		
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	All Weather			
	Main road	CC			
	Internal streets	CC			
	Nearest ~~NH~~/SH/MDR/ODR Dist. in kms.	0 kms			
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No Nearest 15km			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	No Nearest 15km			
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes			
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes (Govt) 24 hours			

3

	Power supply for Domestic Use	Yes			
	Power supply for Agricultural Use	Yes (8hrs			
	Power supply for Commercial Use	Yes			
	Road/ Street Lights	Yes			LED
	Electrification in Government Buildings/ Schools/ Hospitals	Yes			
	Renewable Energy Source Facilities (Y/ N)	No			
	LED Facilities	Yes			
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes 4nos.			
	Location Condition	Usable			
	Community Toilet (With bath/ without bath facilities)	With Bath Facilities			
	Solid & liquid waste Disposal system available				
	Any facility for Waste collection from road	No			
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL. OTHER (SPECIFY)	Nyari River			
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	100% Pakka			

V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	Yes			
	Sub-Centre				
	PHC	No			
	BLOCK PHC	No			
	CHC/RH	No			
	District/ Govt. Hospital	No			
	Govt. Dispensary	No			
	Private Clinic	Yes			
	Private Hospital/	No			
	Nursing Home	No			
	AYUSH Health Facility				
	sonography /ultrasound facility	No			
	If any of the above Facility is not available in village than approx. distance from village: .22...kms.				
	Suggestions if any:				
K.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes			
	Primary School	Yes			
	Secondary school	Yes			
	Higher sec. School	Yes			
	ITI college/ vocational Training Center	Yes			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	Yes			
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				

Suggestions if any:					
L.	**Socio- Culture Facilities**	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	1			No
	Public Library (With daily newspaper supply: Y/N)				No
	Public Garden				No
	Village Pond				No
	Recreation Center				No
	Cinema/ Video Hall				No
	Assembly Polling Station				Yes
	Birth & Death Registration				Yes

If any of the above Facility is not available in village than approx. distance from village: ..12....kms.

Suggestions if any:

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

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

Suggestions if any:

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

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

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

VII. DATA COLLECTION FROM VILLAGE

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

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks

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

IX. Smart Village / Heritage Details

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

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:
Ms.Darshana Chauhan,Project Co-ordinator
Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

12.3 NAKARAVADI VILLAGE SURVEY

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VII

ALLOCATED VILLAGE SURVEY

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

Name of District:	Rajkot
Name of Taluka:	Rajkot
Name of Village:	Nakaravadi
Name of Institute:	Darshan Institute of Engineering & technology
Nodal Officer Name & Contact Detail:	
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	તલાટી-કમ-મંત્રી, નાકરાવાડી ગ્રામ પંચાયત
Date of Survey:	13 - 11 - 2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001				
2.	2011	1750	865	885	325

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	763
2.	Forest Area (In hect.)	0
3.	Agricultural Land Area (In hect.)	313
4.	Residential Area (In hect.)	7
5.	Other Area (In hect.)	-
6.	Distance to the nearest railway station (in kilometers):	4 km - Maliyasan

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7.	Name of Nearest Town with Distance:	Maliyasan 4km
8.	Distance to the nearest bus station (in kilometers):	Maliyasan 4km
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.	Farmer
	2.	Farming helpers
	3.	Private occupation

Major crops grown in the village:	1.	Cotton
	2.	Groundnut
	3.	Spinach

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	Pipe water to Plot			Almost in Every House
2.	**DUG WELL** Protected Well Un Protected Well	Bore well Protected Well			
3.	**WATER FROM SPRING** Protected Spring Unprotected Spring	-			
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/** Irrigation Channel Bottled Water Hand Pump	Hand Pump			

2

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	Other(Specify)**Lake/ Pond**	N.A.			
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:			Nos. 1
	Underground Sump	Capacity:		Inadequate	Nos. 1
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1		Adequate		80% Coverage
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	All weather			
	Main road	C.C			
	Internal streets	C.C			
	Nearest NH/SH/MDR/ODR Dist. in kms.	4 kms			Maliyasan
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No			Nearest 4 kms
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	No			Nearest 4kms
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes			
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes			(24 hours) More than 6hrs

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VII
Techno Economic Survey

	Power supply for Domestic Use	Yes			~~315~~ 405
	Power supply for Agricultural Use	Yes			25
	Power supply for Commercial Use	No			
	Road/ Street Lights	Yes			
	Electrification in Government Buildings/ Schools/ Hospitals	Yes			
	Renewable Energy Source Facilities (Y/ N)	Yes			
	LED Facilities	Yes			
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	N.A.			
	Location Condition	.			
	Community Toilet (With bath/ without bath facilities)	N.A.			
	Solid & liquid waste Disposal system available	No			
	Any facility for Waste collection from road	~~No~~ Yes			Occasionally
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL. OTHER (SPECIFY)	Well Tube Well			
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	50/50			

4

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			Nearest 12 kms Rajkot
	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: ..12....kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes			
	Primary School	Yes		Inadequate	
	Secondary school	No			
	Higher sec. School	No			
	ITI college/ vocational Training Center	No			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	No			

Gujarat Technological University, Ahmedabad, Gujarat

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	If any of the above Facility is not available in village than approx. distance from village: ..12....kms.
Suggestions if any:	

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

If any of the above Facility is not available in village than approx. distance from village: ..12....kms.

Suggestions if any:

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

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

Suggestions if any:

N.	Other Facilities	Condition		Available (YES)	Available (NO)
	1. Have these programme implemented the village?				
	2. Are there any beneficiaries in the village from the following programme?				
✓	3. Janani Suraksha Yojana			Yes	
	4. Kishori Shakti Yojana				
	5. Balika Samriddhi Yojana				
✓	6. Mid-day Meal Programme			Yes	
✓	7. Intergrated Child Development Scheme (ICDS)			Yes	
	8. Mahila Mandal Protsahan Yojana (MMPY)				
	9. National Food for work Programme (NFFWP)				
	10. National Social Assistance Programme				
✓	11. Sanitation Programme (SP)			Yes	
	12. Rajiv Gandhi National Drinking Water Mission				
	13. Swarnjayanti Gram Swarozgar Yojana				
	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)			Yes	
	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	N.A.			
2.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	N.A.			
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	N.A.			
2.	Recent Projects going on for Development of Village	No			
3.	Any NGO working for village development	No			
4.	Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS CYCLONE DROUGHT LANDSLIDES AVALANCHE OTHER (SPECIFY)	Yes			

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VII
Techno Economic Survey

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

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

IX. Smart Village / Heritage Details

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	IS THEIR ANY THING FOR THE VILLAGE ENHANCEMENT POSSIBLE ?	Door to Door Waste Collection & Water Supply	Inadequate

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:
Ms.Darshana Chauhan,Project Co-ordinator
Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

12.4 VILLAGE GAP ANALYSIS

VILLAGE GAP Analysis					
Village Facilities	**Planning Commission/UDPFI Norms**	**Village Name:**	NAKARAVADI		
		Population:		1750	
		Existing	**Required as per Norms**	**Smart Village / Cities / Heritage Future Projection Design**	**Gap**
Social Infrastructure Facilities					
Education					
Anganwadi	Each or Per 2500 population	1	2		-1
Primary School	Each Per 2500 population	1	2		0
Secondary School	Per 7,500 population	1	0		+1
Higher Secondary School	Per 15,000 Population	0	-		0
College	Per 125,000 Population	0	1		-1
Tech. Training Institute	Per 100000 Population	0	1		-1
Agriculture Research Centre	Per 100000 Population	-	-		-
Skill Development Center	Per 100000 Population	-	-		-
Health Facility					
Govt/Panchyat Dispensary or Sub PHC or Health Centre	Each Village	0	1		-1
Primary Health & Child Health Center	Per 20,000 population	0	1		-1
Child Welfare and Maternity Home	Per 10,000 population	0	1		-1
Multispeciality Hospital	Per 100000 Population	-	-		-
Public Latrines	1 for 50 families (if toilet is not there in home, specially for slum pockets & kutcha house)	0	1		-1
Physical Infrastructure Facilities					
		Adequate / Inadequate			

Transportation		Yes			
Pucca Village Approach Road	Each village	INADEQUATE			
Bus/Auto Stand provision	All Villages connected by PT (ST Bus or Auto)	No			
Drinking Water (Minimum 70 lpcd)		Yes			
Over Head Tank	1/3 of Total Demand	No			
U/G Sump	2/3 of Total Demand	Yes			
Drainage Network - Open		No			
Drainage Network - Cover		Yes			
Waste Management System		No			
Socio- Cultural Infrastructure Facilities					
Community Hall	Per 10000 Population	-	1		-1
community hall and Public Library	Per 15000 Population	-	1		-1
Cremation Ground	Per 20,000 population	-	-		-
Post Office	Per 10,000 population	0	1		-1
Gram Panchayat Building	Each individual/group panchayat	1	1		0
APMC	Per 100000 Population	-	1		-1
Fire Station	Per 100000 Population	-	1		-1
Public Garden	Per village	-	1		-1
Police post	Per 40,000Population	0	1		-1
Shopping Mall					
Electrical Design					
Electricity Network		**Adequate/ Inadequate**			
Street light	Per 5000 Population	Adequate			
Electricity	Village Population	Adeuate			
Any Smart Village Facility					
Technology		N/A			
		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

Sr No.	Village	Discipline	Part-1	Part - 2
1	Nakaravadi	Civil/ Electrical	Community hall	Play Ground
			Public toilet	Gram Panchayat
			Public library	Water Tank
			Public health center	Road Network Through Nakaravadi
			Bus stop	Rain Water Harvesting
			Solar roof top design	Solar Water Pump
			Solar Water Purifier	Auto Intensity Control Of Street Light
				Mobile Technology (Gsm) Based Remote Monitoring And Control Of Digital Energy Meter
2	Khirasara	Civil	Biogas	
			Intze Tank	
			Anganwadi	
			Recreation Center	
			Eco sanitation	
			Gate	
3	**Nyara**	Civil	Maternity home	
			Community Hall	
			Rain harvesting	
			Post office	
			Main Gate	
			Paver block pavement	
4	**Patidad**	Civil	Soak pit	
			Vacation training center	
			PHC	
			Cinema hall	
			Chabutro	
			Meditation hall with acoustic air circulation	
			Sewage Treatment Plant	
			Gram Panchayat	
			Bus stand	

5	**Virnagar**	Civil	Public library	
			Step well	
			Polling booth cum conference hall using green concept	
6	**Halenda**	Civil	Liquid Waste Management	
			Flexible Pavement	
			Public Garden	
			Public Toilet	
			Drinking Water Tank for Animal	
			Passive Solar Building	
7	**Kankot**	Civil	RO Plant	
			Solid Waste Management	
			Step Auditorium	
			Sahakari Mandali	
			Victory post	
			Green house	

12.7 Summary of Photographs in Table Format

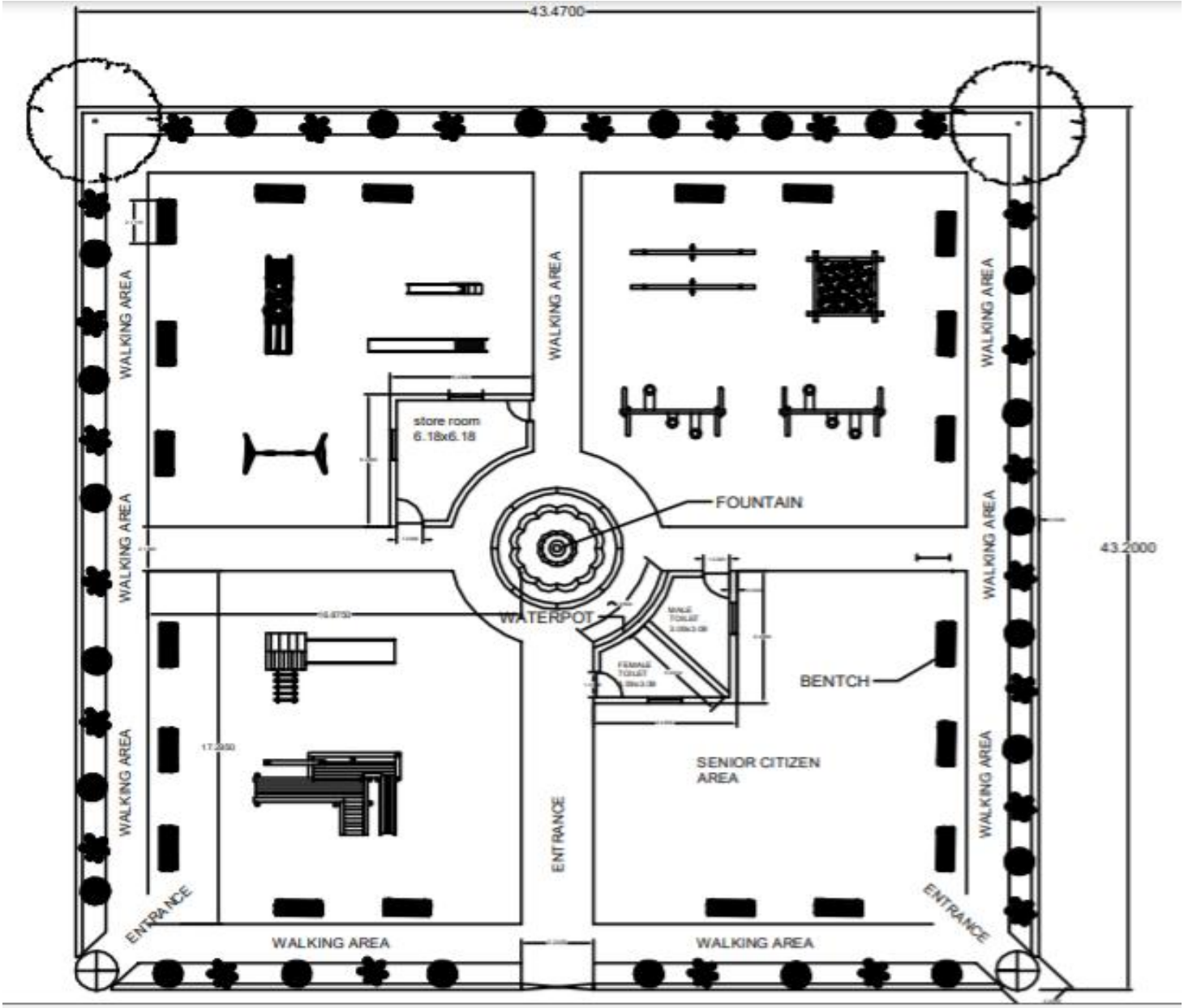
12.8 Village Interaction with sarpanch or Talatimantri Report with the photograph

- We met the Sarpanch & Talati Mantri of Nakaravadi. they were very welcoming & helpful to us, they provided the vital information of village.
- We followed the Covid guidelines & visited all the existing amenities which are in village.
- We took input from villagers & Sarpanch for the requirements of village.
- We won't be able to provide the designed amenities to them but at least a step ahead towards destination.

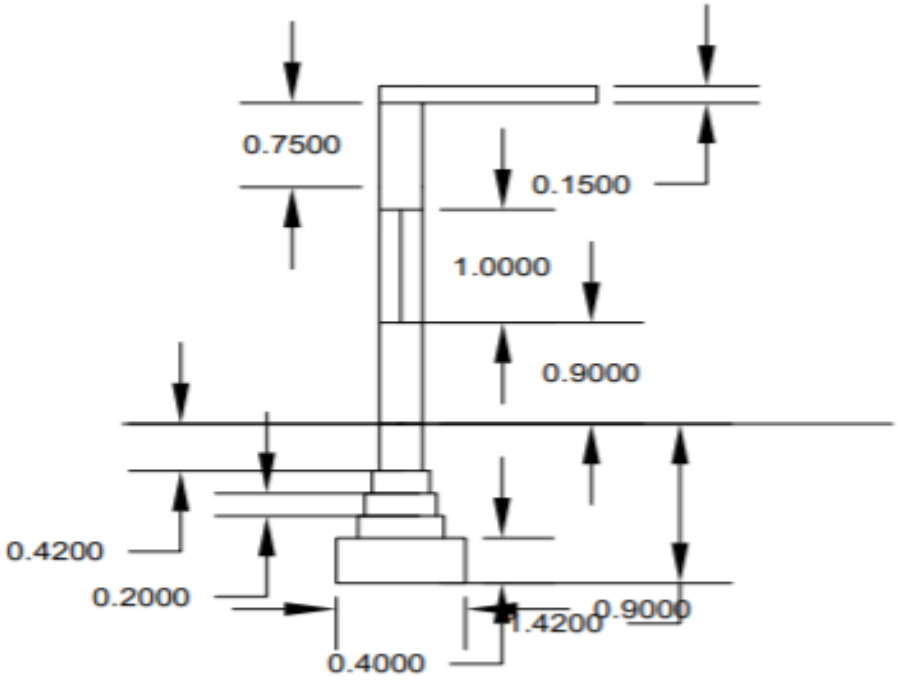
Chapter 13

13.1 Civil Design Proposals

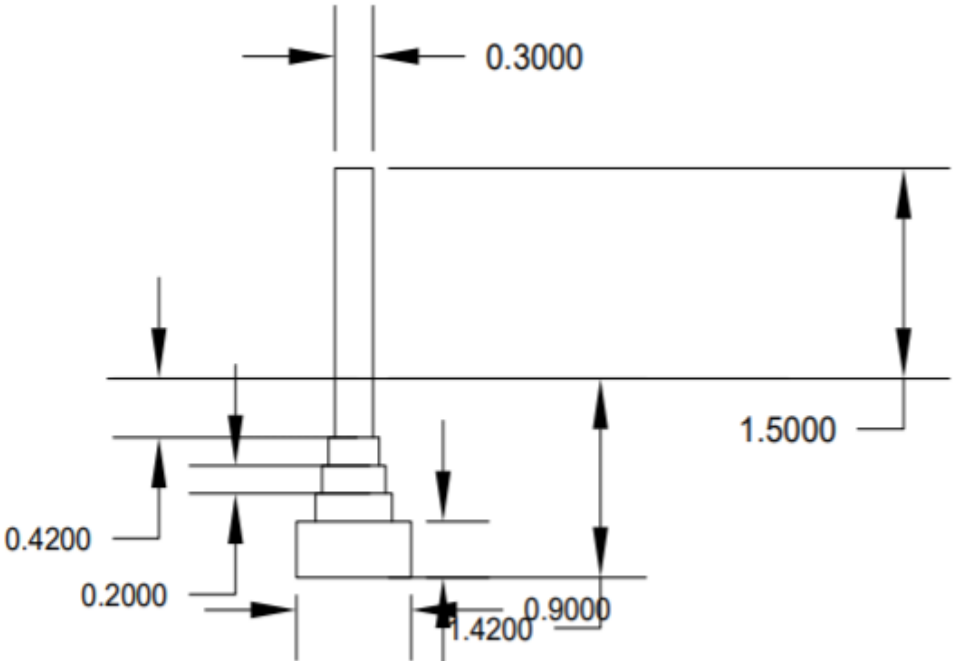
13.1.1 Civil Design 1 – Play Ground



DRAWING 1 – PLAYGROUND



DRAWING 2 – PLAYGROUND INTERNAL WALL SECTION



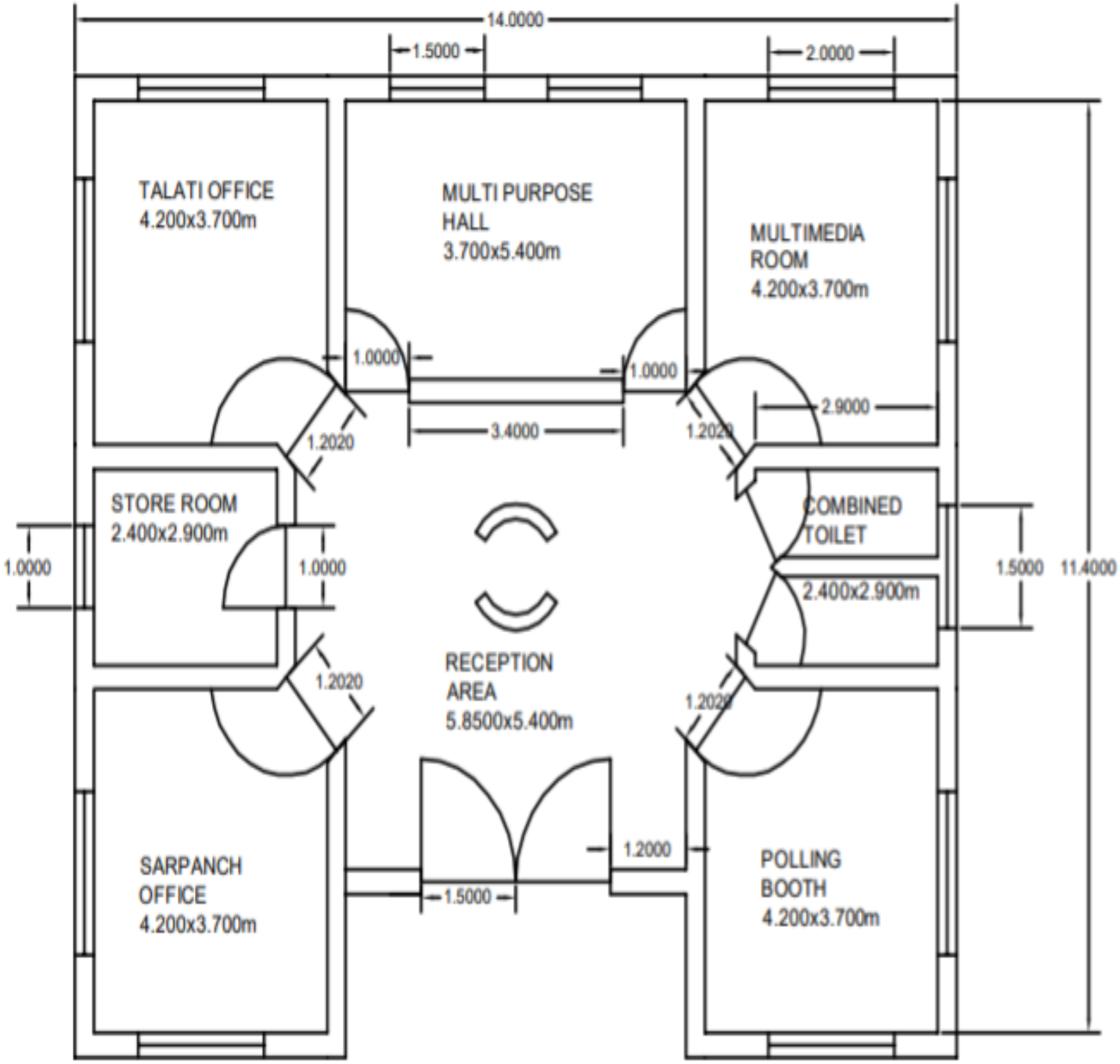
DRAWING 3 – PLAYGROUND BOUNDRY WALL SECTION

Sr. No.	Item	No.	L	B	H	Quantity	Total
1	**Excavation** Hor. Wall = 56.430 Ver. wall = 61.160 Total = 117.590	1	117.590	0.9	1.42	150.280	**150.280 m^3**
2	**B.B.C.C (1:6:12) in Foundation**	1	117.590	0.9	0.4	42.332	**42.332 m^3**
3	**First class brick masonry up to plinth in C.M. (1:6)**						
	Step 1	1	117.590	0.6	0.2	14.111	
	Step2		117.590	0.5	0.2	11.759	
	Step3		117.590	0.4	0.2	9.407	
	Step4		117.590	0.3	0.42	14.816	**50.093 m^3**
4	**Sand filling in plinth**						
	Toilet	1	6.48	6.48	0.42	17.636	
	Store room	1	6.48	6.48	0.42	17.636	**35.272 m^3**
							112.838 m^3
5	**First class brick masonry in super structure in C.M. (1;6)**						
	Boundary wall's = 86.670	1	86.670	0.3	1.5	39.002	
	Internal wall's = 30.920	1	30.920	0.3	3	27.828	**66.830 m^3**
	Deduction in masonry						
	Door's						
	D1	1	3.24	0.30	1.5	1.458	
	D2	2	2.30	0.30	1.5	2.070	
	D3	4	1.20	0.30	2.2	3.168	**6.696 m^3**
	Window's						
	W1	2	1.5	0.3	1.00	0.900	**1.035 m^3**
	Ventilator's	2	1.5	0.3	0.15	0.135	**15.078m^3**
						Net	**59.099 m^3**
6	**15 cm thick lintel with 2side 15cm bearing**						
	Door's						

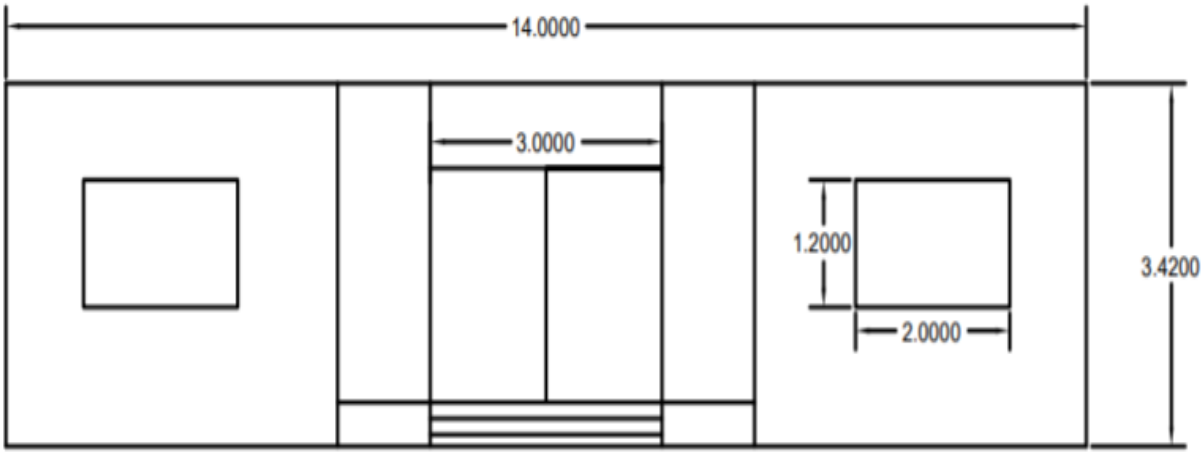
	D3 = 1.20 + 0.3	4	1.50	0.30	0.15	0.270	
	Window's						
	W1 = 1.50 + 0.3	2	1.80	0.30	0.15	0.162	
						Net	**0.432 m^3**
7	**15 cm thick R.C.C. slab portion (1:1.5:3)**						
	Slab area = 53.826	1	-	-	-	53.826	**53.826 m^2**
8	**1.5 cm thick single coat cement plaster in C.M. (1:4)**						
	Toilet block	2	6.48	-	3.00	38.880	
		1	4.89	-	3.00	14.670	
	Store room	2	6.48	-	3.00	38.880	
		1	4.89	-	3.00	14.670	
	Deduction						
	Door's						
	D3	4	1.20	-	2.2	10.560	
	Window's						
	W1	2	1.50		1.0	3.000	
	Ventilator's	2	1.50		0.15	0.450	
						Net	**93.090 m^2**
9	**double coat sun faced plaster to external wall's**						
	External wall's						
	Vertical wall = 43.20	2	86.400	-	1.5	129.600	
	Horizontal wall = 43.47	2	86.940	-	1.5	130.410	
	Internal wall's = 30.920	1	30.920	-	3.42	105.746	**365.756 m^3**
	Deduction						
	Door's						
	D1	1	3.24	-	1.5	1.458	
	D2	2	2.30	-	1.5	2.070	
	D3	4	1.20	-	2.2	3.168	
	Window's						
	W1	2	1.5	-	1.00	0.900	
	Ventilator's	2	1.5	-	0.15	0.135	**7.731 m^3**
						Net	**358.025 m^3**

Sr.No.	Item	Quantity	Per	Rate (Rs.)	Amount (Rs.)
1	Excavation	150.280	m3	220	33061.600
2	B.B.C.C (1:6:12) in Foundation	42.332	m3	2620	110909.840
3	First class brick masonry up to plinth in C.M. (1:6)	50.093	m3	3850	192858.050
4	Sand filling in plinth	112.838	m3	3950	445710.100
5	First class brick masonry in super structure in C.M. (1:6)	59.099	m3	1930	114061.070
6	15 C.M. thick R.C.C. lintel with 2 side 15 C.M. bearing	0.432	m3	4100	1771.200
7	15 C.M. thick R.C.C. slab	53.826	m3	4100	220686.600
8	15 mm thick single coat cement plaster in C.M. (1:4)	93.090	m2	300	27927.000
9	Double coat sun faced plaster to external Walls	358.025	m2	320	114568.000
10	Indian W.C. pans with a pair of foot rest	2	Nos.	3400	6800.00
11	Foot rest's	2	Pair	475	950.00
12	P.V.C. flushing cistern for W.C.	2	Nos.	2900	5800.00
13	Urinal's for male toilet	3	Nos.	600	1800.00
14	P.V.C. automatic flushing tank for urinal	3	Nos.	2100	6300.00
15	Nahni trap's	2	Nos.	350	700.00
16	Gully trap's	2	Nos.	450	900.00
17	Big size swing's	2	Nos.	28500	57000
18	Small size swing	1	Nos	19000	19000
19	Seesaw's	2	Nos	14000	28000
20	Small size slide	1	Nos	35000	35000
21	Big size slide	1	Nos	55000	55000
22	FRP multi station slide	1	Nos	95000	95000
21	Medium size slide with side stair	1	Nos	74000	74000
22	Bench's	20	Nos	7500	150000
Total					1797803.460
Add 5% Contingencies					89890.173
Grand total					1887693.633
Say					1890000.rs

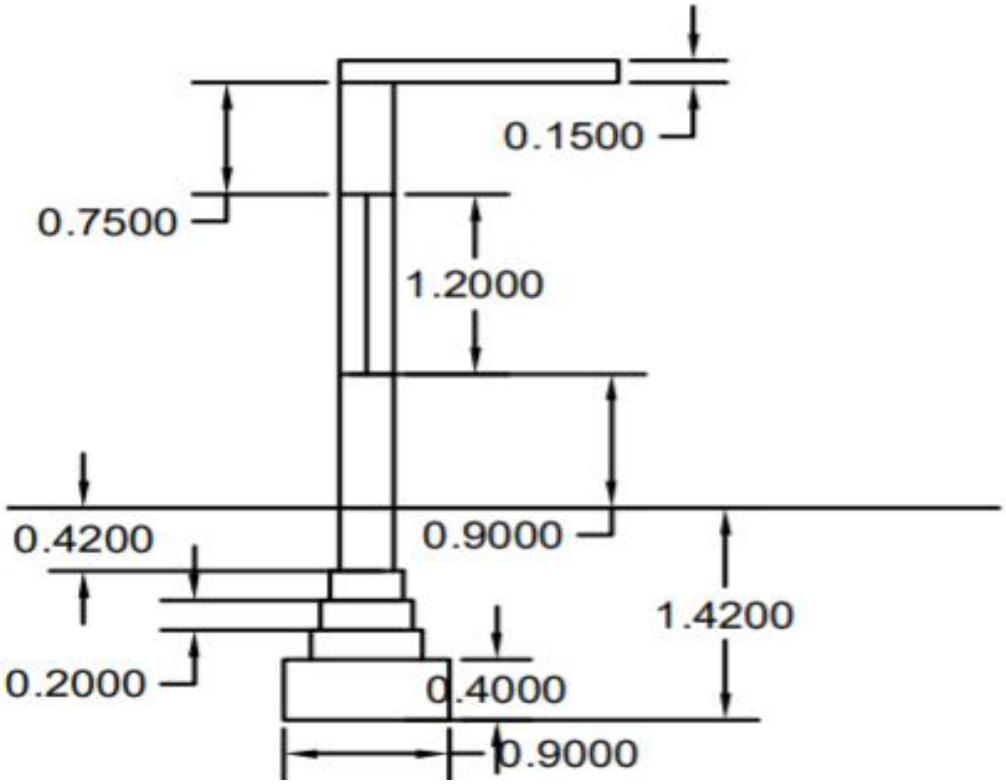
13.1.2 Civil Design 2 – Gram Panchayat



DRAWING 4 – GRAM PANCHAYAT



DRAWING 6 – GRAM PANCHAYAT EVEVATION



DRAWING 5 – GRAM PANCHAYAT WALL SECTION

`Sr.No.	Item	No.	L	B	H	Quantity	Total
1	**Excavation** Hor. Wall = 43.00 Ver. wall = 44.20 Total = 87.20	1	87.20	0.9	1.42	89.520	**89.520 m^3**
2	**B.B.C.C (1:6:12) in Foundation**	1	87.20	0.9	0.4	31.392	**31.392 m^3**
3	**First class brick masonry up to plinth in C.M. (1:6)**						
	Step 1	1	87.20	0.6	0.2	10.464	
	Step2		87.20	0.5	0.2	8.72	
	Step3		87.20	0.4	0.2	6.976	
	Step4		87.20	0.3	0.42	10.987	**37.138 m^3**
4	**Sand filling in plinth**						
	Reception area	1	7.15	4.10	0.42	12.312	
	Talati office	1	4.2	3.7	0.42	6.527	
	Sarpanch office	1	4.2	3.7	0.42	6.527	
	Multimedia room	1	4.2	3.7	0.42	6.527	
	Polling booth	1	4.2	3.7	0.42	6.527	
	Multipurpose hall	1	3.7	5.4	0.42	8.392	
	Store room	1	2.4	2.9	0.42	2.923	
	Combined toilet's	1	2.4	2.9	0.42	2.923	**52.658 m^3**
5	**First class brick masonry in super structure in C.M. (1;6)**						
	Internal wall's = 87.20	1	87.20	0.3	3	78.480	**78.480 m^3**
	Deduction in masonry						
	Door's						
	D1	1	3.00	0.3	2.2	1.980	
	D2	4	1.20	0.3	2.2	3.168	
	D3	4	1.00	0.3	2.2	2.640	**7.788 m^3**
	Window's						
	W1	8	2.00	0.3	1.2	5.760	
	W2	2	1.50	0.3	1.2	1.080	
	W3	1	1.00	0.3	1.2	0.360	**7.200 m^3**

	Ventilator's	1	1.50	0.3	0.20	0.090	
						Net	**15.078m^3**

6	**15 cm thick lintel with 2side 15cm bearing**						
	Door's						
	D1 = 3.00 + 0.3	1	3.30	0.30	0.15	0.149	
	D2 = 1.20 + 0.3	4	1.50	0.30	0.15	0.270	
	D3 = 1.00 + 0.3	4	1.30	0..30	0.15	0.234	
	Window's						
	W1 = 2.00 + 0.3	8	2.30	0.30	0.15	0.828	
	W2 = 1.50 + 0.3	2	1.80	0.30	0.15	0.162	
	W3 = 1.00 + 0.3	1	1.30	0.30	0.15	0.059	**1.702 m^3**
7	**15 cm thick R.C.C. slab portion (1:1.5:3)**						
	Area of slab = total area - wall area = 157.200 – 26.160 = 131.040	1	-	-	-	131.040	**131.040 m^2**
8	**1.5 cm thick single coat cement plaster in C.M. (1:4)**						
	Reception area	2	7.15	-	3.00	42.900	
		2	4.10	-	3.00	24.600	
	Talati office	2	4.2	-	3.00	25.200	
		2	3.7	-	3.00	22.200	
	Sarpanch office	2	4.2	-	3.00	25.200	
		2	3.7	-	3.00	22.200	
	Multimedia room	2	4.2	-	3.00	25.200	
		2	3.7	-	3.00	22.200	
	Polling booth	2	4.2	-	3.00	25.200	
		2	3.7	-	3.00	22.200	
	Multipurpose hall	2	4.2	-	3.00	25.200	
		2	3.7	-	3.00	22.200	
	Store room	2	2.4	-	3.00	14.400	
		2	2.9	-	3.00	17.400	
	Combined toilet's	2	2.4	-	3.00	14.400	

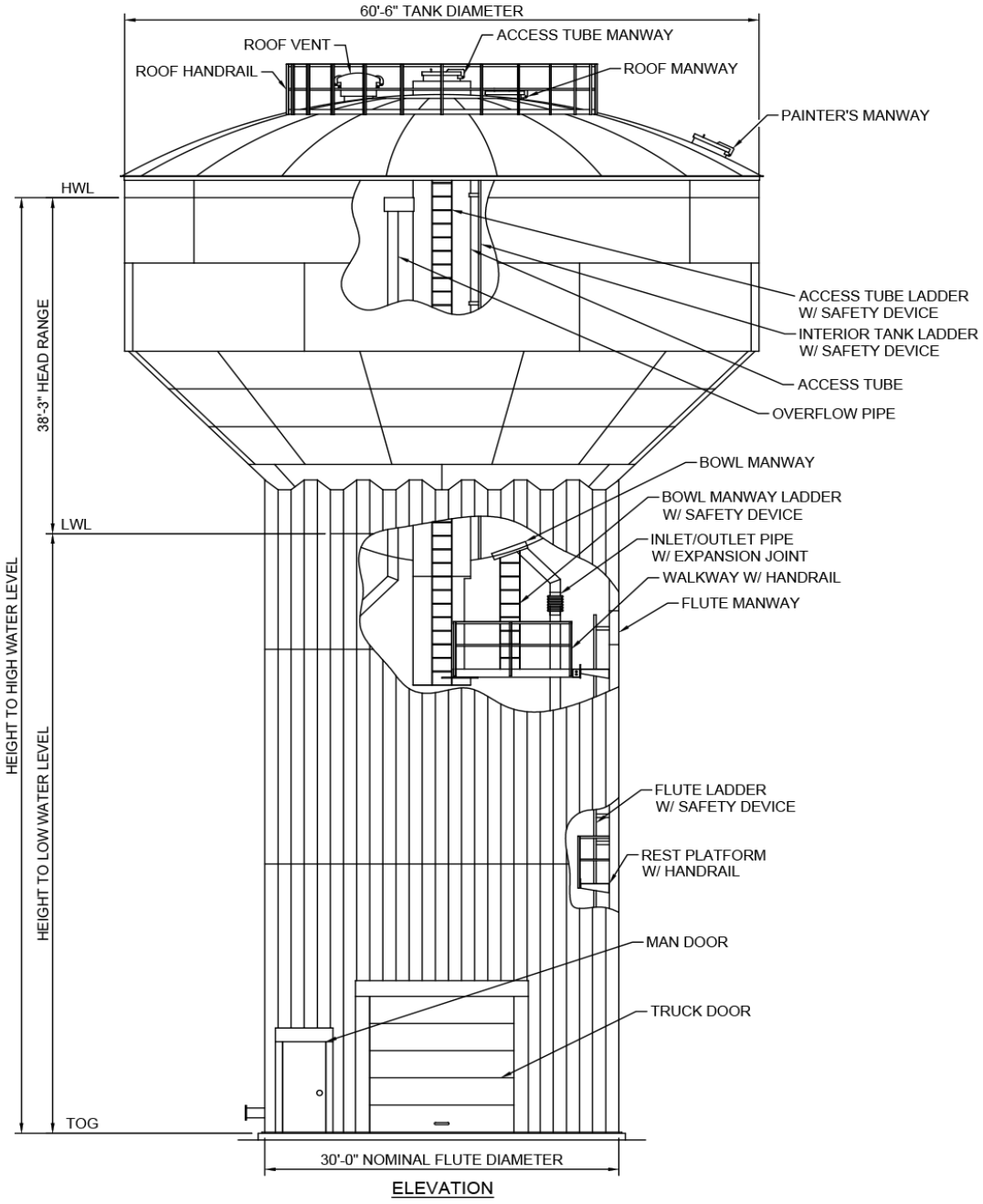
		2	2.9	-	3.00	17.400	**368.100m^3**
	Deduction						
	Door's						
	D1	1	3.00	-	2.2	6.600	
	D2	4	1.20	-	2.2	10.560	
	D3	4	1.00	-	2.2	8.800	
	Window's						
	W1	8	2.00		1.2	19.200	
	W2	2	1.50		1.2	3.600	
	W3	1	1.00		1.2	1.200	
	Ventilator's	1	1.50		0.20	0.027	**49.987m^3**
						Net	**318.113 m^2**

9	**double coat sun faced plaster to external wall's**						
	External wall's						
	Vertical wall = 11.40	2	17.315	-	3.42	118.43	
	Horizontal wall = 14.00	2	12.191	-	3.42	83.386	**201.816m^3**
	Deduction						
	Door's						
	D1	1	3.00	-	2.2	6.600	
	Window's						
	W1	8	2.00		1.2	19.200	
	W2	2	1.50		1.2	3.600	
	W3	1	1.00		1.2	1.200	
	Ventilator's	1	1.50		0.20	0.027	**30.627m^3**
							171.189m^3

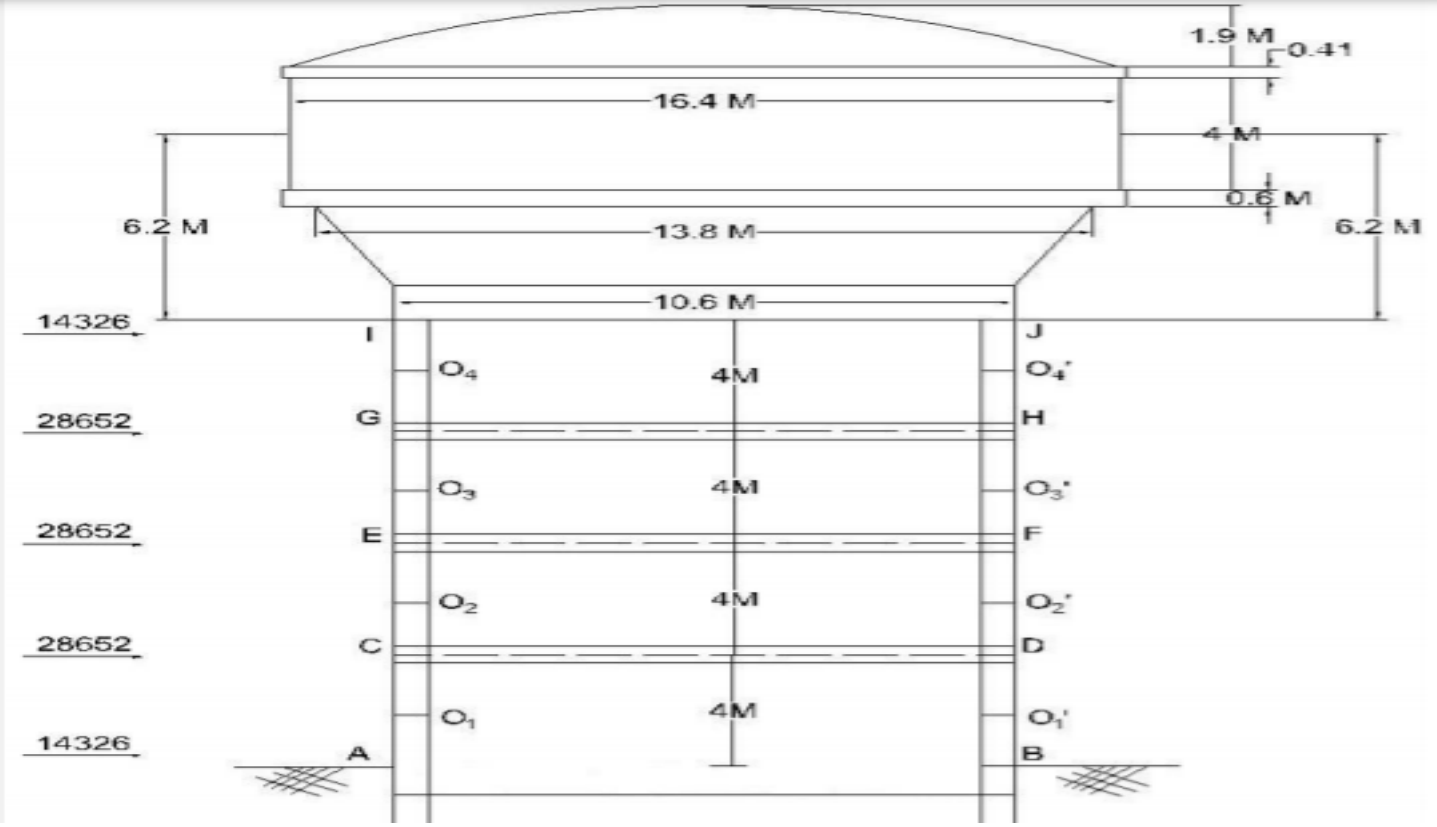
Sr.No.	Item	Quantity	Per	Rate (Rs.)	Amount (Rs.)
1	Excavation	89.520	m3	220	19694.400
2	B.B.C.C (1:6:12) in Foundation	31.392	m3	2620	82247.040
3	First class brick masonry up to plinth in C.M. (1:6)	37.138	m3	3850	142981.300

4	Sand filling in plinth	52.658	m^3	3950	207999.100
5	First class brick masonry in super structure in C.M. (1:6)	15.078	m^3	1930	29100.540
6	15 C.M. thick R.C.C. lintel with 2 side 15 C.M. bearing	1.702	m^3	4100	6978.200
7	15 C.M. thick R.C.C. slab	131.040	m^3	4100	537264.00
8	15 mm thick single coat cement plaster in C.M. (1:4)	318.113	m^2	300	95433.900
9	Double coat sun faced plaster to external Walls	171.189	m^2	320	54780.480
10	Indian W.C. pans with a pair of foot rest	2	Nos.	3400	6800.00
11	Foot rest's	2	Pair	475	950.00
12	P.V.C. flushing cistern for W.C.	2	Nos.	2900	5800.00
13	Urinal's for male toilet	3	Nos.	600	1800.00
14	P.V.C. automatic flushing tank for urinal	3	Nos.	2100	6300.00
15	Nahni trap's	2	Nos.	350	700.00
16	Gully trap's	2	Nos.	450	900.00
Total					1199828.830
Add 5% Contingencies					59991.442
Grand total					1259274.272
Say					12600000.rs

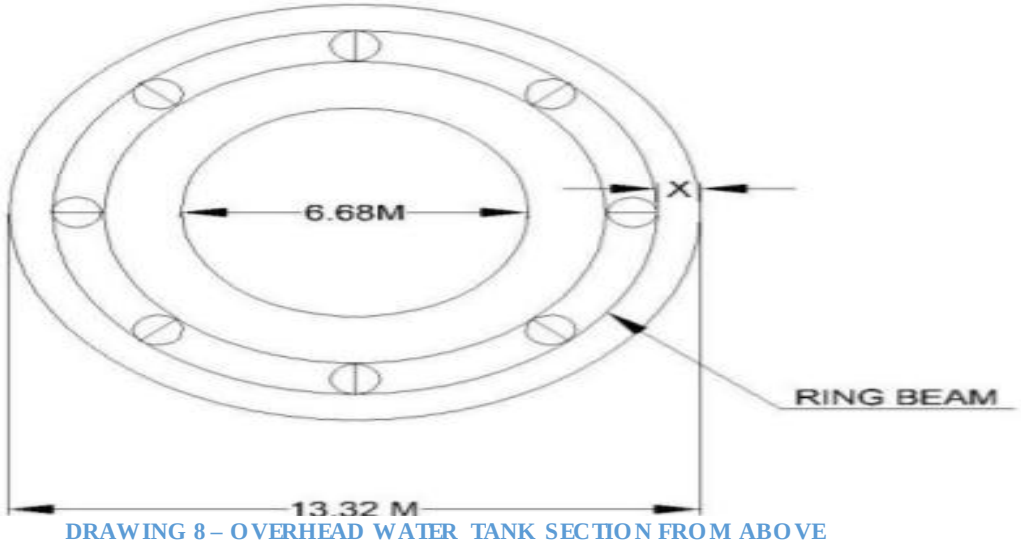
13.1.3 Civil Design 3 - WATER TANK



DRAWING 7 – OVERHEAD WATER TANK



DRAWING 9 – OVERHEAD WATER TANK SECTION



DRAWING 8 – OVERHEAD WATER TANK SECTION FROM ABOVE

(Yearly Water Demand of Village/town)			
Total population of village/town	Water requirement per person per day	Total water requirement per day at village/town level	Total water requirement in a year
(a)	(b)	C= (a*b)	C* 365
1750	135 lpcd	236250	86231250

DESCRIPTION OF OVER HEAD TENK

- The estimate of reinforced concrete water tank is based on SOR 2019. The design depends on the location of tanks, i.e. overhead, on ground or underground water tanks. The tanks can be made in different shapes usually circular and rectangular shapes are mostly used.
- Underground tanks: Rectangular tank
- Overhead tanks*: Spherical tank
- Tank resting on grounds: Circular tank
- The benefits of installing a rainwater tank at your new home are many: Rainwater is filtered enough to use to wash the car or in the pool. Capturing rainwater reduces the pressure on storm water systems. Storing water means less need for governments to construct new dams.
- We design about 10,00,000 liter water capacity of overhead tank.

ESTIMATE

TABLE 11 - COSTOFOVERHEAD WATER TANK

ESTIMATE ACCORDING TO SOR 2019	
ABSTRACT	
ESR-WATER TANK (10 00 000CAPACITY)	
	Description of item
Item No.1	**RCC ESR (description of item for turnkey tender)**

	Designing structurally (and aesthetically) complying provisions of relevant Indian standards and constructing RCC Elevated service Reservoir of the following capacity and height , using latest Soil Investigation Report of proposed site , Seismic zone, Wind speed Zone. Including (1) Container shape any suitable type(or as specified), (2) Staging consisting of column brace trestle / shaft / combination column- brace trestle and shaft as appropriate(or as specified) and (3) Appropriate foundation system. This includes excavation in all types of soil strata(including hard rock), casting100 mm thick P.C.C. levelling course in M-10 , Refilling the pit with proper soil and disposing of the surplus stuff at all required lead. (4) This will also include cement plaster in CM 1:2 with approved water proofing compound all over inside container (i.e. walls, base, top slab/dome bottom etc. all).. (5) All types of labour & material charges of lowering , laying, erecting / hoisting & joining of pipe assembly of Inlet, Outlet, overflow, washout and bye pass arrangement as per hydraulic design are including. (6) Providing and fixing of any accessories(specified), CI Manhole frame and covers, water level indicator , lightening conductor, GI Pipe railing around walk way, at roof level, at gallery and around landing of inside shaft, Adequate cowl type ventilators or lantern type ventilator with stainless steel jali. (7) Scope of work includes constructing RCC spiral staircase with adequate tie beams,staircase footing ,Rcc chambers for valves. ventilating shaft and ventilators as well as door in shaft, SS grating to be provided to outlet pipe (inside container) for safety. (8) including providing and applying three coats of cement paint/snowcem (as specified) to the whole structure. (9) It also includes satisfactory water tightness test as per relevant I.S. Code and painting name of scheme & capacity on the tank as per direction of engineer in charge.		
1.A	**As above up to staging height(L.S.L.) 12m from G.L. and S.B.C.10)**	Unit per	Rate Rs./- for the year 2019-20
	Capacity of ESRs (shell type container like cylindrical, conical, intze, folded plates & its combination)		**Seismic ZONE 3**
	11).Cost of 10lacs lit. capacity	NO.	**84,97,778 .00**

1.B	**Extra staging height above 12 mt onward, for each 1000 L per meter height.**		
	6). Above 500000 to 1000000 liters	per 1000 Litre	**85.51**

We have design more than 12 Mt height, up to 15 Mt

so, remaining 3 Mt design below,

= 3 x 1000 x 85.51

= 2 56 530 /-

TOTAL COST OF ESR WATER TANK

= 84,97,778+ 2 56 530

= □ 87,54,308

SAY □ 88 00 000 /-

13.1.4 Civil Design 4 - Effective Road network passing through Nakaravadi

- Currently if you travel from Rajkot to Wankaner the route is via Kuvadava which is 50.3 km & takes around 1hr 15min time.
- There are so many commuters who travel to Rajkot ∞ Wankaner, most of them travel from State transport & rest uses private vehicles.
- Our new Route Saves about 4 km & most importantly it passes through our village NAKARAVADI
- This will save precious fuel & reduce pollution in the state.
- This will reduce travel time & attract more commutes & will increase Economic Activities.
- This Route will give a huge exposure to our village for development

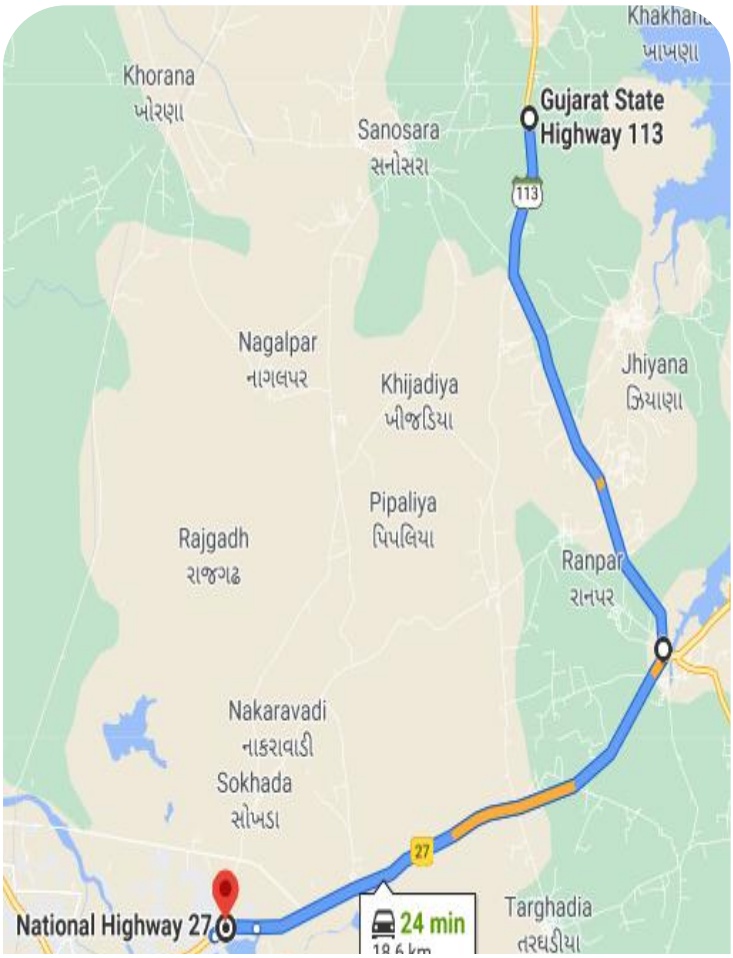


Figure 1 - CURRENT ROAD PATH

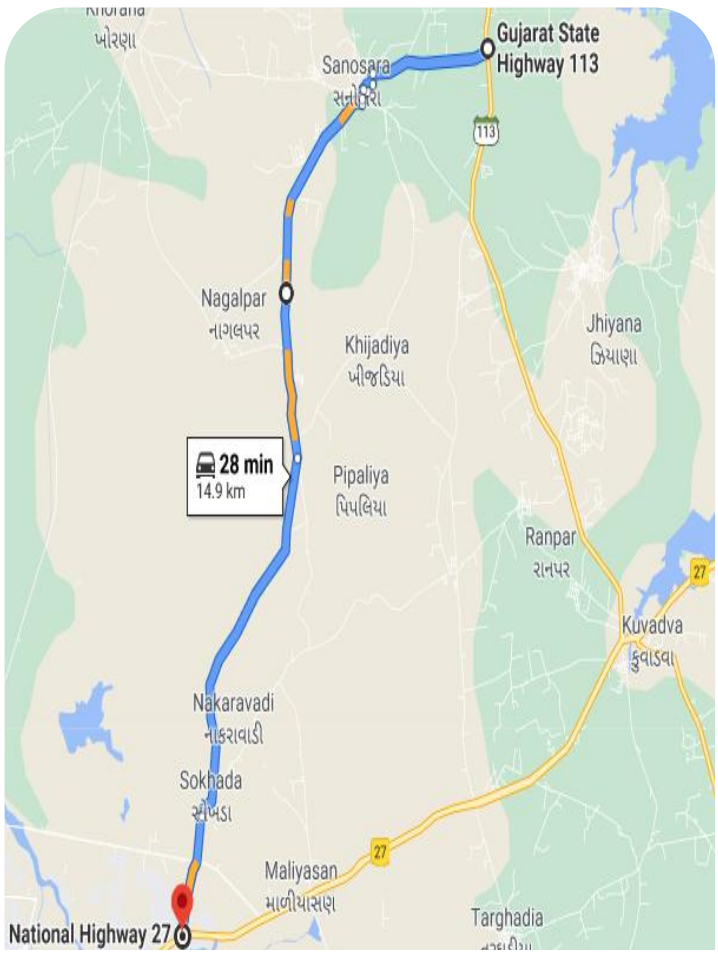


Figure 2 - PROPOSED ROAD PATH

Current Road

Proposed Road

Officials of the National Highways Authority of India (NHAI) estimate the average cost of building twolane highways at Rs 4.5 to 6 crore per km and six-lane highways at around Rs 14 crore per km, inclusive of land costs.

Assumptions made:

1. Typical roadway section as shown in the figure below.
2. Cost of land is not considered.
3. Cost of ancillary works like drains, culverts, crash barriers, medians, etc., are not considered.
4. The existing road alignment is assumed to be of *kachcha/cart* road. The same formation profile is followed.
5. Rates are derived from Central Public Works Department (CPWD) schedule of rates (DSR) 2014. A premium of 15% is added over the DSR.

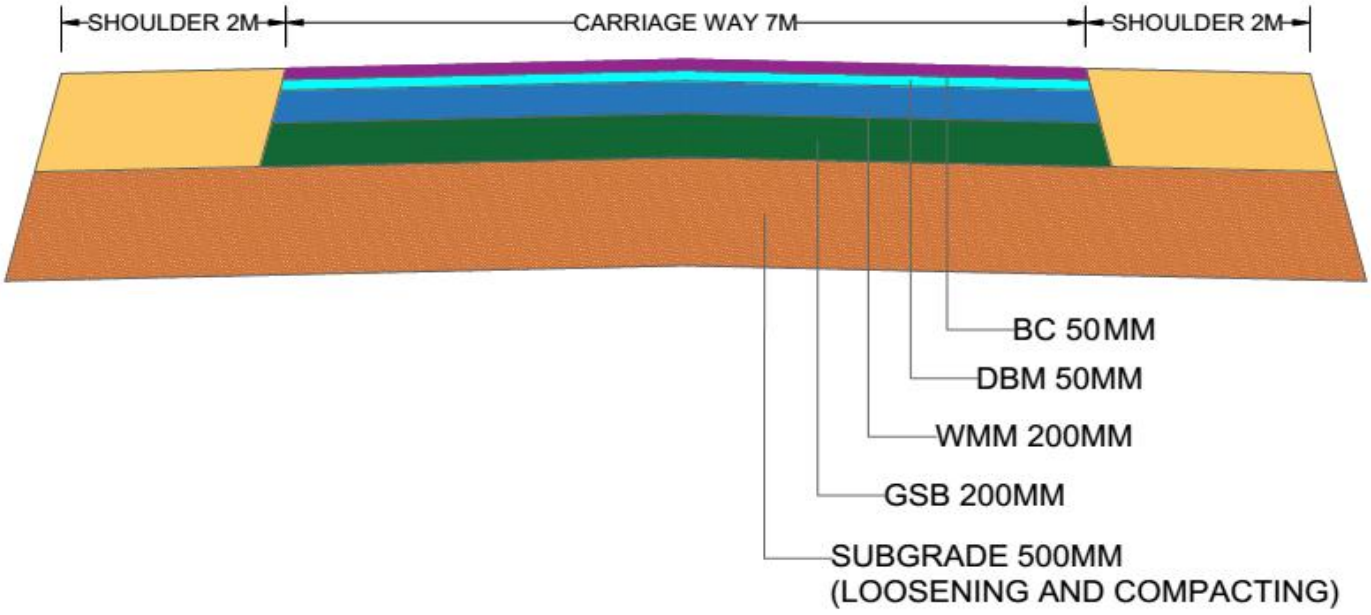


Figure 3 - SECTION OF BITUMINOUS ROAD

TABLE 12 – RATE ANALYSIS OF ROAD

Cost of 1km stretch of Bituminous Road is □ 1,73,08,000

Sl. No.	Description	No.	Length	Breadth	Depth	Quantity	Unit	Rate (DSR+15%)	Amount
1	Subgrade	1	1000	11	0.5	5500	cum	186	10,23,000
2	Shoulders	2	1000	2	0.5	2000	cum	929	18,58,000
3	Granular sub base (GSB)	1	1000	7	0.2	1400	cum	2,443	34,20,200
4	Wet mix macadam (WMM)	1	1000	7	0.2	1400	cum	2,437	34,11,800
5	Dense bituminous macadam (DBM)	1	1000	7	0.05	350	cum	10,109	35,38,150
6	Bituminous concrete (BC)	1	1000	7	0.05	350	cum	11,591	40,56,850
	TOTAL COST								**₹ 1,73,08,000**

Cost of 15 km stretch of Bituminous Road is 17308000×15

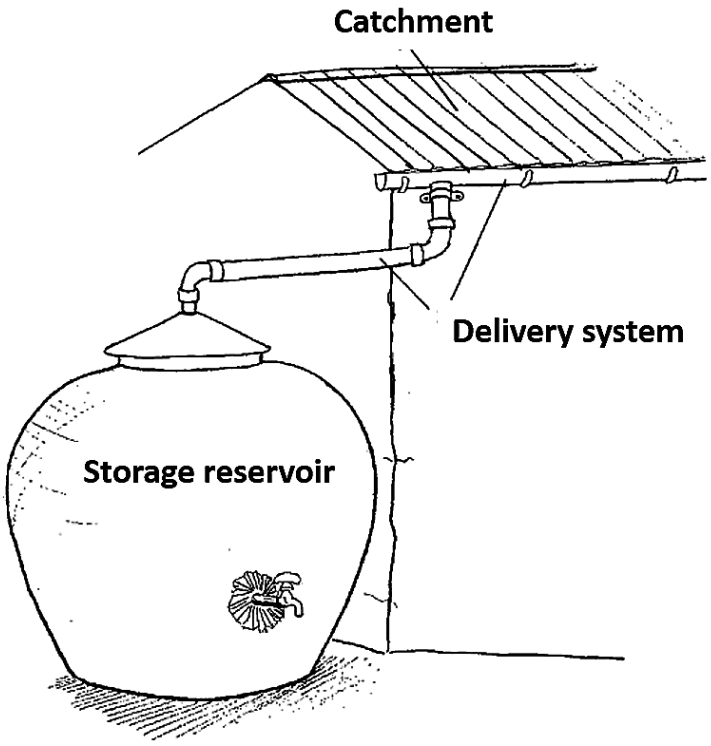
$= □ 259,620,000$

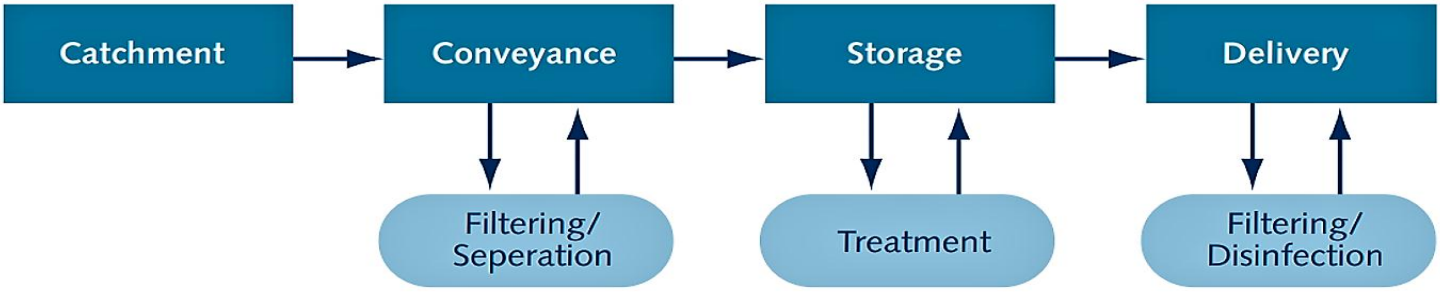
$\sim □ 26$ Cr

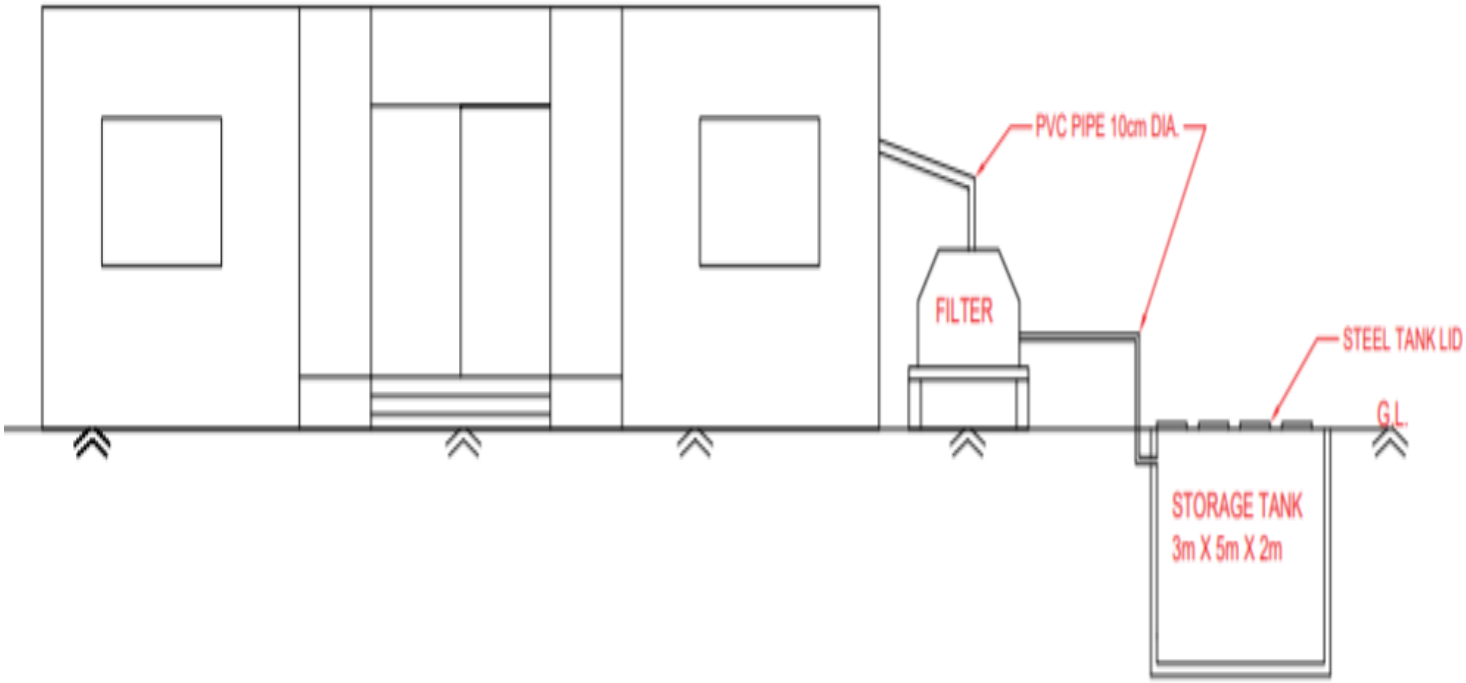
13.1.5 Civil Design 5 – Rain Water Harvesting System

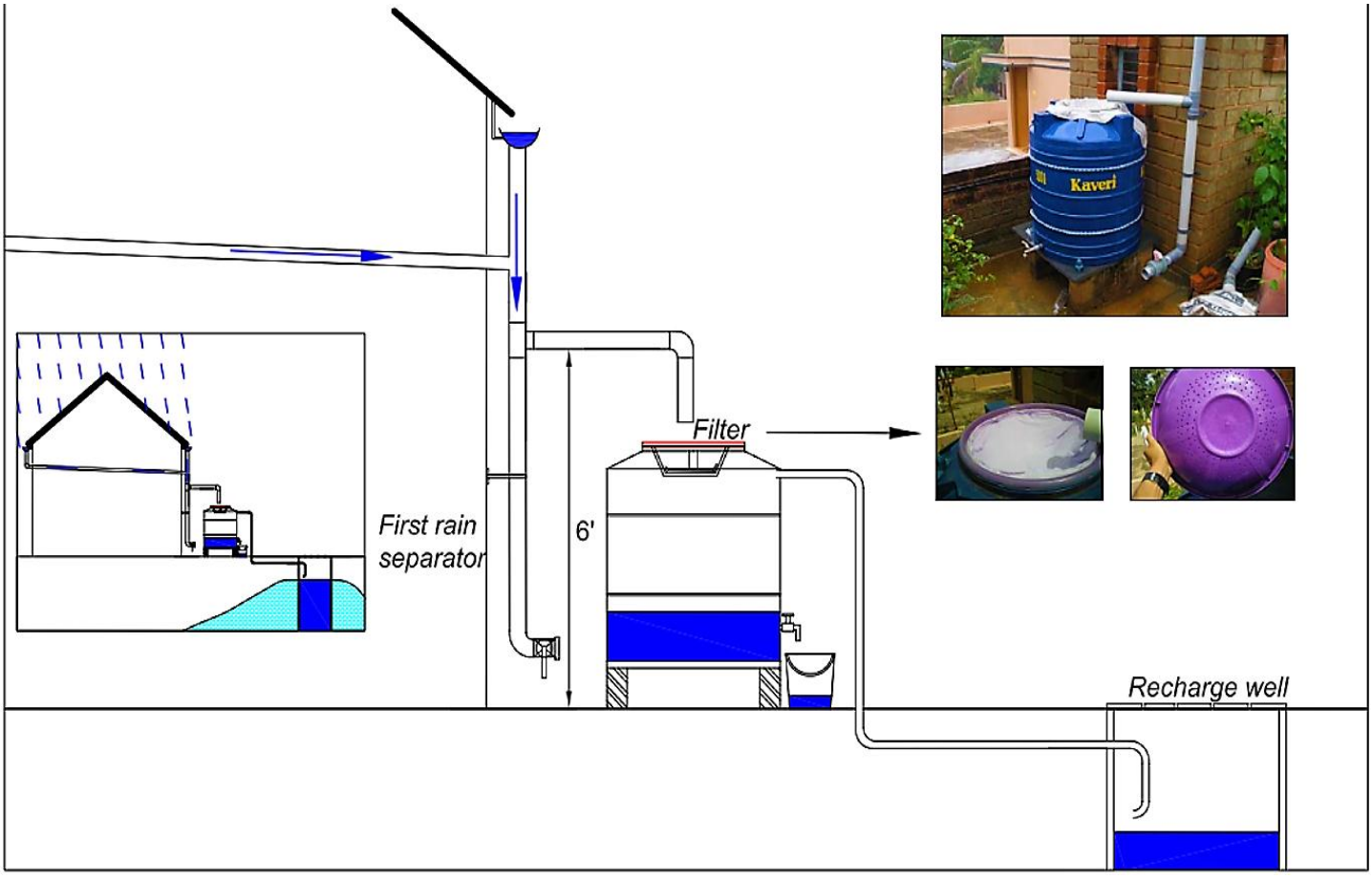
Rainwater harvesting methods are site specific and hence it is difficult to give a generalised cost. But first of all, the major components of a rainwater harvesting system - rain and catchment area - are available free of cost. A good proportion of the expenses would be for the pipe connections. By judiciously fixing up the slopes of roofs and location of rainwater outlets, this could be brought down considerably. However the cost varies widely depending on the availability of existing structures like wells and tanks which can be modified and used for water harvesting.

Typically, installing a water harvesting system in a building would cost between Rs 2,000 to 30,000 for buildings of about 300 sq. m. The cost estimate mentioned above is for an existing building.





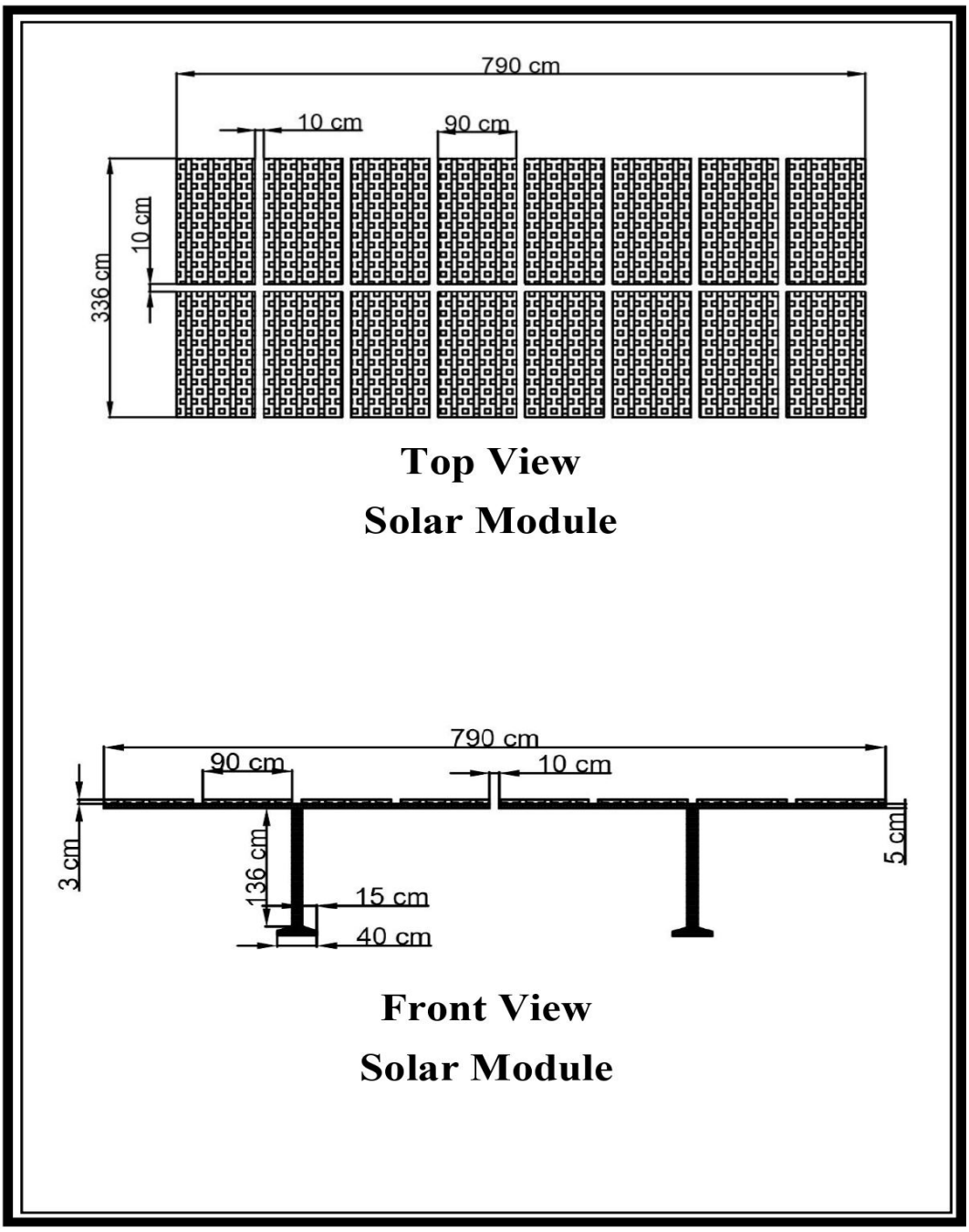

PVC PIPE 10cm DIA.
FILTER
STEEL TANK LID
G.L.
STORAGE TANK
3m X 5m X 2m


Kaveri
Filter
First rain separator
6'
Recharge well

Sr. No.	Item	No.	L	B	H	Quantity	Total
1	**Excavation** Hor. Wall = 5	1	5	6	2	60	**60 m^3**
2	**PCC bed** = 6	1	6	6	0.10	3.6	**3.6 m^3**
3	**RCC wall** = 10	1	10	0.15	2	3.0	**3.0 m^3**

Sr. No.	Item	Quantity	Per	Rate (Rs.)	Amount (Rs.)
1	Excavation	60	m^3	220	**1420**
2	PCC bed	3.6	m^3	2800	**10080**
3	RCC wall's	3.0	m^3	4100	**12300**
4	PVC pipes	8	m	119	**950**
5	Filter tank	1	Nos	5000	**5000**
6	Storage tank steel lid (3mx2.5m)	2	Nos	6500	**6500**
7	Filter media	2	Nos	200	**400**
Total					36650.00
Add 5% Contingencies					1832.500
Grand total					38482.500
Say					38500.00rs

13.1.6 Electrical Design 1



DRAWING 10 – SOLAR STRUCTTURE FOR WATER PUMP

Solar water pump:

Solid works Design of solar structure:

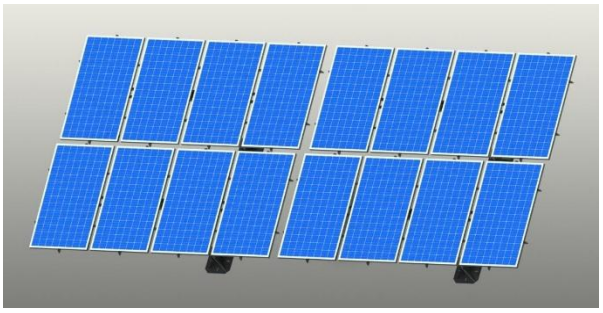


Figure 4 - FRONT VIEW OF SOLAR STRUCTURE

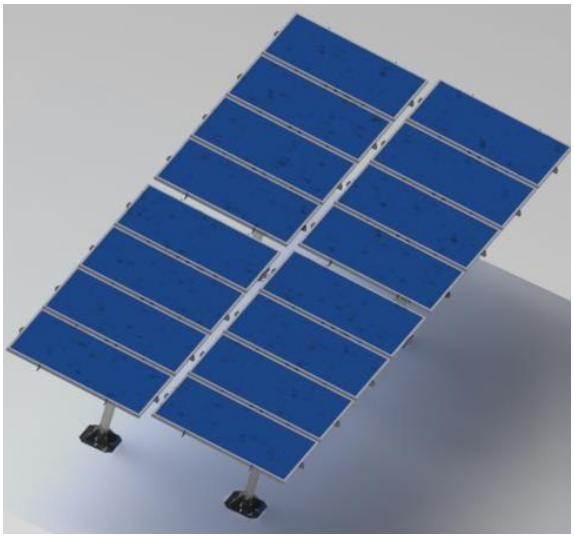


Figure 5 – TOP VIEW OF SOLAR STRUCTURE

SOLAR WATER PUMP DESCRIPTION

- A solar water pump system is basically an electrical pump system with one or many Photo Voltaic (PV) panels offering the electricity. A solar panel array powers an electric motor, which further powers a bore or surface pump in a conventional solar powered pumping system.

- Solar-powered water pumps can deliver simultaneously drinking water and water for livestock or irrigation. Large-scale irrigation necessarily involves large volumes of water, thus justifies a large solar PV array, so solar water pumps may be specifically useful in small-scale or community-based irrigation. Since the water can only be required at certain times of the year, a large PV array would be desirable.

- Our solar water pump is used to fill the water for the overhead tank.

- And we also have a water level indicator circuit to signal when the water level has crossed the overflow level and to turn off the pump, guaranteeing that no water is wasted.

MAJOR COMPONENT DETAIL

- Solar panel

- Surface pump or submersible pump
- Water tubes
- Inverter
- Water level indicator

Solar Panel Detail

- For filling the overhead tank, we use a 5 HP solar water pump in this design. The capacity of the village's overhead water tank is approximately 1,00,000 liters.
- The solar provided power for a 5 HP solar water pump is 5 KW, and a surface pump is also used in this design.
- Each solar panel is 335W, so the total number of solar panels required is about 15.
- In the table below, you'll find more information.

Table 3 - Solar water pump detail

Components	Description
Solar Power Plant	5 KW
Solar Panel in Watt	335 W
Solar Panel Qty	15 nos.
On Grid Solar Inverter	5 KW
MC4 Connector	2 Pairs
Solar Structure	5 KW
AC Junction Box	1 nos.
DC Junction Box	1 nos.
DC Cable	40 Mtr.
AC Cable	30 Mtr.
Space required	30 sq. mtr.
Solar accessories	Fasteners, Cable Tie, Crimping Tool, Earthing Kit, Lighting Arrestor

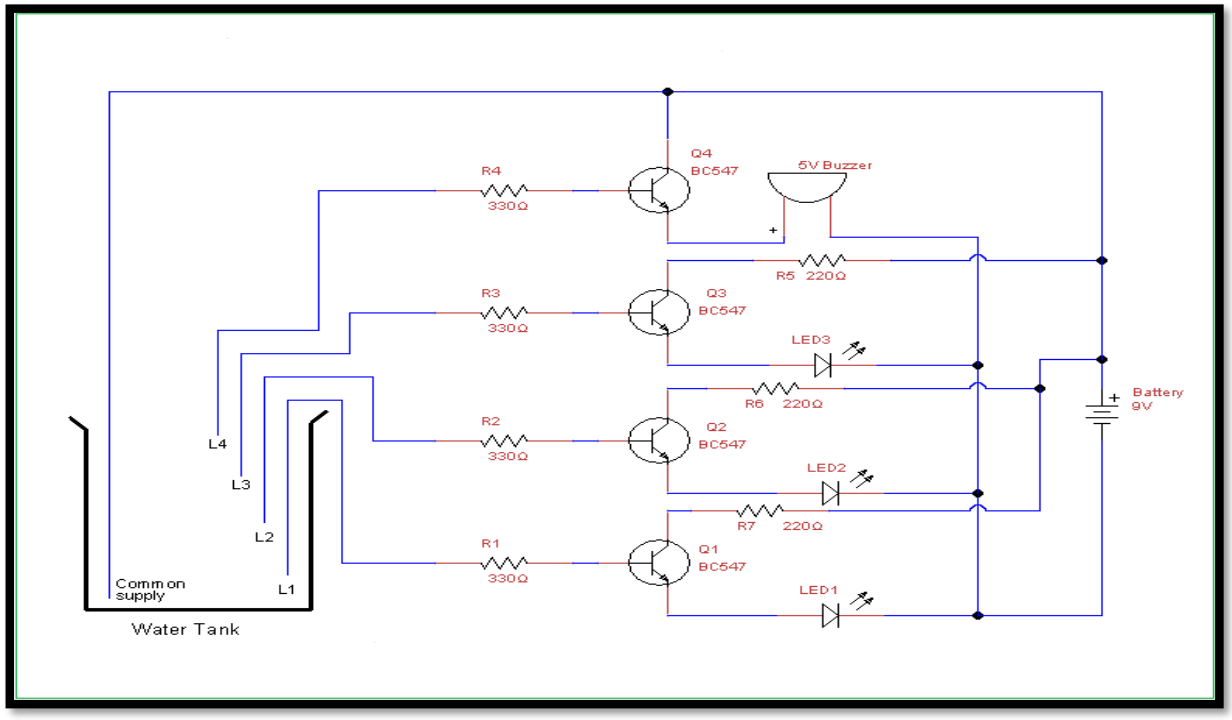
Water Level Indicator:

The Water Level Indicator detects and indicates the water level in an overhead tank or some other water container using a simple mechanism.

Table 4 - Water Level Indicator Detail

Sr no.	Name of Components	Range
1	One Printed circuit Board	Medium size
2	3 LED lights (Green, Yellow, Red)	2-5 volt
3	DC voltage supply(Battery)	9 volt
4	One switch	1-10 volt
5	Power connector (Here Using USB)	3-5 volt
6	3 resistor	220 ohm
7	Wires	As per requirement
8	One Buzzer	5-15 volt

Schematic Diagram



DRAWING 11 – WATER LEVEL INDICATOR

TABLE 5 - INDIVIDUAL COMPONENT DETAIL

Sr no.	Description	Unit	Detail
1	5 HP 3 phase monoblock pump	RPM Voltage	2800 RPM 440 volt
2	Solar Panel	Watt	335w
3	Operating voltage of panel	Volts	24 volt
4	Voltage at max power (Vmp)	Volts	38.92 volts
5	Current at max power(Imax)	Amps	8.61 amps
6	Open circuit current (Voc)	Volts	46.14 volts
7	Short circuit current (Isc)	Amps	9.1 amps
8	Warranty for solar panel	Year	25 year
9	Warranty for whole system	Year	5 year
10	Suction size of pipe	Inch	3.60
11	Discharge size of pipe	Inch	1.9

Specification of 5 KW Solar Inverter

Sr no.	Description	Detail
1	Max. DC input power (W)	6500w
2	Max. DC input voltage (V)	1000v
3	Max. input current (A)	22/22
4	Max. short current (A)	13.8

AC Output Data

5	Nominal Output power (W)	5000
6	Max. output Apparent power (W)	5000
7	Nominal Output frequency (Hz)	50-60 Hz
8	Max. Output current (A)	8.5
9	Output Power factor	Adjustable 0.9 leading to 0.9 lagging
10	Max. Efficiency	98%

Protection

11	Anti-Islanding Protection	Integrated
12	Input Reverse Polarity Protection	Integrated
13	Insulation Resistor Detection	Integrated
14	Residual Current Monitoring Unit	Integrated
15	DC SPD Protection	Type-II
16	AC SPD Protection	Type-II
17	Output Over Current Protection	Integrated
18	Output Short Protection	Integrated
19	Output Over Voltage Protection	Integrated

General Data

20	Operating Temperature Range (°C)	25~60 °C
21	Relative Humidity	0~100%
22	Cooling	Natural Convection
23	Noise (DB)	<25
24	User Interface	LCD &LED
25	Weight (Kg)	25
26	Protection Degree	IP65
27	Topology	Transformerless

Detailed Cost of Solar water pump:

TABLE 6 - COST OF SOLAR WATER PUMP

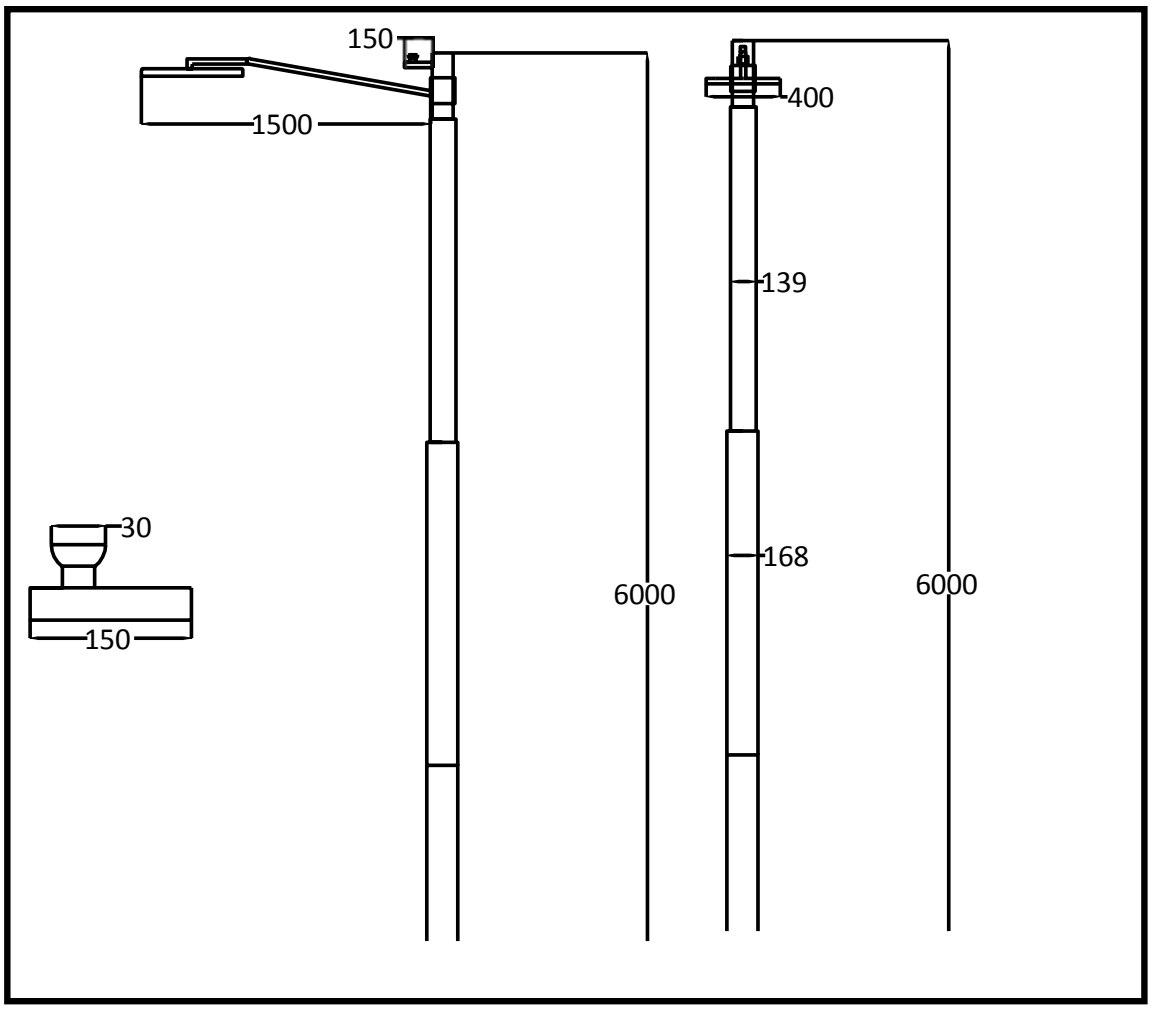
Item no.	Description	Quantity	Total cost (Rs.)
1	5 HP 3 Phase Centrifugal mono-block pump	1nos	20600
2	335 watt Solar Module	15nos	136500
3	5 KW Solar Inverter	1nos	57000
4	5 KW Ground mounted solar structure	1nos	25000
5	Labor cost (5%)	4 men	20000
6	Galvanized Water Tubes	25 meter	4150
7	Water level Indicator	1nos	1499
		Total	**2,64,749**

TABLE 7 - COMPONENT PRICE PER WATT

Sr no.	Description	Quantity	Price per watt (Rs.)
1	335 watt Solar Module	15nos	29
2	5 KW Ground mounted solar structure	1nos	5
3	5 KW Solar system	1nos	34.98

13.1.7 Electrical Design 2

Auto intensity control of Street Light:



All dimensions are in mm

DRAWING 12 - DESIGN OF AUTO INTENSITY CONTROL STREET LIGHT

Purpose:

- The main goal of creating an automatic street light is to save energy. Since the light switches on and off as needed, it saves energy while also reducing our workload.
- Auto Intensity Adjustment of Street Lights is a simple project that automatically regulates the intensity of street lights based on sunlight conditions. Usually, street lights are switched on in the evening and remain on until the morning.
- This will result in unwanted energy consumption since the lights would be on all of the time. However, with the Arduino project Auto Intensity Regulation of Street Lights, you can control the intensity depending on the ambient lighting conditions.

Main Component detail:

1) LED light
2) Transformer
3) Rectifier
4) Voltage regulator
5) Arduino UNO model
6) LDR (light dependent resistor)
7) Pole

Transformer:

An electrical transformer is a device that converts alternating current from one voltage to another. It functions on the magnetic induction concept and can be programmed to "step up" or "step down" voltages. For the purposes of this design, we convert 240v to 18v AC.

Rectifier:

A rectifier is a system that transforms two-way alternating current (AC) into single-directional direct current (DC) (DC). In this circuit, we convert 18 volts AC to 18 volts DC.

LDR (light dependent resistor):

An LDR is a part with a (variable) resistance that differs based on the quantity of light it absorbs. It can now be used in light sensing circuits as a result of this. This is a standard LDR. Symbol for an LDR circuit.

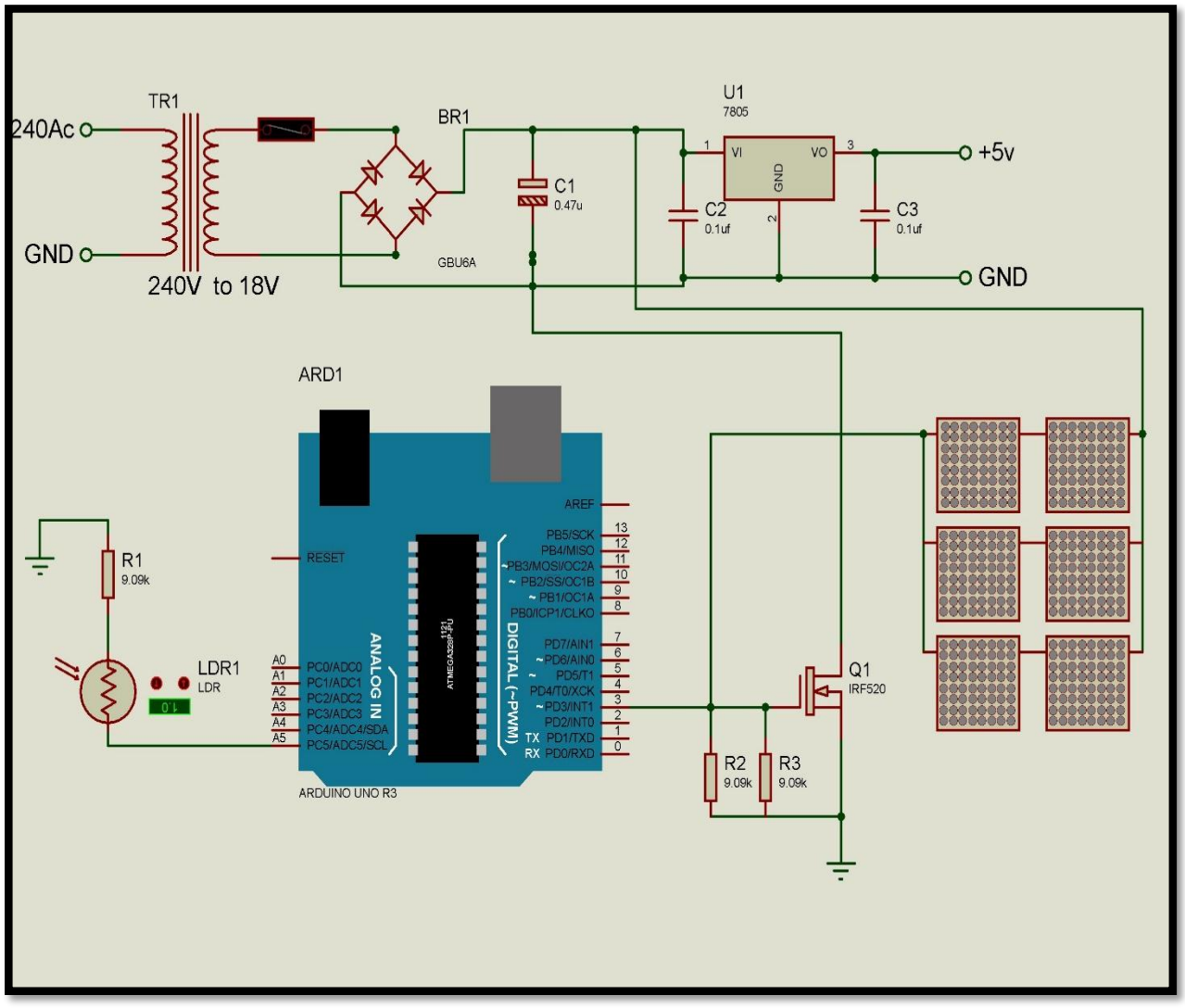
Working of LDR:

LDRs (light-dependent resistors) are used in automatic security lights to detect light levels. Their resistance decreases as the light intensity increases: an LDR's resistance is high in the dark and at low light levels, and only a small amount of current can pass through it.

Pole:

Since very heavy components such as fixtures, panels, and batteries are installed on the top of the pole, strong poles are expected for solar street lights

Circuit Diagram:



DRAWING 13 - CIRCUIT DIAGRAM OF AUTO INTENSITY CONTROL STREET LIGHT

Programming Code:

```
int out = 3;

int ldr = A5;

 void setup() { Serial.begin(9600);
  pinMode(ldr,INPUT);
  pinMode(out,OUTPUT);
 }
 void loop() {
  if(Serial.available())
  {
   ldr =analogRead();
  }
  if (ldr == '0')
  {
   analogWrite(ou1, 0) ;
   }
  if (ldr== '1')
  {
   analogWrite(out, 175) ;
   }
  if (ldr == '2')
  {
   analogWrite(out, 185) ;
  }
  if (ldr== '3')
  {
```

```
    analogWrite(out,  195);
    }
  if (ldr == '4')
  {
    analogWrite(out,  205);
    }
  if (ldr == '5')
  {
    analogWrite(out,  215);
    }
  if (ldr == '6')
  {
    analogWrite(out,  225);
  }
  if (ldr == '7')
  {
    analogWrite(out,  235);
    }
  if (ldr == '8')
  {
    analogWrite(out,  245);
    }
  if (ldr == '9')
  {
    analogWrite(out,  255);
    }
}
```

Specification of Arduino UNO R3:

TABLE 8 - FEATURES OF THE ARDUINO UNO R3

Sr no.	Description	Unit	Detail
1	Microcontroller		ATmega328
2	Output voltage	Volt	5V
3	Input voltage (recommended)	Volt	7-12V
4	Input voltage (limit)	Volt	6-20V
5	Digital I/O Pins		14(of which 6 provide PWM output)
6	Analog Input Pins		6
7	DC Current per I/O Pin	mA	40mA
8	DC Current for 3.3V Pin	mA	50mA
9	Flash Memory	KB	32KB of which 0.5 KB used by bootloader
10	SRAM	KB	2KB
11	EEPROM	KB	1KB
2	Clock Speed	MHz	16MHz

Cost Detail:

TABLE 9 - COST OF STREET LIGHT FOR ONE PIECE

Sr no.	Description	Specification	Cost
1	LED light	18W	920
2	Transformer	240V AC to 18V AC	90
3	Rectifier	18V AC to 18V DC	20
4	Voltage regulator	LM7805 IC	50
5	Arduino UNO model R3	-	325
6	LDR	100Ω-10MΩ	15
7	Street light Pole	6meter	4275
8	Other component	-	50
9	Labor cost	-	5000
		Total Cost	**10,745/-**

Total cost

Sr no.	Description	Quantity	Total Cost
1	Auto intensity control of street light system	20nos	5745
		Total	**2,14,900/-**

We included transportation and labor work in the above table.

13.1.8 Electrical design 3

Mobile technology (GSM) based remote monitoring and control of digital Energy meter

Purpose:

Electricity is the crucial requirement for leading a comfortable life. It is to be properly used and managed. No proper planning of power distribution is leading to tariff calculation problems. Many statistical errors prevail in monthly customer billing process.

This idea of wireless data transmission is being proposed to reduce the human dependency to collect the monthly reading and to minimize the technical problems regarding the billing process. This helps in considerable reduction of power thefts as well to calculate average power consumption of particular locality.

The aim of this project is to track and regulate the Domestic Energy Meter from a far. This device allows the Electricity Department to read meter readings on a daily basis without having to go to each home. This is accomplished by the use of a Microcontroller device that continuously tracks and records Energy Meter readings in a non-volatile memory spot. A GSM modem is also used in this system for remote monitoring and control of the Energy Meter.

The readings are continuously recorded by the Microcontroller-based device, and the live meter readings can be sent to the Electricity Department upon request. The bill can also be sent via GSM message, which will be displayed on the LCD monitor. In the event of non-payment of energy bills, this device can also be used to switch off the power to the home. For each energy meter, a dedicated GSM modem with SIM card is needed.

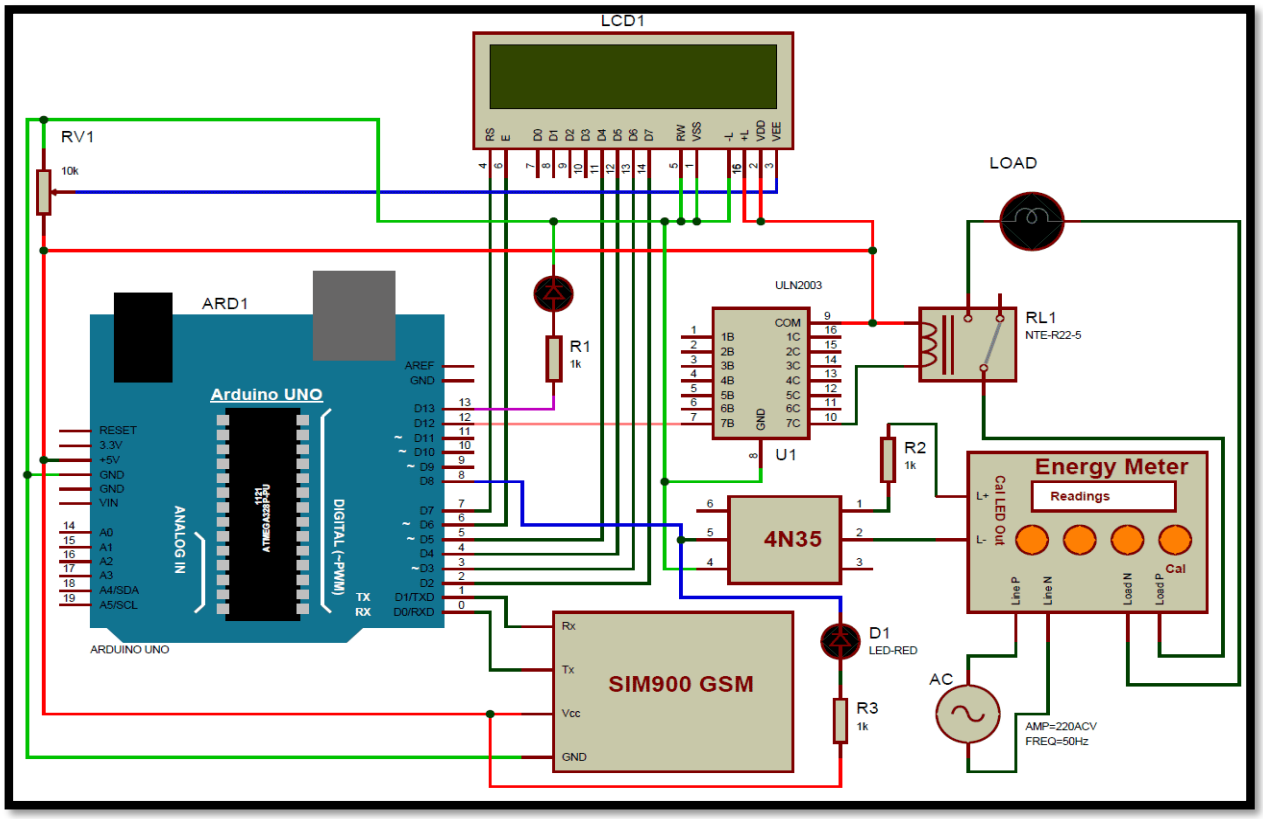
Features:

1. Provides user friendly remote energy meter monitoring.
2. Supports controlling of meter.
3. Can be controlled anywhere in the world.
4. Non-volatile memory based energy-reading storing.
5. Auto disconnect feature.

The design provides the following learning's:

1. Energy meter working.
2. Conversion of AC supply to DC supply.
3. Interfacing energy meter to Arduino.
4. LCD interfacing to Arduino.
5. GSM technology.

Circuit Diagram Wireless energy meter



DRAWING 14 - CIRCUIT DIAGRAM WIRELESS ENERGY METER

Block diagram of regulated power supply: Here, below block diagram represents all the

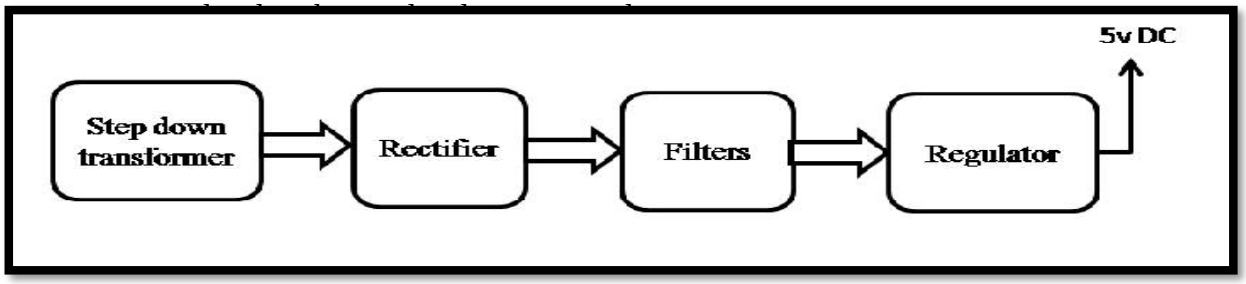


FIGURE 6 - BLOCK DIAGRAM OF REGULATED POWER SUPPLY

Block Diagram of energy meter:

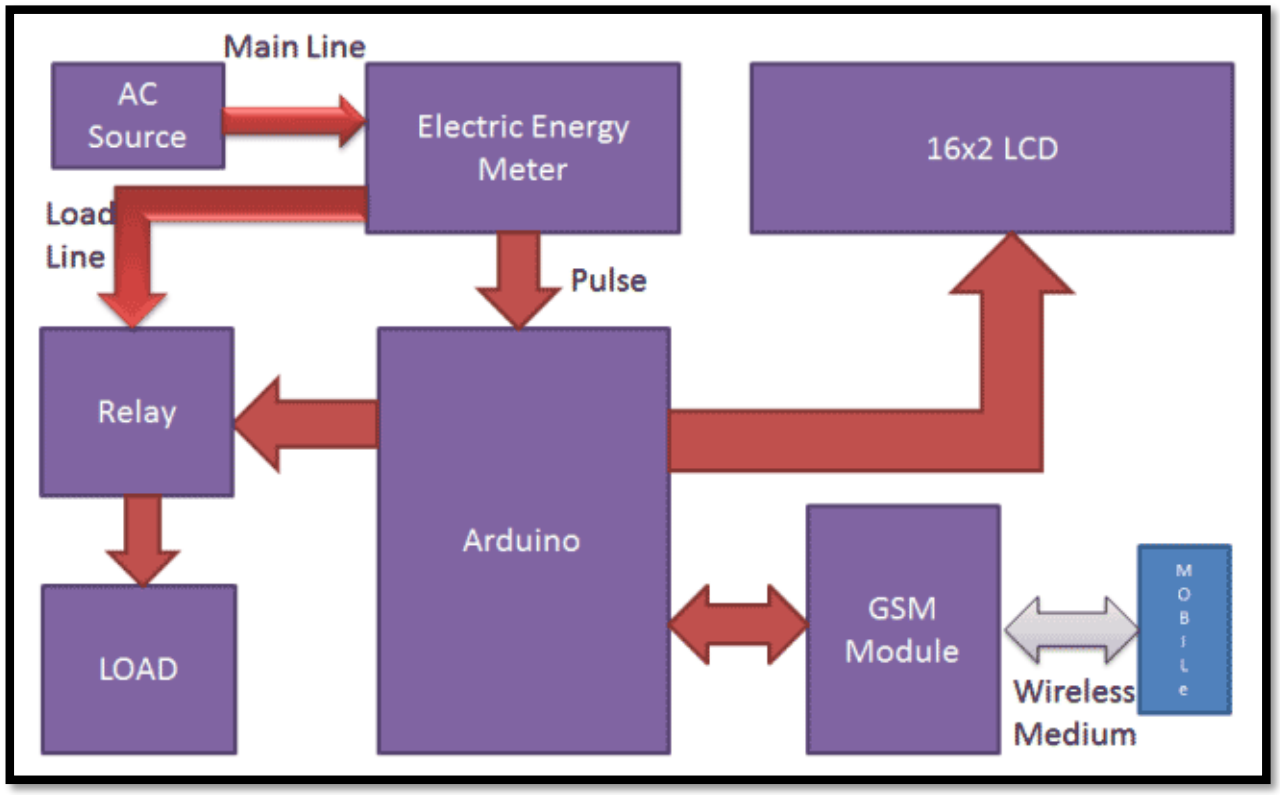


FIGURE 7 - BLOCK DIAGRAM OF ENERGY METER

The major building blocks of this project are:

1. Regulated Power Supply
2. Arduino
3. GSM Modem
4. Electromagnetic Relay and Relay Driver
5. Digital Energy Meter
6. LCD Display with driver
7. Buzzer with driver
8. Crystal oscillator
9. LED indicators

Software's used:

1. PIC-C compiler for Embedded C programming.
2. PIC kit 2 programmer for dumping code into Micro controller.
3. Express SCH for Circuit design.
4. Proteus for hardware simulation

Specifications Preferred:

The specifications used for the design and development of this wireless energy meter are given below. This system is also used to disconnect the power supply to the house in case of non-payment of bill and also in case of heavy usage of load than specified.

Table 10 - Specification detail for wireless energy meter

Sr no.	Description	Specification
1.	Input voltage	230 V
2.	operating frequency	50 HZ
3.	GSM modem	Tri band GSM modem
4.	MC input voltage	5V
5.	Memory	Non- volatile
6.	Display System	LCD display
7.	GSM Frequency	400-450 MHZ
8.	EPROM memory	4 KB

Programming Code:

```
#include <LiquidCrystal.h>

int currentPin = 1;            //Assign CT input to pin 1
double kilos = 0;
int peakPower = 0;
unsigned long startMillis;
unsigned long endMillis;
LiquidCrystal lcd(8, 9, 4, 5, 6, 7);  //Assign LCD screen pins, as per LCD shield requirements

void setup()
{
  lcd.begin(16,2);             // columns, rows.  use 16,2 for a 16x2 LCD, etc.
  lcd.clear();
  lcd.setCursor(0,0);          // set cursor to column 0, row 0 (the first row)
  lcd.print("Arduino");
  lcd.setCursor(0,1);          // set cursor to column 0, row 1 (the second row)
  lcd.print("Energy Meter");
  startMillis = millis();
}


  lcd.setCursor(10,0);
  lcd.print(RMSPower);
  lcd.print("W");
  lcd.setCursor(0,1);
  lcd.print(kilos);
```

```
  lcd.print("kWh");
  lcd.setCursor(10,1);
  lcd.print(peakPower);
  lcd.print("W");
}
```

Applications:

1. Electricity departments.
2. Household Energy meter monitoring.
3. Railway electrical systems.
4. Industrial Energy remote monitoring.
5. Remote controlling systems.

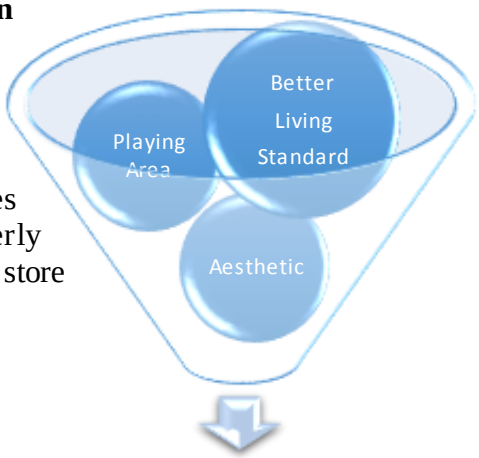
Cost Detail:

TABLE 11 - Cost of wireless energy meter for one piece

Sr no.	Description	Specification	Cost Detail
1	Regulated Power Supply.	12V Dc	104
2	Arduino UNO	-	325
3	GSM Modem	SIM900A	1100
4	Electromagnetic Relay	12 V	30
5	Relay Driver	230V 10A	500
6	Digital Energy Meter	1 Phase 240V 5-30A	4800
7	Crystal oscillator	16MHz	15
8	Buzzer with driver	5V	18
9	LCD Display with driver	-	188
10	LED indicators	-	60
		Total Cost	**7140/-**

13.2 Reason for Students Recommending this Design

Playground adds a pleasant space to the village. We knew how important Health is in this pandemic & for that Playground consists of multiple sections which can be used by different age group , it even includes a Toilet which makes a hygienic environment & it makes things easy for kids & elderly people. It even consists of a store room where villagers can store sports materials / Gym Equipments etc.



Design 1 - Playground

Design 2 – Gram Panchayat

The Current state of Gram Panchayat is Nowhere safe for occupants which can be clearly see in pictures. In our design of Gram Panchayat, we've provided separate office for Talati & Sarpanch.

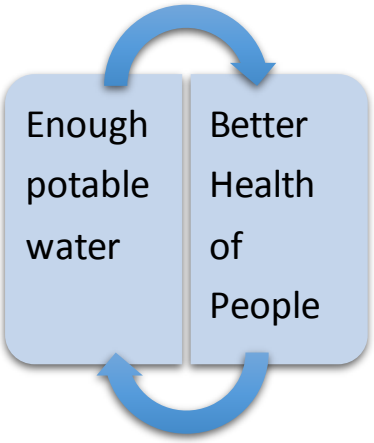
We've even provided Multi Media room for any meeting or to spread awareness to villagers in a audio – video format.

We've Provided a Store Room to keep the Govt. Equipments & Files in it.

We've even provided Polling Station for voting purposes & on non-Election days it can be used as sitting area.

We've provided big main hall for spiritual gatherings.

Design 3 – Water Tank



Water tank was a pre requisite for Nakaravadi as villagers are suffering from intense water Scarcity.

Water Tank Further add the capacity of storage of water & Will reduce the problem of this basic requirements.

Design 4 – Effective Road Network Through Nakaravadi

Less fuel Consumption

Development opportunities to village

Less Travel time & congestion

Our Road network is very helpful to the commuters who are commuting to Rajkot From Wankaner , They're so many & by this route the congestion at Kuvadva Chowkdi will reduce to an extent .

This route will Drastically increase employment opportunities for villagers as so many people passing & resting by village.

This will further aid in for villagers as well, because the existing connecting road to NH 27 is in very poor condition.

Design 5 – Rain Water Harvesting System: -

This System is provided in the plan of Gram Panchayat as the Roof Catchment area is around 168sq.m. & this collected water from rain, gets stored in a separate tank with the capacity of 30000litres. This water can be used for cattle, washing, & every other non-drinking purposes.

Electrical Design 1 - Solar Water Pump

- Solar water pumps are a relatively new concept in mechanics. A solar water pump system is commonly seen in residential and commercial uses, as well as for irrigation of agricultural land. Through solar panels, the pump can eliminate the cost of energy and provide a more feasible option that uses energy from the sun (and not fuel-burning mechanisms) for pumping water.
- As well as in our allocated village Maliyasan has some sort of problem with overhead tank so we design the overhead tank and in the other half of solar water pump is also used in a better way.

Design 2 - Auto intensity control of Street Light

- Auto Intensity Control of Street Lights is a project where the intensity of the street lights is automatically controlled based on the sunlight conditions. Generally, street lights are turned on during evening time and will continue to glow till morning.

Design 3 - Mobile technology (GSM) based remote monitoring and control of digital Energy meter

- Wireless power meters, also known as wireless energy meters, are electricity consumption meters that use wireless technology. They are used to monitor and measure power or electric energy through wireless transmission. Traditional energy meters can be converted to wireless energy meters using wireless communication modules (such as GSM). These wireless meters eliminate the need for human labour in metering and billing a customer's electricity usage.

13.3 About designs Suggestions / Benefit of the villagers

Solar water pump

This solar water pump not only provided the residents with daily access to clean drinking water on demand, but it also included water storage in above tanks. Water was also provided for cleaning and sanitary needs as a result of this.

- Auto intensity control of Street Light
  There is no need to control the system manually because it is totally automated.
- Energy-saving, a slew of LEDs lowers the price, and the lifespan of street lights can be extended.
- In the cold, it has good stability.
- The level of sensitivity is really high.
- It works based on the intensity of the light.
- Designing is very simple with components.
- Intelligent street lights.

Mobile technology (GSM) based remote monitoring and control of digital Energy meter

The wireless electricity consumption metre minimises the amount of personnel required to bill each house or company for electricity. The user can monitor the electricity bill at regular intervals based on their needs using this wireless metre device.By using this microcontroller based wireless energy meter we can check and pay our electricity bills online from anywhere (even we can get reminded about electricity bills via SMS), so that we can pay bills and avoid the electric power supply disconnections.

Chapter 14 – Technical Options with Case Studies

14.1 Civil Engineering

14.1.1 Earthquake Resistant Design

Earthquake Resistant Design Techniques for Buildings and Structures

Among the most important advanced techniques of earthquake resistant design and construction are:

- Base Isolation
- Energy Dissipation Devices

Base Isolation Method

A base isolated structure is supported by a series of bearing pads which are placed between the building and the building's foundation. (See Figure 1.) A variety of different types of base isolation bearing pads have now been developed. The bearing is very stiff and strong in the vertical direction, but flexible in the horizontal direction.

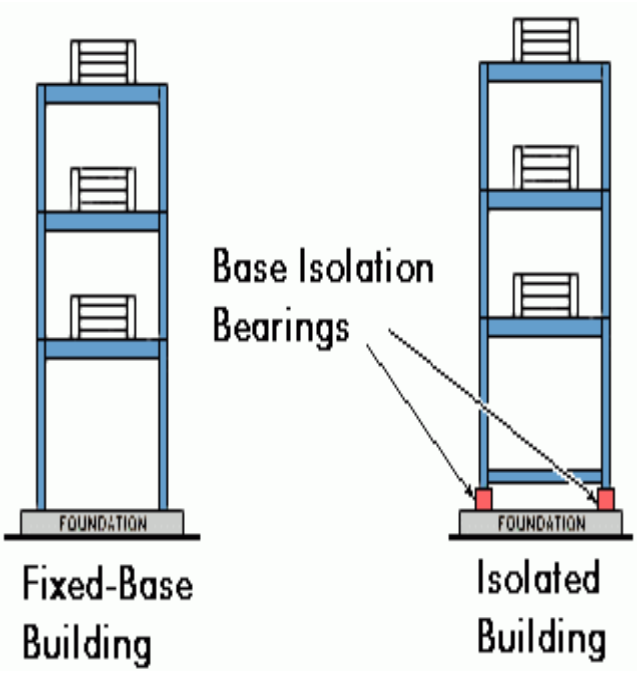


FIGURE 8 - BASE-ISOLATED AND FIXED-BASE BUILDINGS

Earthquake Generated Forces

To get a basic idea of how base isolation works, examine Figure 2. This shows an earthquake acting on both a base-isolated building and a conventional, **fixed-base,** building. As a result of an earthquake, the ground beneath each building begins to move. In Figure 2, it is shown moving to the left. Each building responds with movement which tends toward the right. The building undergoes **displacement** towards the right. The building's displacement in the direction opposite the ground motion is actually due to **inertia.** The inertial forces acting on a building are the most important of all those generated during an earthquake. It is important to know that the inertial forces which the building undergoes are proportional to the building's **acceleration** during ground motion. It is also important to realize that buildings don't actually shift in only one direction. Because of the complex nature of earthquake ground motion, the building actually tends to **vibrate** back and forth in varying directions.

In addition to displacing toward the right, the un-isolated building is also shown to be changing its shape-from a rectangle to a parallelogram. It is **deforming.** The primary cause of earthquake damage to buildings is the **deformation which the building undergoes as a result of the inertial forces acting upon it.**

Response of Base Isolated Building

By contrast, even though it too is displacing, the base-isolated building retains its original, rectangular shape. It is the lead-rubber bearings supporting the building that are deformed. The base-isolated building itself escapes the deformation and damage, which implies that the inertial forces acting on the base-isolated building have been reduced. Experiments and observations of base-isolated buildings in earthquakes have been shown to reduce building accelerations to as little as 1/4 of the acceleration of comparable fixed-base buildings, which each building undergoes as a percentage of gravity. As we noted above, inertial forces increase, and decrease, proportionally as acceleration increases or decreases. Acceleration is decreased because the base isolation system lengthens a building's **period of vibration,** the time it takes for the building to rock back and forth and then back again. And in general, structures with longer periods of vibration tend to reduce acceleration, while those with shorter periods tend to increase or **amplify** acceleration. Finally, since they are highly elastic, the rubber isolation bearings don't suffer any damage. But the lead plug in the middle of our example bearing experiences the same deformation as the rubber. However, it generates heat. In other words, the lead plug reduces, or **dissipates,** the energy of motion, i.e., **kinetic energy**--by converting that energy into heat. And by reducing the energy entering the building, it helps to slow and eventually stop the building's vibrations sooner than would otherwise be the case, in other words, it **damps** the building's vibrations.

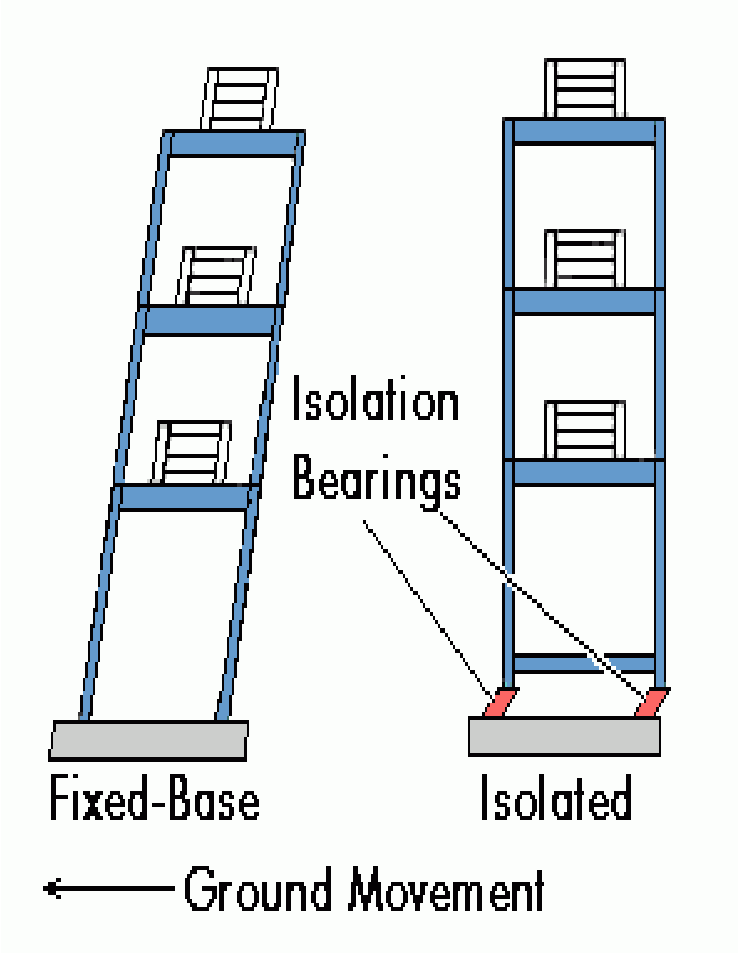


FIGURE 9 - BASE-ISOLATED, FIXED-BASE BUILDINGS

Energy Dissipation Devices

The second of the major new techniques for improving the earthquake resistance of buildings also relies upon damping and energy dissipation, but it greatly extends the damping and energy dissipation provided by lead-rubber bearings. As we've said, a certain amount of vibration energy is transferred to the building by earthquake ground motion. Buildings themselves do possess an inherent ability to dissipate, or damp, this energy. However, the capacity of buildings to dissipate energy before they begin to suffer deformation and damage is quite limited. The building will dissipate energy either by undergoing large scale movement or sustaining increased internal strains in elements such as the building's columns and beams. Both of these eventually result in varying degrees of damage. So, by equipping a building with additional devices which have high damping capacity, we can greatly decrease the seismic energy entering the building, and thus decrease building damage. Accordingly, a wide range of **energy dissipation devices** have been developed and are now being installed in real buildings. Energy dissipation devices are also often called **damping devices.** The large number of damping devices that have been developed can be grouped into three broad categories:

- **Friction Dampers**: these utilize frictional forces to dissipate energy
- **Metallic Dampers** : utilize the deformation of metal elements within the damper
- **Viscoelastic Dampers** : utilize the controlled shearing of solids
- **Viscous Dampers**: utilized the forced movement (orificing) of fluids within the damper

Fluid Viscous Dampers General principles of damping devices are illustrated through Fluid Viscous damper. Following section, describes the basic characteristics of fluid viscous dampers, the process of developing and testing them, and the installation of fluid viscous dampers in an actual building to make it more earthquake resistant.

Damping Devices and Bracing Systems

Damping devices are usually installed as part of **bracing systems.** Figure 3 shows one type of damper-brace arrangement, with one end attached to a column and one end attached to a floor beam. Primarily, this arrangement provides the **column** with additional support. Most earthquake ground motion is in a horizontal direction; so, it is a building's columns which normally undergo the most **displacement** relative to

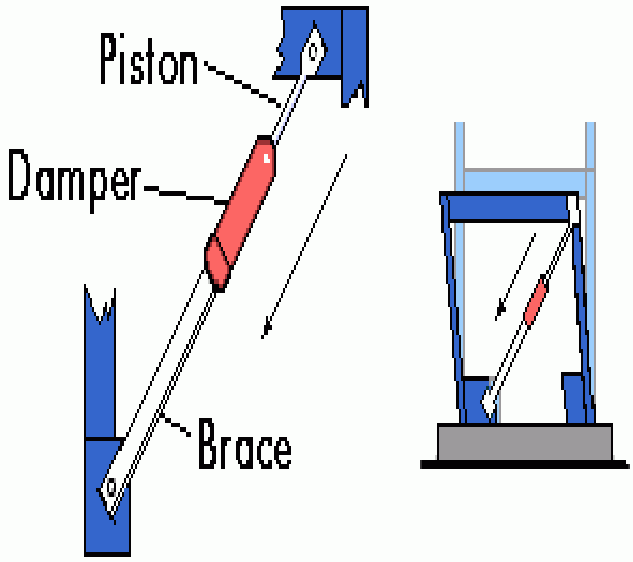


FIGURE 10 - DAMPING DEVICE INSTALLED WITH BRACE

the motion of the ground. Figure 3 also shows the damping device installed as part of the bracing system and gives some idea of its action.

14.1.2 Seismic Retrofitting Techniques for Concrete Structures:

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

1. Introduction to Seismic Retrofitting Techniques:

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

1.1 Seismic Retrofitting of Concrete Structures:

Definition: It is the modification of existing structures to make them more resistant to seismic activity, ground motion, or soil failure due to earthquakes. The retrofit techniques are also applicable for other natural hazards such as tropical cyclones, tornadoes, and severe winds from thunderstorms.

1.2 Need for Seismic Retrofitting:

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

1.3 Problems faced by Structural Engineers are:

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

1.4 Basic Concept of Retrofitting:

The aim is at:

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

2. Classification of Retrofitting Techniques:

2.1 Adding New Shear Walls:

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

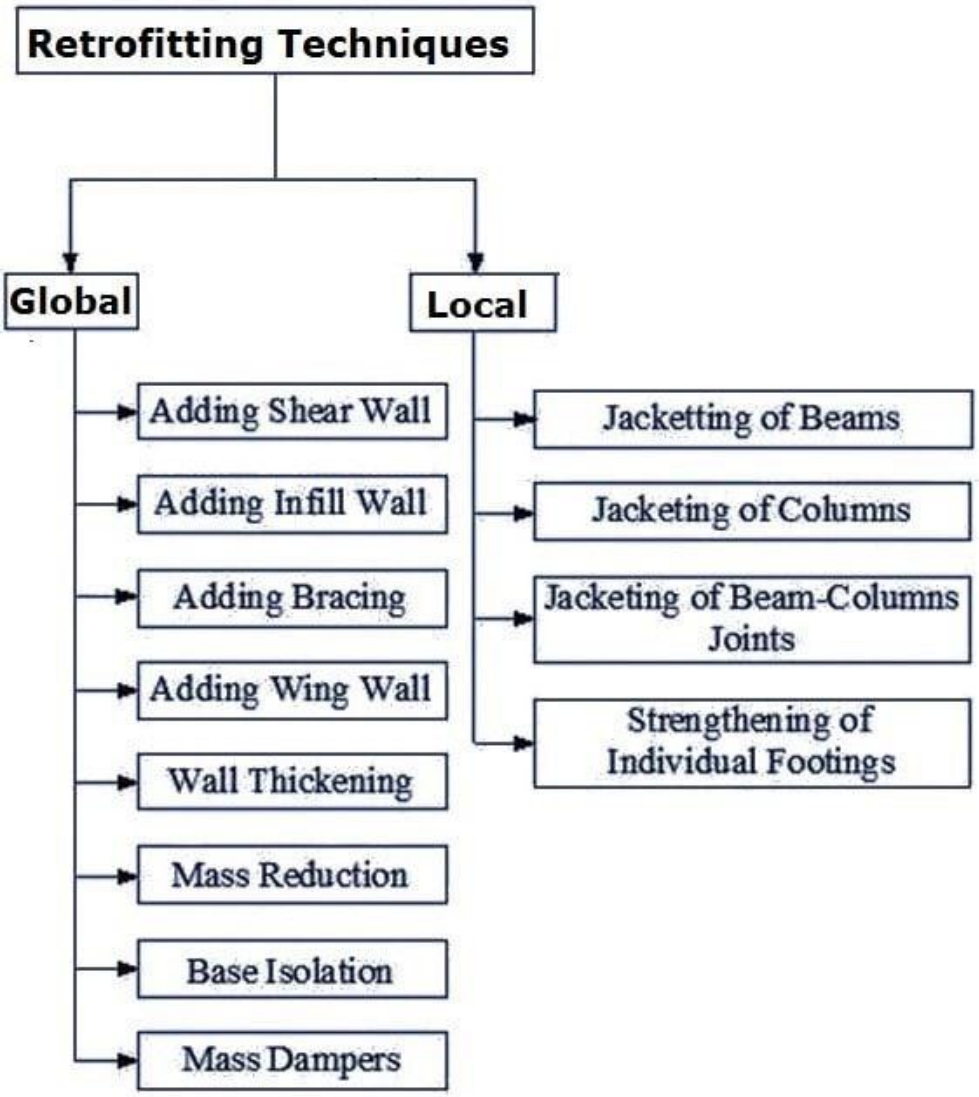


FIGURE 11 - RETROFITTING TECHNIQUES FOR REINFORCED CONCRETE STRUCTURES

2.2 Adding Steel Bracings

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

Adding STEEL Bracings:

2.3 Jacketing (Local Retrofitting Technique):

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

Types of Jacketing:

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

Purpose for jacketing:

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

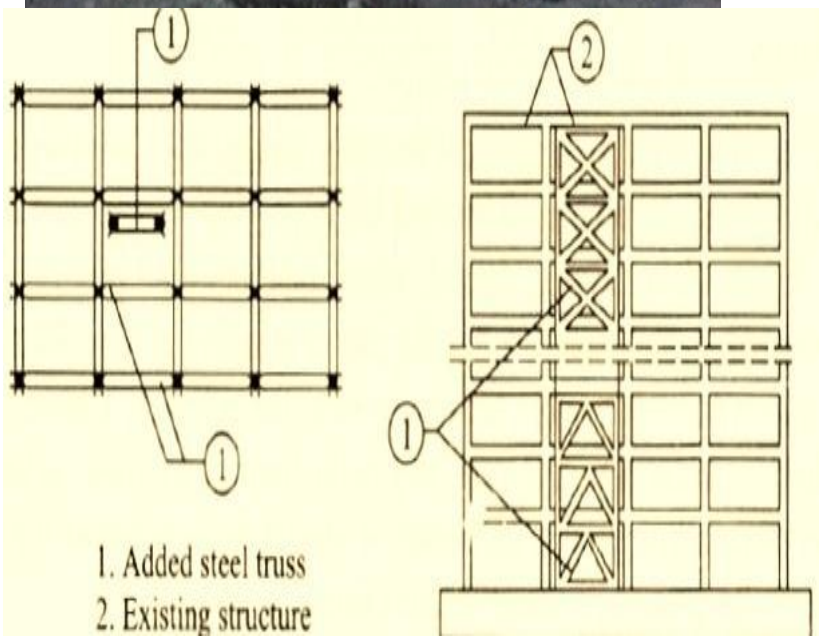


Figure 20: RC Building retrofitted by steel bracing

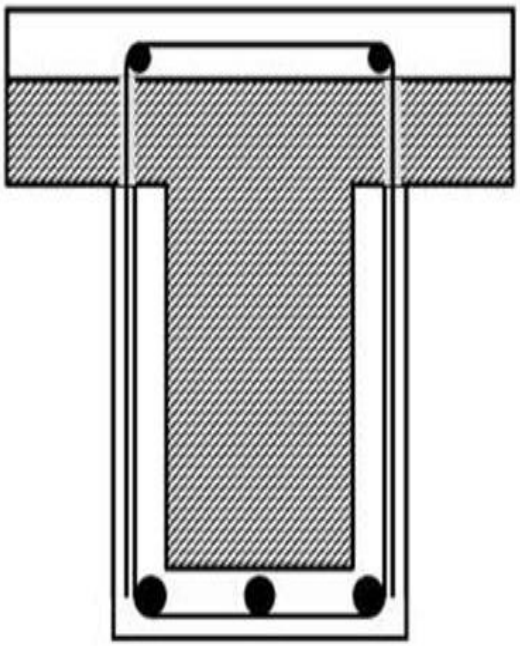


FIGURE 13 - BEAM JACKETING

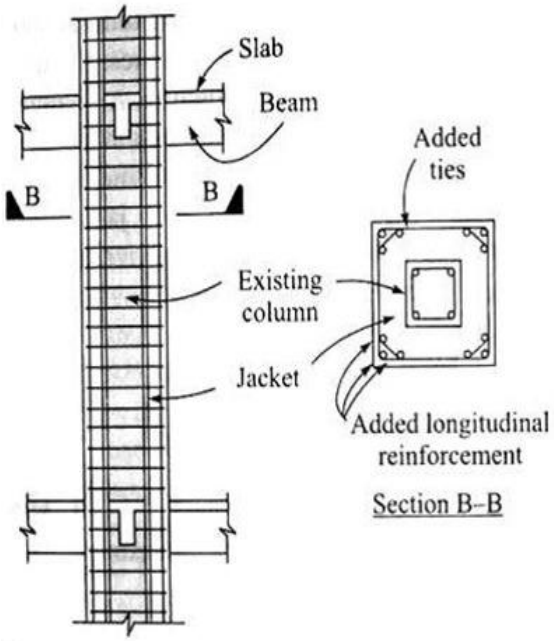


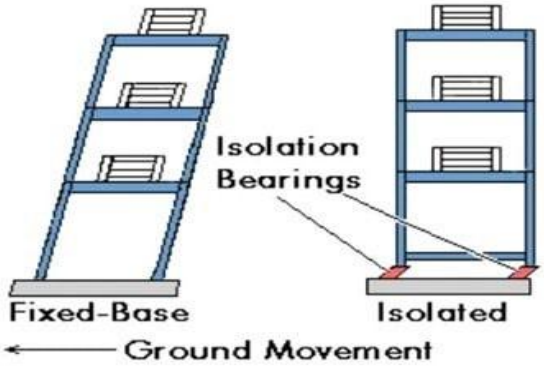
FIGURE 14 – COLUMN JACKETING

2.4 Base Isolation (or Seismic Isolation):

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

(a)Model Under Test, (b) Diagrammatical Representation

(a)



(b)

FIGURE 15 - BASE ISOLATED STRUCTURES

2.4.1 Advantages of Base Isolation

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

2.4.2 Disadvantages of Base Isolation

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

2.5 Mass Reduction Technique of Retrofitting:

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

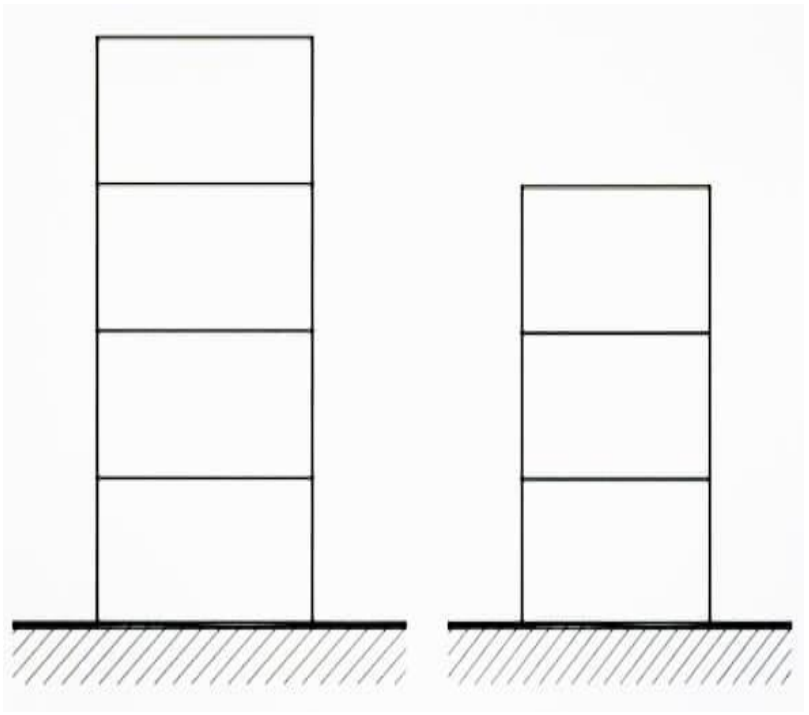


FIGURE 16 - SEISMIC RETROFITTING BY MASS REDUCTION (REMOVAL OF STOREY)

2.6 Wall Thickening Technique of Retrofitting:

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

3. Indian Standard Codes for Earthquake Design of Structures:

- IS: 1893-2002 (part-1) Criteria for Earthquake Resistant Design of Structures (Part 1 : General Provision and Buildings) - Code of Practice
- IS: 4326-1993 Earthquake Resistant Design and Construction of Buildings – Code of Practice
- IS: 13920-1993 Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces – Code of Practice
- IS: 13935-1993 Repair and Seismic Strengthening of Buildings – Guidelines

- IS: 13828-1993 Improving Earthquake Resistance of Low Strength Masonry Buildings – Guidelines
- IS: 13827-1993 Improving Earthquake Resistance of Earthen Buildings – Guidelines

4. Conclusion – Seismic Retrofitting Techniques for concrete structures:

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

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

Construction Techniques

Building construction methods have experienced significant facelift in recent times with innovative technologies being harnessed optimally for improving the qualitative index of buildings.

This has spelled considerable advantages for end users like us who can remain immune from recurrent expenses on repairs and other incidental building-related jobs. Construction lead time has also been reduced and building costs have been rationalized.

This post takes you through 8 techniques that have given the much-needed fillip to the most primitive human pursuit that still exists i.e. construction.

1) 3D Volumetric Construction
Using this modular construction technology, 3D units are produced in controlled factory settings using needful construction and building materials.

Finished units are transported to site in various modules, basic structural blocks or final touched up units with all amenities installed, for assembly. Blocks can be erected rapidly at site and properties of concrete like fire retardant, sound resistivity, thermal mass etc. are retained.

FIGURE 17 – 3D VOLUMETRIC CONSTRUCTION

2) Precast Flat Panel Modules
These are primarily wall and floor modules which are manufactured away from the actual site and then transported to site for erection. Load bearing components like decorative cladding and insulation panels can also be produced.

Also called cross-wall construction, the technology has gained momentum due to seamless adherence to specifications and ease as well as swiftness of construction.

FIGURE 18 – PRECAST FLAT MODULES CONSTRUCTION

3) Tunnel Formwork System

With this tunnel technique, construction is paced up for cellular structures of repetitive patterns through the building of monolithic walls or units in a single operation per day.

Expeditious work is achieved by deploying formwork and readily mixed concrete with the convenience and agility of factory conditions. Formworks in tunnel form are stacked and used at the site with cranes.

FIGURE 19 - TUNNEL FORMWORK SYESTEM

4) Flat Slabbing Technology

This technique utilizes the simplicity of contemporary formwork for quickly building flat slabs to facilitate easy and swift placing of horizontal amenities and for partitioning.

Maximization of pre-fabricated services occurs as services can be carried out in an uninterrupted manner in zones underneath the floor slabs.

Every top-notch **building Construction Company** is using the same as internal layouts can be conveniently modified for accommodating alterations at a later date. Further, reinforcement needed is lesser which cuts down labour costs significantly.

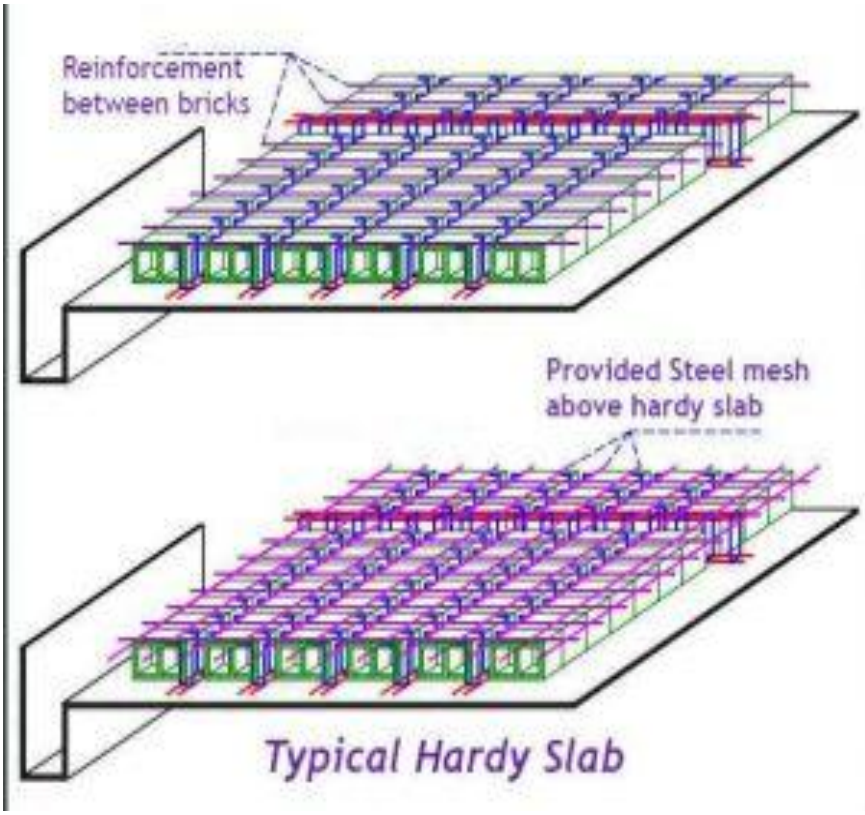


FIGURE 20 – FLAT SLABBING TECHNOLOGY

5) Pre-cast Foundation Technique

Foundations can be built swiftly with precast concrete units which are produced in a factory and are high on quality quotient. Strength is imparted to foundation related building construction materials through interconnected concrete piles.

This technique allows construction work to progress even in inclement weather and minimizes excavation activity.

FIGURE - 21 PRE-CAST FOUNDATION TECHNIQUE

6) Hybrid Concrete Building Technique

This technique expedites construction turnaround time by blending the advantages of concrete pre-casting with the in-situ building. Quality improves, whereas the cost of construction plummets.

Hybrid concrete structures are easy to build, competitive in nature and perform consistently.

FIGURE 22 – HYBRID CONCRETE BUILDING TECHNIQUE

7) Thin Joint Masonry Technique

Utilization of this technique leads to the reduction of the quantum of mortar applied by slashing it depth from 10mm to lesser than 3mm. Consequently, mortar can be laid swiftly with enhanced productivity on the longer wall panels.

With large sized concrete blocks, higher construction efficiency along with significant cost reduction can be achieved. Within a single day, the number of mortar courses laid is higher as curing of mortar takes place quickly without compromising on bonding strength resulting in the elimination of floating problem.

FIGURE 23 – THIN JOINT MASONARY

8) Insulating Concrete Formwork (ICF) Technique

ICF technique employs polystyrene blocks that feature twin walls and can be rapidly put together for creating building wall formwork. The formwork is then pumped in with high quality, ready mixed, factory-made concrete.

The building construction process becomes fool-proof and the resultant structure has a high level of sound and thermal insulation.

FIGURE 24 – INSULATING CONCRETE FORMWORK TECHNIQUE

Construction Equipments

Types of Heavy Construction Equipment

Different types of heavy equipment commonly used in the construction are as follows:

1. Excavators
2. Backhoe
3. Dragline Excavator
4. Bulldozers
5. Graders
6. Wheel Tractor Scraper
7. Trenchers
8. Loaders
9. Tower Cranes
10. Pavers
11. Compactors
12. Telehandlers
13. Feller Bunchers
14. Dump Trucks
15. Pile Boring Machine
16. Pile Driving Machine

1. Excavators

Excavators are important and widely used equipment in construction industry. Their general purpose is to excavation but other than that they are also used for many purposes like heavy lifting, demolition, river dredging, cutting of trees etc. Excavators contains a long arm and a cabinet. At the end of long arm digging bucket is provided and cabinet is the place provided for machine operator. This whole cabin arrangement can be rotatable up to 360^{o} which eases the operation. Excavators are available in both wheeled and tracked forms of vehicles.

FIGURE 25 - TRACKED EXCAVATOR

2. Backhoe

Backhoe is another widely used equipment which is suitable for multiple purposes. The name itself telling that the hoe arrangement is provided on the back side of vehicle while loading bucket is provided in the front. This is well useful for excavating trenches below the machine level and using front bucket loading, unloading and lifting of materials can be done.

FIGURE 26 - BACK HOE

3. Dragline Excavator

Dragline excavator is another heavy equipment used in construction which is generally used for larger depth excavations. It consists a long length boom and digging bucket is suspended from the top of the boom using cable. For the construction of ports, for excavations under water, sediment removal in water bodies etc. can be done by dragline excavator.

FIGURE 27 - DRAG LINE EXCAVATOR

4. Bulldozers

Bulldozers are another type of soil excavating equipment which are used to remove the topsoil layer up to particular depth. The removal of soil is done by the sharp edged wide metal plate provided at its front. This plate can be lowered and raised using hydraulic pistons. These are widely used for the removal of weak soil or rock strata, lifting of soil etc.

FIGURE 28 - BULLDOZER

5. Graders

Graders also called as motor graders are another type of equipment used in construction especially for the construction of roads. It is mainly used to level the soil surface. It contains a horizontal blade in between front and rear wheels and this blade is lowered in to the ground while working. Operating cabin is provided on the top of rear axle arrangement. Motor Graders are also used to remove snow or dirt from the roads, to flatten the surface of soil before laying asphalt layer, to remove unnecessary soil layer from the ground etc.

FIGURE 29 - MOTOR GRADER

6. Wheel Tractor Scrapers

Wheel Tractor Scrapers are earth moving equipment used to provide flatten soil surface through scrapping. Front part contains wheeled tractor vehicle and rear part contain a scrapping arrangement such as horizontal front blade, conveyor belt and soil collecting hopper. When the front blade is lowered onto the ground and vehicle is moved, the blade starts digging the soil above the blade level and the soil excavated is collected in hopper through conveyor belt. When the hopper is full, the rear part is raised from the ground and hopper is unloaded at soil dump yard.

FIGURE 30 - WHEELED TRACTOR SCRAPER

7. Trenchers

Trenchers or Trenching machines are used to excavate trenches in soil. These trenches are generally used for pipeline laying, cable laying, drainage purposes etc. Trenching machines are available in two types namely chain trenchers and wheeled trenchers. Chain trenchers contains a fixed long arm around which digging chain is provided. Wheeled trenchers contains a metal wheel with digging tooth around it. To excavate hard soil layers, wheeled trenchers are more suitable. Both types of trenchers are available in tracked as well as wheeled vehicle forms.

FIGURE 31 - WHEELED TRENCHER

8. Loaders

Loaders are used in construction site to load the material onto dumpers, trucks etc. The materials may be excavated soil, demolition waste, raw materials, etc. A loader contain large sized bucket at its front with shorter moving arm. Loader may be either tracked or wheeled. Wheeled loaders are widely used in sites while tracked or crawled loaders are used in sites where wheeled vehicles cannot reach.

Figure 32 - Loader

9. Tower Cranes

Tower cranes are fixed cranes which are used for hoisting purposes in construction of tall structures. Heavy materials like pre-stressed concrete blocks, steel trusses, frames etc. can be easily lifted to required height using this type of equipment. They consists mast which is the vertical supporting tower, Jib which is operating arm of crane, counter jib which is the other arm carries counter weight on rear side of crane and an operator cabin from which the crane can be operated.

FIGURE 33 - TOWER CRANE

10. Paver

Paver or Asphalt paver is pavement laying equipment which is used in road construction. Paver contains a feeding bucket in which asphalt is continuously loaded by the dump truck and paver distributes the asphalt evenly on the road surface with slight compaction. However a roller is required after laying asphalt layer for perfect compaction.

FIGURE 34 - ASPHALT PAVER

11. Compactors

Compactors or Rollers are used to compact the material or earth surface. Different types of compactors are available for different compacting purposes. Smooth wheel rollers are used for compacting shallow layers of soil or asphalt etc. sheep-foot rollers are used for deep compaction purposes. Pneumatic tyred rollers are used for compacting fine grained soils, asphalt layers etc.

FIGURE 35 - SMOOTH WHEEL COMPACTOR

12. Telehandlers

Telehandlers are hoisting equipment used in construction to lift heavy materials up to required height or to provide construction platform for workers at greater heights etc. It contains a long telescopic boom which can be raised or lowered or forwarded. Different types of arrangements like forklifts, buckets, cabin, lifting jibs etc. can be attached to the end of telescopic boom based on the requirement of job

FIGURE 36 - TELEHANDLER

13. Feller Bunchers

Feller buncher is tree cutting heavy equipment used to remove large trees in the construction field. They cut the tree and grab it without felling, likewise gathers all the cut down trees at one place which makes job easier for loaders and dump trucks.

14. Dump Trucks

Dump trucks are used in construction sites to carry the material in larger quantities from one site to another site or to the dump yard. Generally, in big construction site, off-road dump trucks are used. These off-road dump trucks contains large wheels with huge space for materials which enables them to carry huge quantity of material in any type of ground conditions.

FIGURE 40 - OFF-ROAD DUMP TRUCK

15. Pile Boring Equipment

Pile boring equipment is used to make bore holes in the construction site to install precast piles.

FIGURE 41 - PILE BORING MACHINE

16. Pile Driving Equipment

Another heavy equipment used in construction site is pile driving equipment in case of pile foundation construction. This equipment lifts the pile and holds it in proper position and drives into the ground up to required depth. Different types of pile driving equipment are available namely, piling rigs, piling hammer, hammer guides etc. in any case the pile is driven into the ground by hammering the pile top which is done hydraulically or by dropping.

Figure 42 - Pile Boring Equipment

14.1.4 Engineering Aspects of Soil mechanics - Environmental Impact Assessment

1. Foundations

The loads from any structure have to be ultimately transmitted to a soil through the foundation for the structure. Thus, the foundation is an important part of a structure, the type and details of which can be decided upon only with the knowledge and application of the principles of soil mechanics.

FIGURE 43 – FOUNDATIONS

2. Underground and Earth-retaining Structures

Underground structures such as drainage structures, pipe lines, and tunnels and earth-retaining structures such as retaining walls and bulkheads can be designed and constructed only by using the principles of soil mechanics and the concept of 'soil-structure interaction'.

FIGURE 44 – UNDERGROUND AND EARTH RETAINING STRUCTURE

3. Pavement Design

Pavement Design may consist of the design of flexible or rigid pavements. Flexible pavements depend more on the subgrade soil for transmitting the traffic loads. Problems peculiar to the design of pavements are the effect of repetitive loading, swelling and shrinkage of sub-soil and frost action. Consideration of these and other factors in the efficient design of a pavement is a must and one cannot do without the knowledge of soil mechanics.

4. Excavations, Embankments and Dams

Excavations require the knowledge of slope stability analysis; deep excavations may need temporary supports—'timbering' or 'bracing', the design of which requires knowledge of soil mechanics. Likewise the construction of embankments and earth dams where soil itself is used as the construction material requires a thorough knowledge of the engineering behaviour of soil especially in the presence of water. Knowledge of slope stability, effects of seepage, consolidation and consequent settlement as well as compaction characteristics for achieving maximum unit weight of the soil *in-situ*, is absolutely essential for efficient design and construction of embankments and earth dams.

The knowledge of soil mechanics, assuming the soil to be an ideal material elastic, isotropic, and homogeneous material—coupled with the experimental determination of soil properties, is helpful in predicting the behaviour of soil in the field.

Soil being a particulate and heterogeneous material, does not lend itself to simple analysis. Further, the difficulty is enhanced by the fact that soil strata vary in extent as well as in depth even in a small area. A thorough knowledge of soil mechanics is a prerequisite to be a successful foundation

engineer. It is difficult to draw a distinguishing line between Soil Mechanics and Foundation Engineering; the later starts where the former ends.

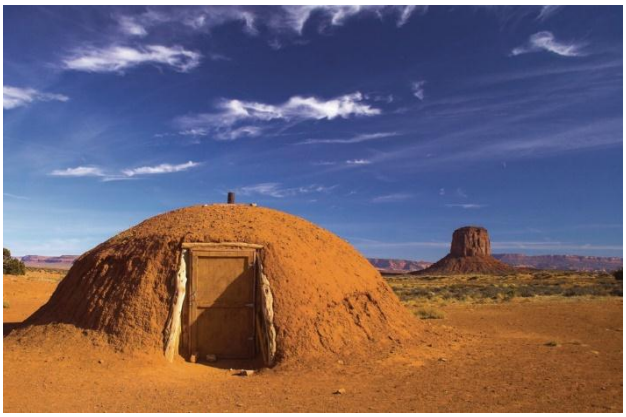


FIGURE 45 – Soil Mechanics History

Environmental Aspects

Soil Supports Us

Access to good soil is very important for building a modern infrastructure. Soil is directly used to make building materials, such as cement and brick, as well as indirectly used to grow the plants used to make building materials such as wood boards and insulation fibers. Historically, many homes and other structures were made from soil or soil that was caked and dried into blocks. These included earthen homes cut into hillsides, homes where mud was "plastered" onto the walls, and adobe homes. Since soil is everywhere, all structures are also built on soil. Selection of sites with the best soil is an important engi- neering decision in the building process. Soil maps are a great tool to help engineers determine the best location for their design. Soil maps are created by soil scientists and present information such as:

Figure 46 -

- the slope of the land surface;
- soil biological, chemical, and physical properties; and,
- potential for water runoff, drainage, or storage.

Soil maps are available for public access from the USDA Natural Resource Conservation Service at the **Web Soil Survey** site at websoilsurvey.sc.egov.usda.gov

Making Smart Engineering Decisions

There are many important engineering decisions that go into developing safe buildings, bridges, and other structures (known as the infrastructure of a community). One of these is determining the best soil to build on. A good soil for infrastructure has the following properties:

- balanced chemistry and neutral pH, so that building materials are not corroded;
- stability through wetting and drying cycles, so that expanding soil does not crack roads or foundations;
- strength under pressure, so that the weight of the building does not cause it to sink into the ground; and,
- ability to capture precipitation, so that runoff and erosion do not damage structures.

Soil is directly used to make building materials, such as cement and brick, as well as indirectly used to grow the plants used to make building materials.

Strength and stability of soil are related to its physical properties. Soil with good structure is more stable. Clay textures are often more stable than sand textures because they have better structure; however, a mix of particle sizes (and pore sizes) is best for engineering (just as it is best for growing crops). Not all soil minerals are equal. Some clay minerals, from a fam- ily called smectite, are more likely to shrink and expand during wetting and drying cycles than minerals from other families, such as kaolinite.

When soil properties are not ideal for building, there are ways to change the landscape and practices to provide for better building sites. For example, drainage can be added or land surfaces reshaped to direct water away from the site. It is important to know what the soil properties are for a site so any corrective measures can be incorporated into the design and future failures avoided. There are some well-known examples in history of builders not understanding their soil prop- erly, resulting in structural failures. One of the most famous is the Leaning Tower of Pisa. The land underneath seemed stable during the dry season when building began, but the soil became unstable during the wet season and sank under the weight of the building. Even worse, it sank unevenly, resulting in a leaning tower. In addition to managing drainage, compacting and stabilizing the soil before construction may have reduced settling problems.

While a leaning building or a cracked foundation seems inconvenient, lack of soils knowledge can also result in cata- strophic structural failures. One example is that eroded soil particles floating in a water body can be abrasive to bridges, eventually damaging the structural support and resulting in collapse. Another example is mudslides. Homes built on steep land surfaces with soil that loses stability when wet can be swept away with the eroding hillside during times of high soil moisture.

Recap

There is soil underneath all structures, from roads to homes to skyscrapers. Selecting sites with the best soil will lead to more stable and safe structures. Managing for long-term success requires understanding the soil properties and managing the movement of water at the building site.

There are some well-known examples in history of builders not understanding their soil properly, resulting in structural failures. One of the most famous is the Leaning Tower of Pisa.

Homes built on steep land surfaces with soil that loses stability when wet can be swept away.

Figure 47 – SOIL FAILURE

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

Wastewater management-

Wastewater is the impure water which is used by the inhabitants for different daily purposes and is directly or indirectly released into a water body. This water contains impurities which can be in the form of solid, liquid, gas, or all of the mentioned states.

The process of purification of these impurities is known as Wastewater management. It is one of the most significant processes concerning sustainable architecture.

Water scarcity is one of the major aspects of the climate crisis, the ever-elevating population and its increasing demand for water resources, has made it a necessity to recycle and reuse the water, to meet the demands. Architecture and the building sector is one of the largest users of water, right from the primary stage of construction to usage of the inhabitants, the building sector consumes a tons of water. A need for better conservation of water is felt, wastewater management comes into the picture in this scenario.

Reusing and recycling of wastewater are not only beneficial for conserving water, but it also has its own advantages. For example, the agriculture sector is the major consumer of water. The reused water is considered to be beneficial for irrigation purposes and it ensures the nutrients necessary for the crops.

Recycled water can be used again for washing and gardening purposes, making it a sustainable choice.

Wastewater can be categorized into two types-

1. Domestic wastewater:

The sewage water collected from residential and commercial complexes through municipal lines falls under this category.It comprises 99% water and 1% organic or inorganic microorganism.

This is further classified into –

Blackwater: Latrine related wastewater.

Greywater: Non-latrine wastewater from kitchen sinks, dishwasher

2. Industrial wastewater:

Water released from industries, which has a high quantity of chemical compounds mixed with water.

It is considered more harmful than domestic wastewater. Wastewater management is a large-scale process and hence it's categorized into two types according to the nature of the water to be treated, area availability, and municipality norms.

- **Centralized process**

In this process, water from different sites and buildings is collected at one central point and is treated at one single treatment plant. This is possible only if the area for such a large-scale water treatment plant is available.

- **Decentralized process**

As opposed to the centralized process, the decentralized process includes the treatment of water on site. These systems have their own advantages and disadvantages. A centralized system may sound beneficial, but consumes a lot for energy, and is not advisable especially for smaller municipalities. Decentralized systems are on a small scale and hence consume less energy and can be made available in the smallest of municipalities.

A few sustainable methods of Wastewater management are listed below.

Wetland treatment:

Wetlands or lagoon is a water body or a pond, which purifies water through stabilization methods. Water plants and fungi like hyacinth and algae, plankton, and certain bacteria help to purify water once it stabilizes. It's a mechanized process but requires very little energy. It can recycle the total amount of water that was supposed to be treated. Although, it requires a large piece of land and a suitable climate.

Aerated lagoons or wetlands.

Aerobic and anaerobic digesters:

Aerobic and anaerobic reactions are systems in which microorganisms are used to decompose the contaminants from the wastewater. The aerobic system requires the presence of oxygen during the whole process. This calls for a mechanized induction of oxygen in biomass. This results in the consumption of energy. Hence, this type of digester is considered not so energy efficient in comparison with its counterpart digester. Anaerobic digesters use the mechanism where the wastewater and biomass are not supposed to be exposed to oxygen or air. Hence, the wastewater treatment plant should be made airtight and does not require a high energy-consuming mechanism. One can infer that anaerobic digester can be a comparatively more sustainable alternative than the aerobic digester.

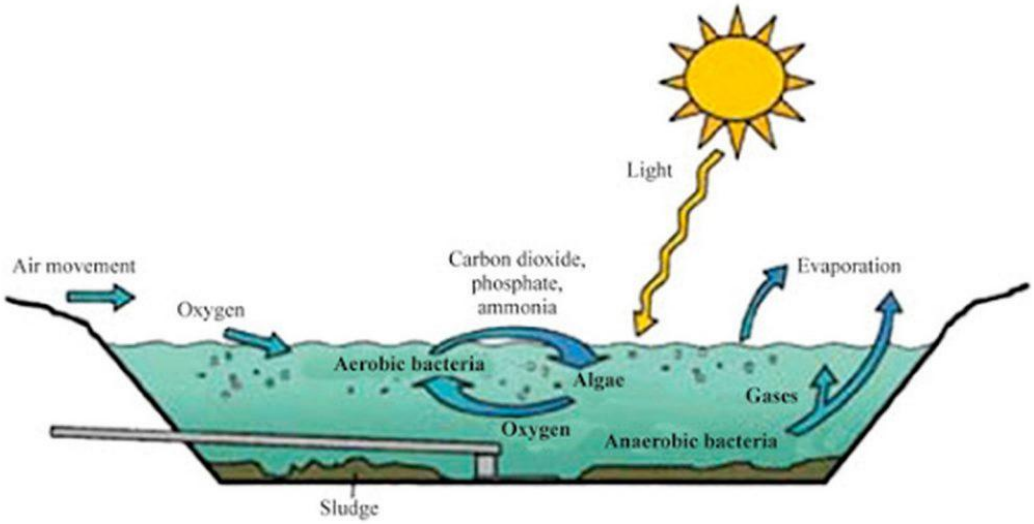


FIGURE 48 – WETLAND TREATMENT

Soil aquifer treatment

FIGURE 48 – SOIL AQUIFER TREATMENT

In this system, wastewater is percolated into groundwater using a mechanical process. The soil acts as a sieve, filtering all the contaminants from the wastewater and the purified water is allowed to mix with groundwater to reuse it shortly. One of the major advantages of this treatment is the addition to the quantity of groundwater and the increase in groundwater reserve. This may result in a change in the hydrological properties of groundwater, which might not be good for the environment.

These methods come under conventional sustainable wastewater treatment processes. One of the contemporary yet sustainable processes developed is the Nerada wastewater treatment process. The award-winning technology was invented in the Delft University of Technology by Prof Mark van Loosdrecht, Netherlands. It is developed by the University and Dutch Foundation for Applied Water Research. This technology uses aerobic granules (which functions equivalent to the bacteria in conventional aerobic digesters) sludge. These granules perform all the biological processes, simultaneously, hence giving fast results.

Sweden's first Nereda wastewater treatment plant

They function as fast settling agents as opposed to the conventional methods where more time is required for the settling process. In this process the waste or effluent is pushed outside the biomass, thereby reducing the energy and cost for the process required. As the processes of aeration, sedimentation, and settling happen simultaneously, there are no separate units installed for these processes. Everything is carried around in a single unit. This makes it cost-effective. It consumes 50% less energy than the other methods. The equipment that is used for this process is small and easy to use in comparison to other methods. Hence, this can be installed in small municipalities and developing and underdeveloped countries as well. This method is the ideal sustainable alternative for a centralized wastewater treatment plant.

One of the examples of implementation of this technique is the metropolis of **Rio-de-Janeiro, Brazil**. Rio-de-Janeiro was hosting the Olympics in 2016. but Wastewater management was a major issue hovering over the city. Rio solved its wastewater treatment issue by introducing the Nerada wastewater treatment plant, in 2012. Located in Deodoro, it was built for approximately 480,000 end users.

In conclusion a sustainable approach towards wastewater management ensures the well-being of the residents and allows the resources to be used up to their optimum limit. Wastewater management helps in creating a circular economy for the cities as every commodity is used consciously. A sustainable approach towards Wastewater management is a boon towards a green and clean future.

14.2.1 Design Power Electronics Converter:

Purpose:

The power semiconductor devices that make up the power converter have switching characteristics that allow them to transform one type of input power into another form of output power.

Power converters have shown to be an important element of both household and commercial equipment. We previously addressed how power electronic technology controls the conversion of one type of electric energy into another. This energy conversion generates voltage and current in a format that meets the needs of different users.

We have already discussed that power electronic devices are a combination of converter and controller where the We've already established that power electronic devices are a combination of converter and controller, with the converter operating in response to the controller's control signal. Power semiconductor devices are powered by integrated circuits in a power electronic converter.

functions in accordance with the controller's control signal Power semiconductor devices are powered by integrated circuits in a power electronic converter.

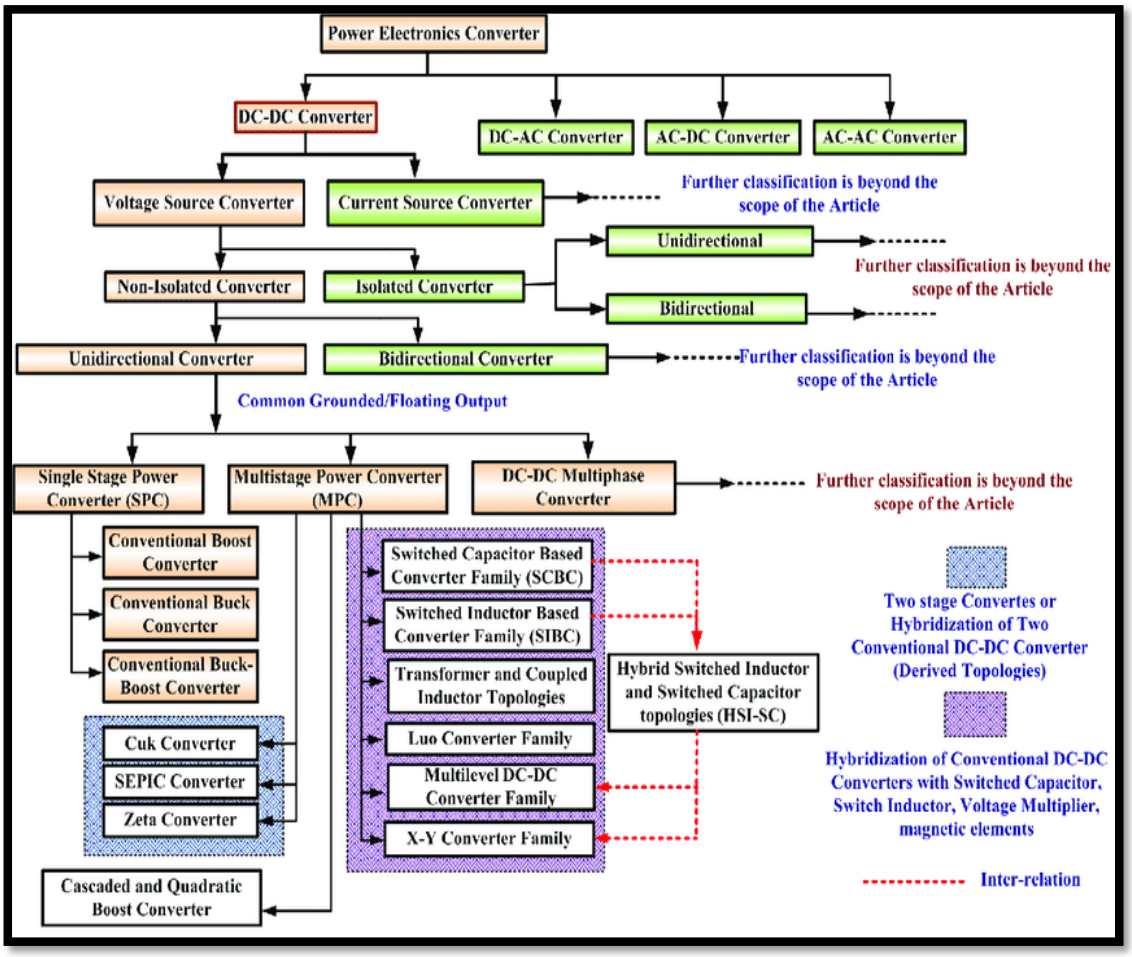
Signal conditioning is an essential feature of converters. Signal conditioning provides signals in their purest form, meaning they are free of harmonics. Having a completely clear signal is said to be elusive in general. However, using a simple low pass LC filter, we can suppress harmonics to some degree.

There are four different types of power electronic converters. Two of the four main groups are subdivided further. One or more power electronic converters can be used in a power electronic configuration. In this article, we'll go through each form of power converter in detail.

There are four major types of power converters:

1) AC to AC
2) AC to DC
3) DC to DC
4) DC to AC

Power Electronics Converter Classification:



Application:

Switch mode power supplies (SMPS), electrical machine control, energy storage systems, lighting drives, active power filters, power generation and distribution, renewable energy conversion, versatile AC transmission, and embedded technology are just some of the applications for power electronic converters.

FIG 49 - POWER ELECTRONICS CONVERTER CLASSIFICATION

14.2.2 Electronic Soft Starter for1/3 Phase Induction Motor for Agriculture:

Purpose:

- The project's goal is to use power electronic circuits and a microcontroller to create an electronic soft starter for induction motors. When starting an induction motor, the starting current will be five to seven times the rated current, and the torque will be two to three times the rated torque. Both the starting current and the starting torque are controlled using the phase control system of silicon controlled rectifiers (SCR). It's a pulse width modulation technique for limiting voltage, current, and power that's commonly used in thyristors, triacs, and other power electronic devices.

Application:
By regulating the acceleration of an electric motor, a soft starter provides reduced voltage to the stator windings of a three-phase induction motor. Initially, a rated voltage is applied during startup, causing a large current to pass through the stator windings.

Advantage:
A soft starter prevents jerks by ensuring smooth and uniform starting by torque control for gradual acceleration of the drive system (in the case of phase 3 control starters). Mechanical components can last longer and need less maintenance as a result of this.

FIG 50 - ELECTRONIC SOFT STARTER FOR 3 PHASE MOTOR

14.2.3 Advanced Wireless Power Transfer System:

This device exemplifies how a wireless mobile charging system works. The device allows the user to charge his phone wirelessly without having to plug in the handheld adapter. The device is demonstrated using a charging pad on which the user simply places his adapter circuit to charge his handset. We employ the advanced power transfer principle for this reason. We use a high frequency transformer to convert the 230V AC mains input to 12 V DC for this purpose. When the adapter coil comes within range of the charging pad coil, power is wirelessly transferred to the receiving coil, and this 12 V DC is provided to the adapter circuit, which is used to convert this 12 V DC to 5V DC, which is then supplied to the mobile

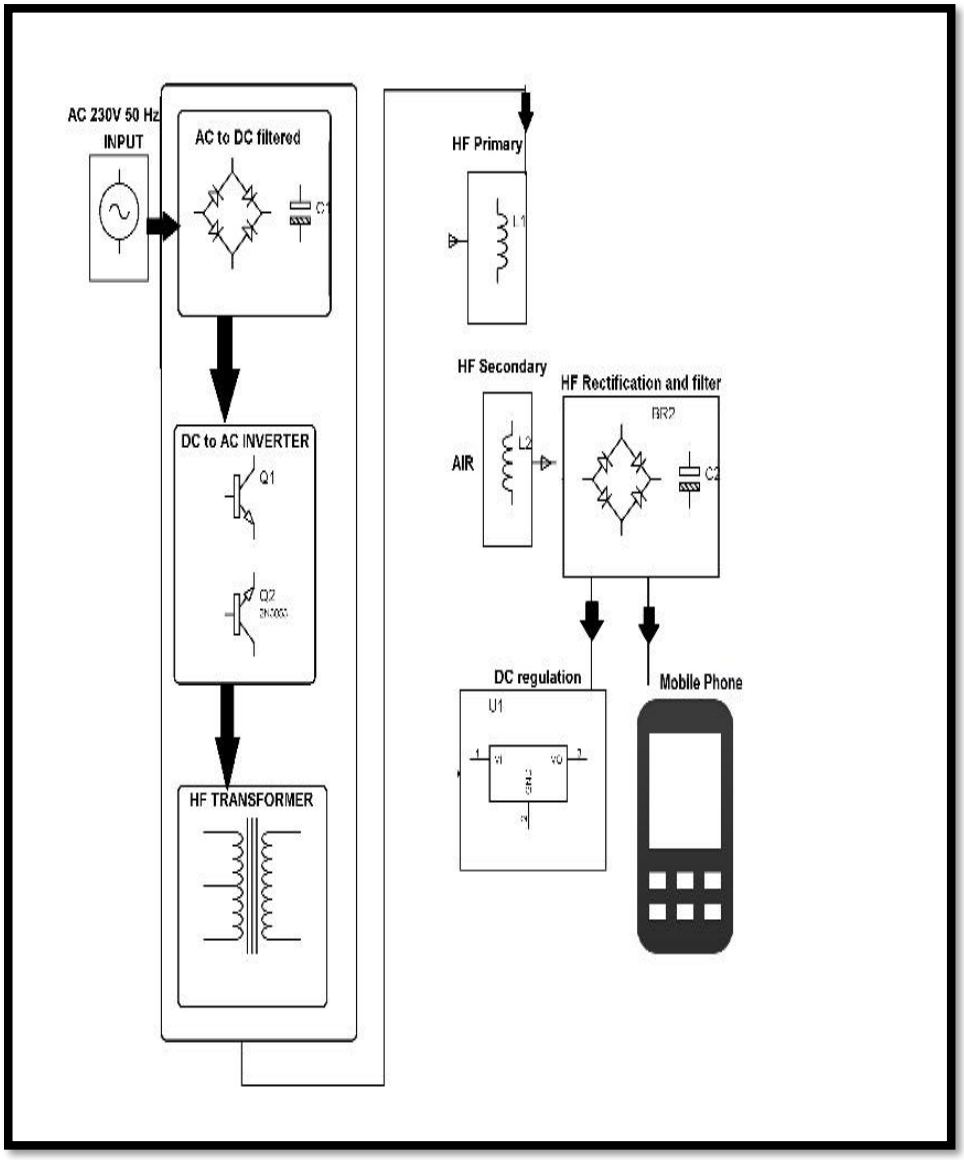


FIG 51 - BLOCK DIAGRAM OF WIRELESS POWER TRANSFER SYSTEM

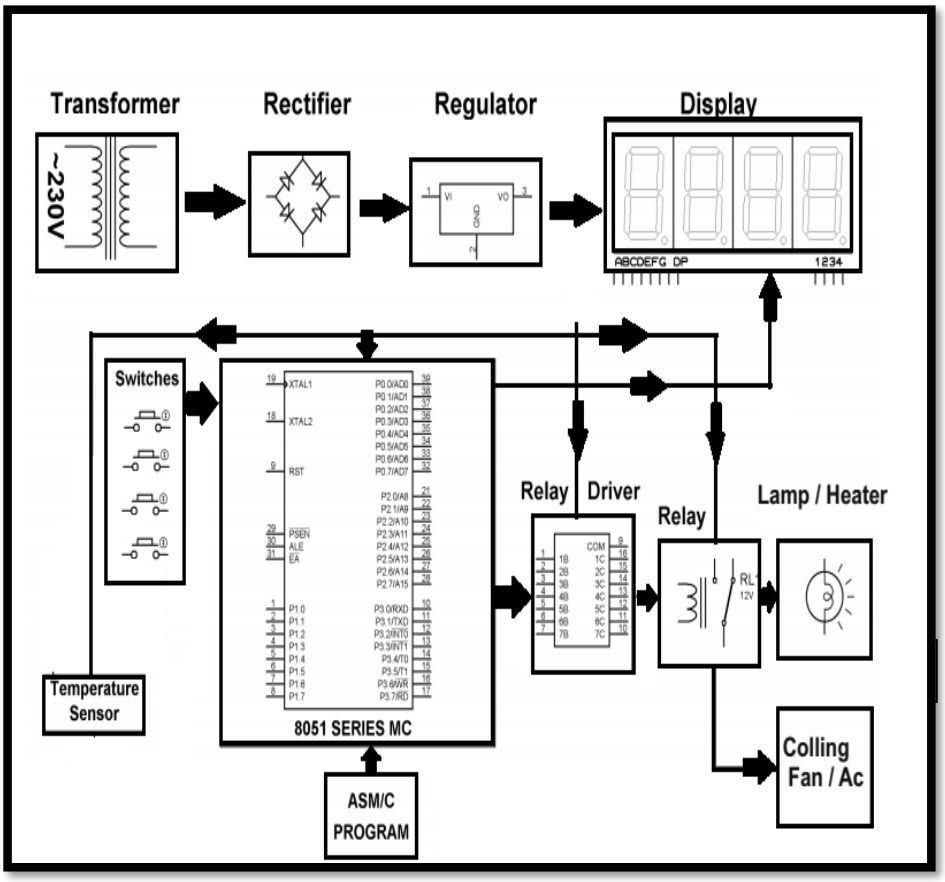
phone. As a result, we can charge our phones wirelessly without having to plug them in. The device could be improved further by incorporating the charging adapter into the phone itself, allowing the user to simply position his or her phone on the charging pad to charge it.

14.2.4 Accurate room temperature Controller:

- The primary goal of this Digital Temperature Controller is to regulate the temperature of any unit, such as an air conditioner or other electronic device, whose temperature fluctuates and necessitates constant monitoring. By self-regulating the system's temperature, this system removes the need for continuous monitoring of the unit.
- Digital temperature sensors are used in our proposed project to provide more precise temperature monitoring in a variety of industries. In terms of precision, our system overcomes the drawbacks of thermostat/analog systems. This device can be used in any business or organization where maintaining precise temperatures is critical.
- The temperature is shown on an LCD monitor, and when the temperature reaches the set limit, the lamp is turned off to regulate the temperature. With the aid of a lamp, the heater is demonstrated. The air conditioner is turned on after the heater is turned off. With the aid of a small fan, air conditioning is demon started.
- When the air conditioner is turned on, it stays on until the temperature falls below the exceed limit. As a result, the system continues to turn on and off the heater or air conditioner to maintain the system's temperature. The machine detects temperature with a digital temperature sensor and sends the information to the microcontroller. The data is processed by the 8051 microcontroller, which then sends the temperature to be displayed on the LCD panel. The monitor has a 7-segment display unit that can show up to four numbers.
- It has four push buttons on which you can set the high and low temperatures. The user will increment and decrement high and low temperatures by pressing the set button. When the temperature exceeds the specified limits, the device senses it and turns the load off.

Hardware Specifications

- 8051 series Microcontroller
- 7-Segment Displays
- LED
- Voltage Regulator
- Transformer
- Crystal
- Push Buttons
- Cooling fan
- Temperature Sensor
- Diodes
- Relay
- Lamp



Software Specifications

- Keil µVision IDE
- MC Programming Language: Embedded C

Why Do We Need of Temperature Controllers?

- In any case where a constant temperature is required, a temperature controller is required.
- When an object must be heated, cooled, or both while remaining at the desired temperature (Set point).
- Regardless of the changing world in which it finds itself.
- Temperature control can be divided into two categories: open loop and closed loop.

Sr no.	Component Detail	Cost Detail
1	8051 series Microcontroller	513
2	7-Segment Displays	90
3	LED	5
4	Voltage Regulator	120
5	Transformer	120
6	Crystal	25
7	Push Buttons	36
8	Cooling fan	145
9	Temperature Sensor	65
10	Diodes	20
11	Relay	27
12	Lamp	90
	Total Cost	**1256/-**

Application:

- It is used in the automotive, automobile, steel and iron industries, food processing, and medical industries.
- It is critical to achieve the correct temperature level, which is especially important in the manufacturing process.
- Temperature management and monitoring aid in the preservation of product quality.

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

Abstract:
Accidents are posing a greater threat to human lives, with road accidents being the most frequent. Many people die as a result of emergency care and family members failing to receive accident reports in a timely manner. Using accelerometer and GPS, an effective vehicle wireless system is developed and implemented in this paper for vehicle accident detection and reporting. A crash is detected using an accelerometer sensor, and the vehicle's location is determined using GPS. In the event of an accident, the device will send an automatic message via GSM to a pre-programmed number, such as a family member's phone number or emergency medical services.

Advantage:

This refers to vehicle protection systems that have been upgraded. This accident warning system detects the accident and its location, and sends GPS coordinates to the designated smartphone, computer, or other device. Features of Vehicle Tracking It is primarily beneficial to businesses that rely on transportation systems.

Fig 52 - System overview

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.

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

Sr. No.	Design Name	Period To Implement	Amount (Rs.)
1.	COMMUNITY HALL	Within 1 year	26,11,942 Rs
2.	PUBLIC LIBRARY	Long term	9,86,817 Rs
3.	PUBLIC TOILET	Immediately	4,67,828 Rs
4.	PUBLIC HEALTH CENTRE	Immediately	7,56,288 Rs
5.	BUS STOP	Within 1 year	9,31,085 Rs
6.	PLAY GROUND	Within 1 year	1890000 Rs
7.	GRAM PANCHAYAT	Immediately	1,26,00,000 Rs
8.	WATER TANK	Immediately	88,00,000 Rs
9.	ROAD NETWORK THROUGH NAKARAVADI	Long term	26 Cr Rs
10.	RAIN WATER HARVESTING	Immediately	38,500 Rs
11.	COMMUNITY HALL ELECTRICAL FITTING	Within 1 year	52,650 Rs
12.	DESIGN OF SOLAR WATER PURIFIER		18,975 Rs
13.	SMART DESIGN OF POST OFFICE LOAD CONTROL USING DTMF	Within 1 year	3311 Rs
14.	SOLAR WATER PUMP	Long term	2,64,750 Rs
15.	Auto intensity control of Street Light:	Immediately	2,14,900 Rs
16.	Mobile technology (GSM) based remote monitoring and control of digital Energy meter	Immediately	7140 Rs

CHAPTER- 16
SURVEY BY INTERVIEWING WITH TALATI AND/OR SARPANCH

Vishwakarma Yojana: Phase VIII

NAKARAVADI VILLAGE SURVEY - An approach towards "Rurbanisation for Village Development"

Administration queries/ Difficulties:

Sr.	Questions	Yes/ No	Remarks
1	What are the sources of income in village?	Yes	Agriculture ,cattle
2	What are the chances of employment in village?	Yes	Agriculture only
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?	No	
6	Is women health awareness Program organized in village?	Yes	Aanganwadi
7	Are women having opportunity to work and income?	No	No such opportunities
8	Child girl education is appreciated in village?	Yes	Yes Since a very long time
9	Facility of vaccination to child is available in village?	Yes	
10	Are village people aware about child vaccination and done to each and every child as per norms?	Yes	
11	Women help line number information is provided to village people?	No	
12	Is water scarcity in village? How many days per year?	Yes	Extreme Scarcity in Summers
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	Specially in Cleanliness
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	

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Chapter 17 - Irrigation / Agriculture Activities And Agro Industry, Alternate Technics And Solution

Indian agriculture is a source of livelihood for more than two-thirds of the Indian population. But the Indian agricultural system before and after independence was not as strong as it is today. Hence the production was not enough to meet the demand for food with the growing Indian population. After that, the Green Revolution was the major success story of Indian agriculture in which some modern farming methods were used.

This was the reason that the nation often suffered from famine and various food shortages before the Green Revolution and today we are in a situation where we are challenged with the problem of surplus. Today with the development of various agricultural technologies/systems that include organic farming, genetic manipulation of crop plants, use of vertical farming, precision farming (PA), etc., this increases crop production with India and the current issues in agricultural production Faces the demand for world present and future food.
Agriculture is the backbone of our country, which is likely to contribute to the Indian economy. India is a country with varying environmental conditions in a single year and hence India's agriculture is made up of many crops, with rice and wheat being the primary food staples. Indian farmers also grow cereals, pulses, tubers, sugarcane, oilseeds, and non-food items like cotton, tea, coffee, rubber, and jute. However, it was observed that the presentations of these crops are challenged by various biological and abiotic stresses, water availability, and growing global populations.

Increasing grain yields per unit area is therefore an important solution to overcome or resolve the contradiction between consumer demand and world food supply, which is projected to increase by 25% or more by 2030.
There are many areas of technology and modern system in India, gradually the Indian Agricultural Green Revolution is undergoing a change from the beginning of technology.

Modern Farming

The recent strategy of liberalization and globalization has opened up new avenues for agricultural modernization. It has focused not only on improving agricultural inputs, infrastructure facilities in rural areas, but also generating agricultural surpluses for local and international markets. Half of the 20th century, the concept of the use of modern agriculture was very successful in meeting the growing demand for food by increasing the world's population.

The day-to-day changing environmental conditions have increased the pressure on crop plants to develop new diseases and pests that affect crop yield. Along with this, due to the dramatic increase in the world population, the area of land under cultivation decreased day by day; Therefore, it is necessary today to increase crop productivity.

Modern agricultural technologies/systems led to a rapid rise in the production of major crops such as rice and wheat, a fall in the price of food, and a slightly reduced number of people who continued to starve. This increase in food production has been mainly due to scientific advances and the use

of new technologies, including the development of new crop varieties including molecular breeding techniques, organic farming systems, genetically modified cropping systems, and construction of large irrigation systems.

Due to several challenges such as climatic variations, biotic, and abiotic stress conditions during peak crop periods, natural disasters have damaged crop yields when we used traditional agricultural systems. New technologies/systems are used by farmers but in some rural areas, the rate of adaptation of new technologies by farmers is slow due to lack of awareness among farmers. New technologies such as organic farming, genetically modified crops, vertical farming, polytonal farming, greenhouse farming, satellites of precision agriculture (PA), and creating a new scope for using multi-crop farming are important for food today and the future.

In recent years, the adoption of digital technologies in precision agriculture has been adjusting the ways that farmers treat crops and manage fields. One doesn't have to be an expert to see how the technology has changed the concept of farming making it more profitable, efficient, safer, and simple. Among other technologies, farmers have picked five they deem to be the best:

- GIS software and GPS agriculture
- Satellite imagery
- Drone and other aerial imagery
- Farming software and online data
- Merging datasets

As a result, modern farms get significant benefits from the ever-evolving digital agriculture. These benefits include reduced consumption of water, nutrients, and fertilizer, reduced negative impact on the surrounding ecosystem, reduced chemical runoff into local groundwater and rivers, better efficiency, reduced prices, and many more. Thereby, business becomes cost-effective, smart, and sustainable. Let's discuss some of these agricultural technologies.

GIS-Based Agriculture

Since fields are location-based, GIS software becomes an incredibly useful tool in terms of precision farming. While using GIS software, farmers are able to map current and future changes in precipitation, temperature, crop yields, plant health, and so on. It also enables the use of GPS-based applications in-line with smart machinery to optimize fertilizer and pesticide application; given that farmers don't have to treat the entire field, but only deal with certain areas, they are able to achieve conservation of money, effort, and time.

Another great benefit of GIS-based agriculture is the application of satellites and drones to collect valuable data on vegetation, soil conditions, weather, and terrain from a bird's-eye view. Such data significantly improves the accuracy of decision-making.

Satellite-Derived Data

Predicting yields, as well as conducting almost real-time field monitoring, with a view to detect a variety of threats with satellite data in service has never been so easy.

The sensors are able to give imagery in various spectra, allowing for the application of numerous spectral indices, such as the Normalized Difference Vegetation Index (NDVI). NDVI allows for the detection of vegetation content, the amount of wilting plants, and overall plant health. Next is the Canopy Chlorophyll Content Index (CCCI) that helps with nutrient application. Then, the Normalized Difference RedEdge (NDRE) detects Nitrogen content. And lastly, the Modified Soil-Adjusted Vegetation Index (MSAVI) is designed to minimize soil background impact at the earliest developmental stages of plants; the list goes on.

Data From The Sky – Drones

With the assistance of drones farmers have an opportunity to define crop biomass, plant height, the presence of weeds, and water saturation on certain field areas with high precision. They deliver better and more accurate data with higher resolution in comparison to satellites. When they are locally operated, they provide valuable information even faster than scouts. Drones are also considered to be unrivaled aides in the battle against insects; the invasion is prevented by applying the insecticide on the hazard areas using drones, all while reducing the likelihood of direct exposure leading to chemical poisoning.

Despite the fact that drones are easy to use and are capable of collecting large amounts of data within short time frames, there are still challenges when using them on a constant basis as they don't come cheap. Drones are almost helpless where mapping or monitoring of large areas is required, and it is better to complement the technology with satellite monitoring among already mapped areas, where specific zones need to be cross-checked.

Modern agricultural techniques help in reducing the manpower required for agricultural work so that the additional manpower available in the agriculture sector can be used in the industry sector to grow the Indian economy. Modern farming methods like vertical farming increases crop yield in the same area with the proper use of the cropping patterns. Agricultural mechanization in modern farming helps reduce labor costs and save valuable time for farmers.

Chapter 18 - Social Activities Done by Students

We were unfortunate as the Covid 19 pandemic hit it was difficult to even do a visit at our village & it was risky for villagers too as city residentials operate closely to them. Schools were closed ,it was risky to accumulate people at one place.

Still we've organized a little meet where we've discussed things to take care in Covid with villagers, we took Sarpanch sir & Shreya Madam with us so we can get some co-ordination from villagers.

We took the material of SAGY questionnaire with us , We visited some homes for survey & gave them awareness about vaccines , covid , symptoms, etc. & we took the data for our Survey form too.

Chapter 19 - SAGY QUESTIONNARE

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Nakaravadi Gram Panchayat: Nakaravadi Ward No. ____

Block: ____ District: Rajkot

State: Gujarat L S Constituency: ____

1. Family Identity and Size

Name of Head of Household	Rataja Mansukhbhai Jeenabhai							Male/ Female	M
SECC Survey ID:		Family Size	11	Over 18	7	6 to 18	4	Under 6	

2. Category & Entitlement Details (Tick as appropriate)

Social Category[1]	Koli	Life Insurance	1. All Adults 2. Some Adults 3. ✓None	AABY	1. Yes 2. No	Kisan Credit Card	✓ Yes / No
Poverty Status Year[2]:	1. BPL 2. ✓APL	Health Insurance	1. All Adults 2. Some Adults 3. ✓None	RSBY	1. Yes 2. No	MGNREGS Job Card Number	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]
Rataja Mansukhbhai	50	M	N	Married		Yes	Yes	No
Mahesh Mansukhbhai	30	M	N	Married		Yes	Yes	No
Jeetesh Mansukhbhai	28	M	N	Married		Yes	Yes	No
Labhuben Mansukhbhai	45	F	N	Married		Yes	Yes	No

3. Children from 6 years and up to 18 years

Name	Age	Sex M/F/O	Disability Y/N	Marital Code*	Level of Education: Code#	Going to School /College (Y/N)	Current Class	Computer Literate Y/N
Ayush Maheshbhai Rataja	12	M	No		7th	Yes		Yes
Vishal Jeeteshbhai Rataja	10	M	No			Yes		Yes

4. Children below 6 years

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

[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)

2

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	X	✓
Children	X	X

9. House & Homestead Data

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

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

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

11. Source of Lighting and Power

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

12. Landholding (Acres)

1. Total		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
Cotton		
Groundnut		
Wheat		

17. Livestock Numbers

Cows: 0	Bullocks: 0	Calves: 0
Female Buffalo: 4	Male Buffalo: 1	Buffalo Calves: 0
Goats/ Sheep: 0	Poultry/ Ducks: 0	Pigs: 0
Any other: Type _____		No. _____
Shelter for Livestock: Pucca / Kutcha / None		
Average Daily Production of Milk(Litres): 8		

18. What games do Children Play

19. Do children play musical instrument (mention)

Schedule Filled By: Naimish N. Mehta
Principal Respondent: Mansukhbhai Rataja
Date of Survey: 27 - 3 - 21

3

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: NaKaraVadi Gram Panchayat: NaKaraVadi Ward No. _____

Block: _____ District: Rajkot

State: Gujarat L S Constituency: _____

1. Family Identity and Size

Name of Head of Household	Manu Bhai Valji Bhai Rathod							Male/ Female	M
SECC Survey ID:		Family Size	5	Over 18		6 to 18	1	Under 6	0

2. Category & Entitlement Details (Tick as appropriate)

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

2. Adults (above 18 years)

Name	Age	Sex M/F / O	Disability Status Y/N	Marital Status[3]	Education Status[4]	Adhaar Card (Y/ N)	Bank A/C (Y/N)	Social Security Pension[5]
ManuBhai Rathod	72	M	Y	married	-	Y	N	N
Manish Bhai Rathod	60	M	N	unmarried	-	Y	Y	N
Kamlesh Bhai Rathod	24	M	N	married	8	Y	Y	N
minaBen Rathod	21	F	N	married	6	Y	N	N

3. Children from 6 years and up to 18 years

Name	Age	Sex M/F/O	Disability Y/N	Marital Code*	Level of Education: Code#	Going to School /College (Y/N)	Current Class	Computer Literate Y/N
Kanu Kamlesh Bhai Rathod	6	M	N		Lkg	Y		N

4. Children below 6 years

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

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

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

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

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

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

4

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

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

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

7. Do members take Regular Physical Exercise

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

8. Consumption of Tobacco

	Smoking	Chewing
Adults	✓	✓
Children	X	X

9. House & Homestead Data

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

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

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

11. Source of Lighting and Power

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

12. Landholding (Acres)

1. Total	1	2. Cultivable Area	1
3. Irrigated Area		4. Uncultivable Area	0

13. Principal Occupations in the Household

Livelihood	Tick if applicable
Farming on own Land	Y
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
Cottan		
Bajari		

17. Livestock Numbers

Cows: 0	Bullocks: 2	Calves: 0
Female Buffalo: -	Male Buffalo: -	Buffalo Calves: -
Goats/ Sheep: -	Poultry/ Ducks: -	Pigs: -
Any other: Type _____		No. _____
Shelter for Livestock: Pucca / Kutcha / None		
Average Daily Production of Milk(Litres): 0		

18. What games do Children Play

19. Do children play musical instrument (mention)

Schedule Filled By: Chirag R.Vasani
Principal Respondent:
Date of Survey: 27-3-21

5

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Nakaravadi Gram Panchayat: Nakaravadi Ward No.

Block: District: Rajkot

State: Gujarat L S Constituency:

1. Family Identity and Size

Name of Head of Household	dilipBhai ChaganBhai Kamadiya						Male/ Female	M
SECC Survey ID:		Family Size	9	Over 18	6	6 to 18	2	Under 6	1

2. Category & Entitlement Details (Tick as appropriate)

Social Category[1]	Kadiya	Life Insurance	1. All Adults 2. Some Adults 3. None	AABY	1. Yes 2. No	Kisan Credit Card	Yes / ~~No~~
Poverty Status Year[2]:	1. BPL 2. APL	Health Insurance	1. All Adults 2. Some Adults 3. None	RSBY	1. Yes 2. No	MGNREGS Job Card Number	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]
dilipBhai kamadiya	65	M	N	Mearid		Y	Y	N
JileshBhai kamadiya	25	M	N	U.M.	12	Y	Y	N
amishBhai kamadiya	29	M	N	mearid	10	Y	Y	N
madhuBen kamadiya	62	F	N	mearid		Y	Y	N

3. Children from 6 years and up to 18 years

Name	Age	Sex M/F/O	Disability Y/N	Marital Code*	Level of Education: Code#	Going to School /College (Y/N)	Current Class	Computer Literate Y/N
Janvi amishBhai kamadiya	8	F	N		P.K.M	Y		N
Jaitesh amishBhai kamadiya	7	M	N		HK.9	Y		N

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
Janvi amishBhai kamadiya	5	F	N	Y	Y			

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

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

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

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

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

6

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

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

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

7. Do members take Regular Physical Exercise

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

8. Consumption of Tobacco

	Smoking	Chewing
Adults	✓	✓
Children	X	X

9. House & Homestead Data

Own House: Yes / No	No. of Rooms: 5
Type: Kutcha / Semi Pucca / Pucca	
Toilet: Private / Community / Open Defecation	
Drainage linked to House: Covered / Open / None	
Waste Collection System	Door Step / Common Point / No Collection System
Homestead Land: Yes / No	Kitchen Garden : Yes / No
Compost Pit: Individual/ Group/ None	Biogas Plant: Individual/ Group/ None

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

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

11. Source of Lighting and Power

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

12. Landholding (Acres)

1. Total		2. Cultivable Area	
3. Irrigated Area		4. Uncultivable Area	

13. Principal Occupations in the Household

Livelihood	Tick if applicable
Farming on own Land	X
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

17. Livestock Numbers

Cows: 5	Bullocks: 0	Calves: 2
Female Buffalo: 4	Male Buffalo: 1	Buffalo Calves: 1
Goats/ Sheep:	Poultry/ Ducks:	Pigs:
Any other: Type _____		No.
Shelter for Livestock: Pucca / Kutcha / None		
Average Daily Production of Milk(Litres): 18 Lit.		

18. What games do Children Play

19. Do children play musical instrument (mention)

Schedule Filled By: Chirag R. Vasani
Principal Respondent: [illegible]
Date of Survey: 27-3-21

7

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Nakaravadi Gram Panchayat: Nakaravadi Ward No. _____

Block: _____ District: Rajkot

State: Gujarat L S Constituency: _____

1. Family Identity and Size

Name of Head of Household	Ramjibhai Vasrambhai Dhimoja							Male/ Female	M
SECC Survey ID:		Family Size	8	Over 18	3	6 to 18	5	Under 6	

2. Category & Entitlement Details (Tick as appropriate)

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

2. Adults (above 18 years)

Name	Age	Sex M/F / O	Disability Status Y/N	Marital Status[3]	Education Status[4]	Adhaar Card (Y/ N)	Bank A/C (Y/N)	Social Security Pension[5]
Ramjibhai Vasrambhai Dhimoja	42	M	N	Yes		Yes	Yes	
Bhavnaben Ramjibhai Dhimoja	36	F	N	Yes		Yes	Yes	

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
Lalji Ramjibhai Dhimoja	8	M	N	-		Yes	2	Yes
Shraddha Ramjibhai Dhimoja	9	F	N	-		Yes	4	Yes

4. Children below 6 years

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

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

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

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

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

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

8

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	X	✓
Children	X	X

9. House & Homestead Data

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

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

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

11. Source of Lighting and Power

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

12. Landholding (Acres)

1. Total	7 Vigha	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
Wheat		

17. Livestock Numbers

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

18. What games do Children Play

19. Do children play musical instrument (mention)

Schedule Filled By: Naimish N. Mehta
Principal Respondent: R. M. J
Date of Survey: 27-3-21

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: Nakravadi

b. Block: _____

c. District: Rajkot

d. State: Gujarat

e. Lok Sabha Constituency: Primary School

f. Number of Wards in the Gram Panchayat: 8

g. Number of Villages in the Gram Panchayat: 1

h. Names of Villages: Nakravadi

Demographic Information

Number of Households 520 Total Population 1750 Male 865 Female 885

SC HHs 15 ST HHs – OBC HHs 1735 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	No	
e.	Nearest Bank Branch (Any)	No	
f.	Nearest Bank with CBS Facility	Yes	2 to 5 km
g.	Nearest ATM	yes	2 to 5 km
h.	Nearest Primary School	yes	500 m
i.	Nearest Middle School	yes	2 to 5 km
j.	Nearest Secondary School	Yes	2 to 5 km
k.	Nearest Higher Secondary School / +2 College	Yes	2 to 5 km
l.	Nearest Graduate College	No	2 to 5 km
m	Nearest ITI / Polytechnic Centre	No	
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	NO	
r	Veterinary Care Centre	NO	
s	Ayurveda Centre	NO	
t	E – Seva Kendra	Yes	500m
u	Bus Stop	Yes	500m
v	Railway Station	No	
w	Library	No	
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 —

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 None

Names of such villages: None

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	—	Maliyasan /Navagam	2 to 5 km
b,	Kerosene	NO	NO	NO	NO	—	Maliyasan /Navagam	2 to 5 km
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 Yes / Not Covered	Nakravadi	
b.	Hand Pump Coverage in Villages:	Covered NO / Not Covered	Nakravadi	
c.	Coverage under Covered Drains:	Covered Yes / Not Covered	Nakravadi	
d.	Coverage under Open Drains:	Covered Yes / Not Covered	Nakravadi	
e.	Villages with Household Electricity Connection (Numbers)	Connected Yes / Not Connected	Nakravadi	

VIII. Land and Irrigation

	Private Land	Area in Acres(h)		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	313-46-64	d.	Pasture / Grazing Land		g.	Check Dam	5
b.	Irrigated Land		e.	Forests/ Plantations		h.	Wells/Bore Wells	2
c.	Un-irrigated Land	7-71-82	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)	5
b)	Number of Households receiving pension (old age, widow, disability)	—
c)	Number of eligible Households who are not receiving pension	—
d)	Number of Households eligible for Ration Card	—
e)	Number of eligible HHs having ration cards	—
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	—
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	—
h)	Number of active Job Card holders under MGNREGA	27
i)	Number of Job Card holders who completed 100 days of work during 2013-14	10 +
j)	Number of shops selling alcohol	—
k)	Number of BPL families	103
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	5
q)	Number of Households headed by physically handicapped persons	—
r)	Total number of Persons with Disability in the village	2
s)	Number of SHGs	—
t)	Number of active SHGs	—
u)	Number of SHG Federations	—
v)	Number of Youth Clubs	—
w)	Number of Bharat Nirman Volunteers	—

Name and Signature of Surveyor and Respondent'

Surveyor	PRI Respondent (Preferably Gram Panchayat Chairperson)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey
G Parmar	સરપંચ, નાકરાવાડી ગ્રામ પંચાયત	તલાટી-કમ-મંત્રી, નાકરાવાડી ગ્રામ પંચાયત	25-05-2021

[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: Nakravadi
b. Ward Number: _____
c. Gram Panchayat: 1
d. Block: _____
e. District: Rajkot
f. State: Gujarat
g. Lok Sabha Constituency: Primary school
h. Number of Habitations / Hamlets in the Gram Panchayat: 1
i. Names of Habitations / Hamlets: Nakravadi (Gam)

Demographic Information

Number of Households 520 Total Population 1750 Male 865 Female 885

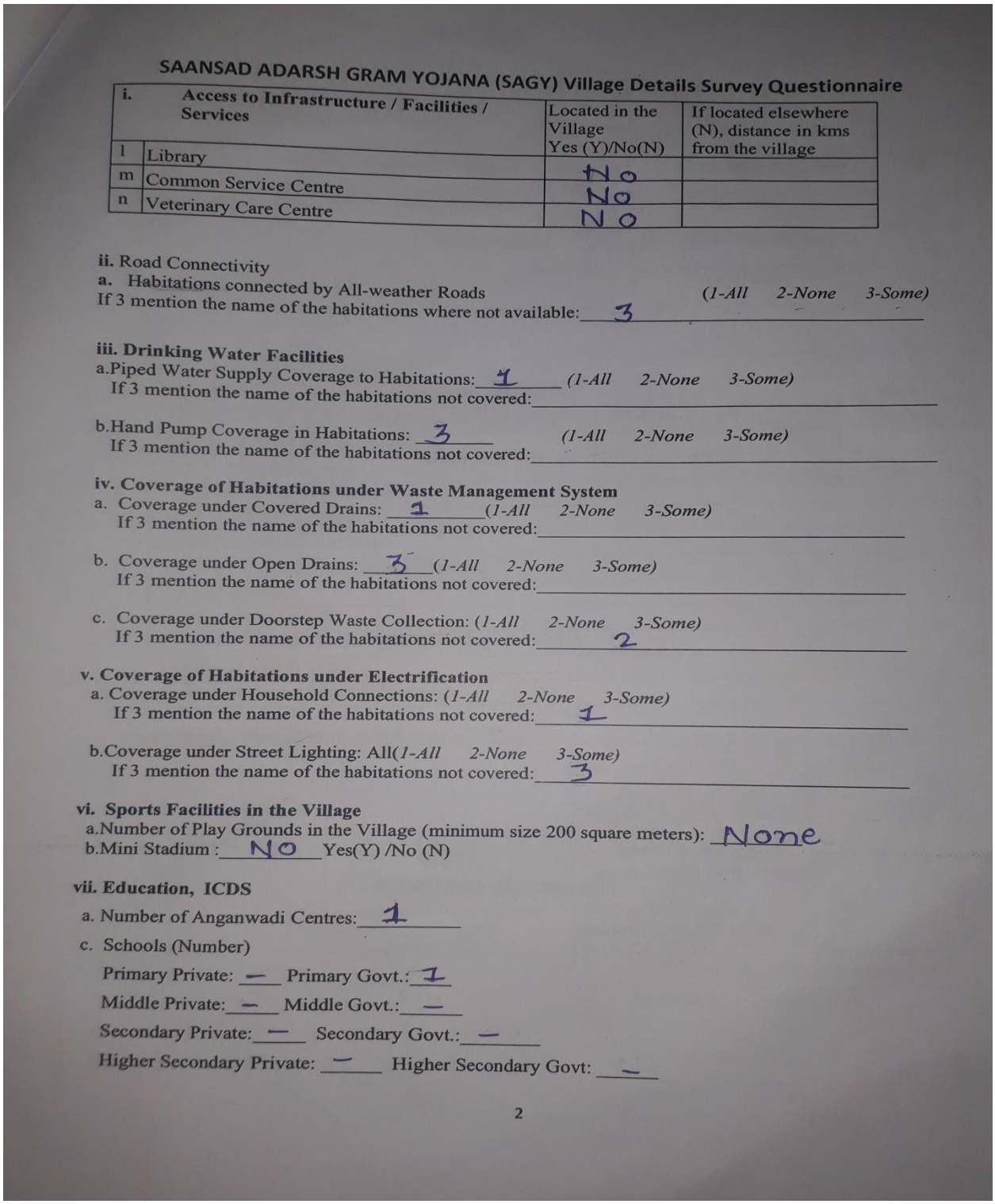
SC HHs 15 ST HHs - OBC HHs 1735 Other HHs -

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	500 m
b.	Nearest Middle School	Yes	2 to 5 km
c.	Nearest Secondary School	Yes	2 to 5 km
d.	Kisan Seva Kendra	No	
e.	Milk Cooperative /Collection Centre	No	
g.	Health Sub Centre	No	
h.	Bank	No	
i.	ATM	No	
j.	Bus Stop	No	
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	No	
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: 3

iii. Drinking Water Facilities

a.Piped Water Supply Coverage to Habitations: 1 *(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: 3 *(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: 2

v. Coverage of Habitations under Electrification

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

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

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

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

vi. Sports Facilities in the Village

a.Number of Play Grounds in the Village (minimum size 200 square meters): None

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(h)		Land Category	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	313-466	d.	Pasture / Grazing Land		g.	Check Dam	5
b.	Irrigated Land		e.	Forests/ Plnatations		h.	Wells/Bore Wells	2
c.	Un-irrigated Land	7-71-82	f.	Other Common Land		I	Tanks /Ponds	1

ix. Entitlement Related Parameters		
1	Number of active Job Card holders under MGNREGA	27
2	Number of active Job Card holders who have completed 100 days of work	10+
3	Number of shops selling alcohol	–
4	Number of BPL families	103
5	Number of landless households	–
6	Number of IAY beneficiaries	–
7	Number of FRA beneficiaries	–
8	Number of common sanitation complexes	–
9	Number of SHGs	–
10	Number of active SHGs	–
11	Existence of SHG Federation in the Village (Yes / No)	–
12	Number of Youth Clubs	–
13	Number of Bharat Nirman Volunteers	–

Name and Signature of Surveyor and Respondent'

Surveyor	PRI Respondent (Preferably a ward member from a ward that is fully or partially covered under the Village)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey
	સરપંચ, નાકરાવાડી ગ્રામ પંચાયત	તલાટી-કમ-મંત્રી, નાકરાવાડી ગ્રામ પંચાયત	25-05-2021

3

COMPREHENSIVE REPORT

ON

Vishwakarma Yojana: Phase VIII

DARSHAN INSTITTE OF ENGINEERING

& TECHNOLOGY, RAJKOT

Prepared by

Mr. Rakesh M. Fataniya

Asst. Prof. Civil Engineering Department

Year: 2020-21

Gujarat Technological University,
Chandkheda, Ahmedabad – 382424 Gujarat

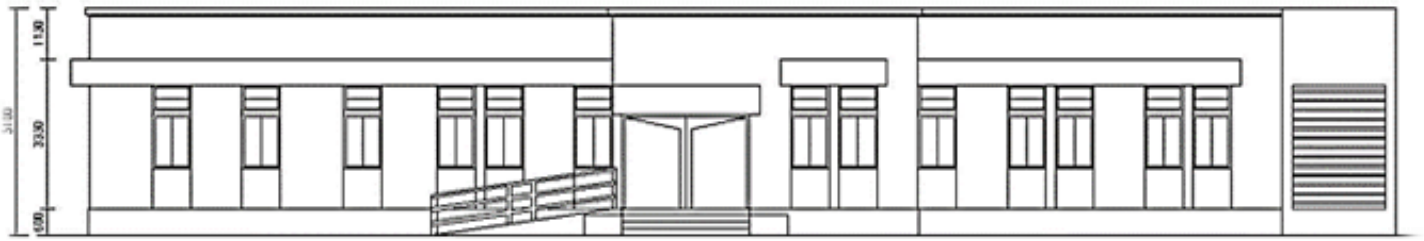
Concept

Vishwakarma Yojana is provides special scheme for development of village by GTU and Government of Gujarat in which students work together and collect data and information regards village development with the help of gram panchayat and stake holders. Village have some basic facilities likes drinking water, drainage system, pucca road, and other facilities like primary school, primary health center, community hall, library, public latrine block, are sufficient so that village can develop. So, we will give proposal regarding sustainable energy sources and solution related to infrastructure problems. Efforts have been made in this project work to identify and plan some of the below facilities for sustainable development of village and to meet need of future population. Vishwakarma Yojana is one of the initiatives towards Rurbanisation that is village development by the government of Gujarat, which was allotted as a real time situation type project provides to GTU.

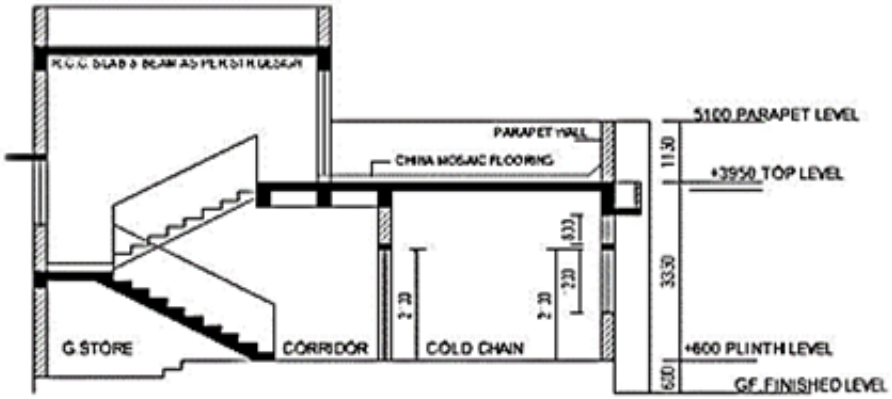
It is one of the strategies to reduce urban city pressure and lower the migration rate by developing village with a "rural soul" but with all urban amenities that a city may have. In this project the students meet the relevant citizens of village and survey the existing facilities. Then design of the sustainable infrastructure which is to be modified is carried out for the village. This includes implementation of engineering skills to prepare detailed project reports for village as a part of the final year project work. By this project certain experiences recreates a real work and need of application of an individual technical knowledge on any existing problems. Based on survey we tried to give design of basic facilities to fulfill their needs. By providing these basic facilities to village for reduce urban city pressure and decrease migration rate, which is ultimate aim of Vishwakarma Yojana.

Village: Maliyasan

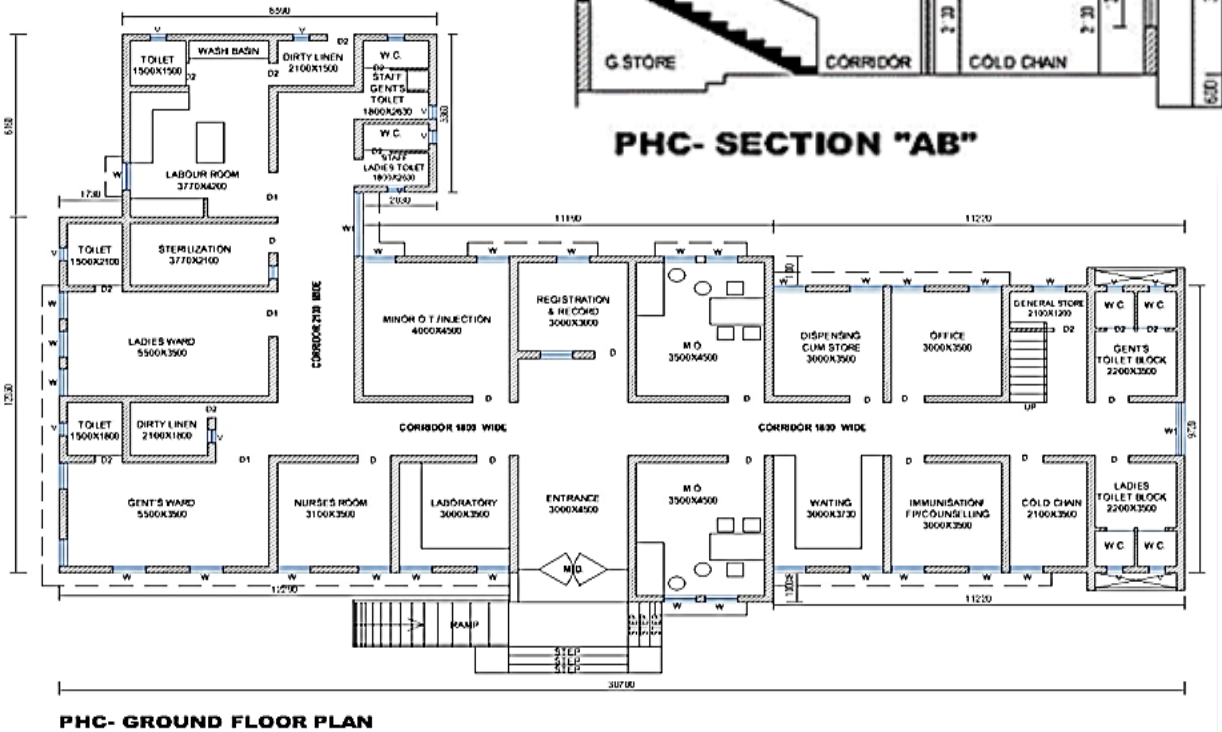
District: Rajkot



PHC- FRONT ELEVATION



PHC- SECTION "AB"

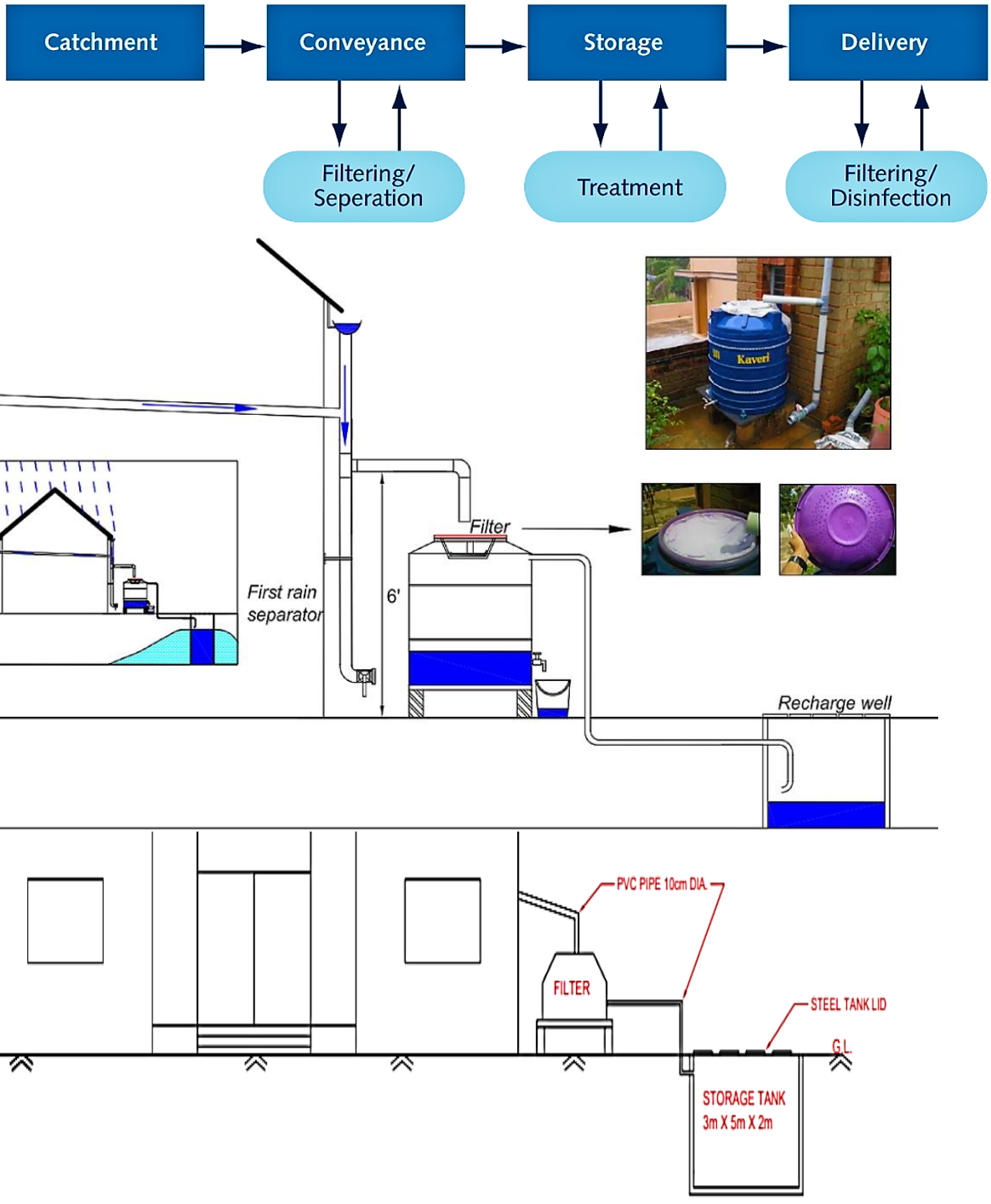


PHC- GROUND FLOOR PLAN

Design Infrastructure: Public Health Centre
Village: Maliyasan, **District:** Rajkot (Phase VII – Part I)

Village: Nakarawadi

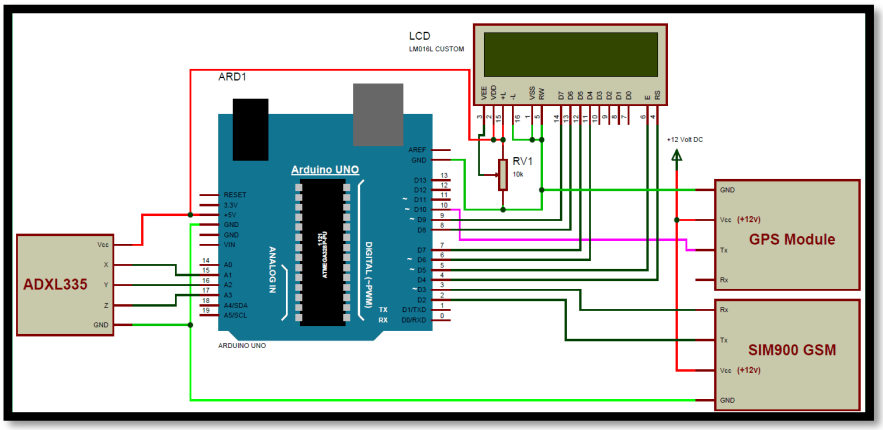
District: Rajkot



Design Infrastructure: Rain Water Harvesting System
Village: Nakarawadi, **District:** Rajkot (Phase VII – Part II)

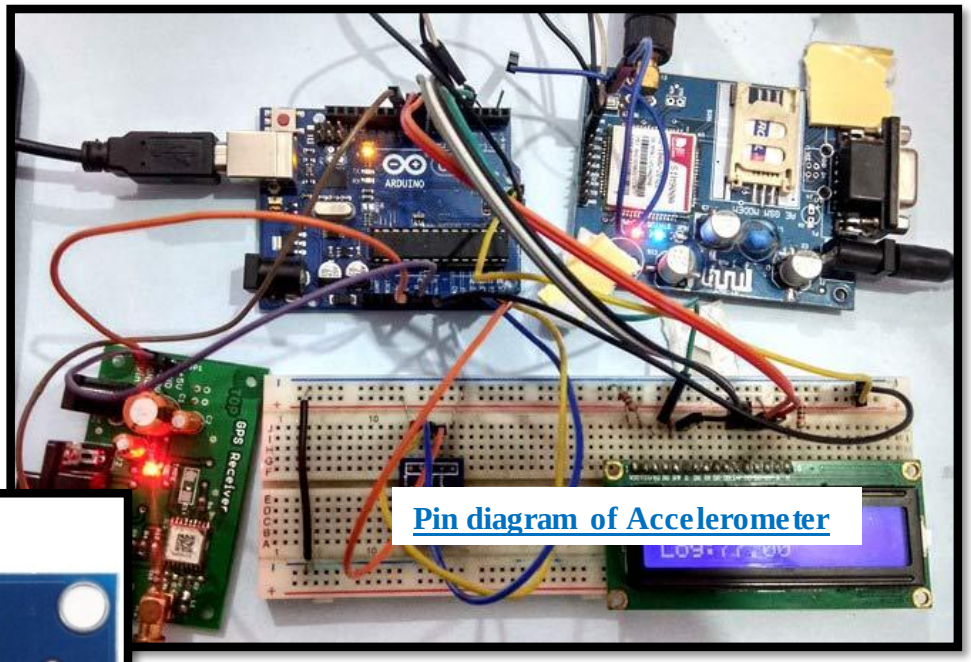
Village: Maliyasan

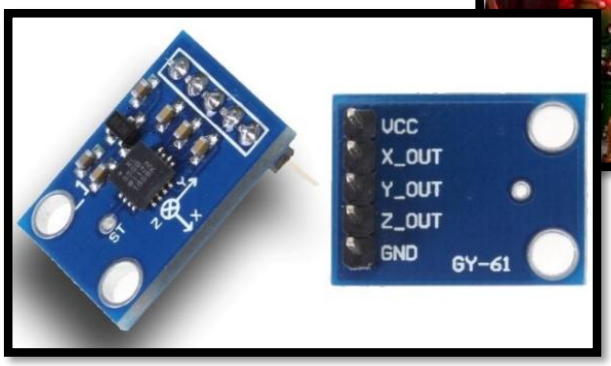
District: Rajkot



Circuit Diagram of Vehicle Accident Detection

Prototype Model of Vehicle Accident detection





Pin diagram of Accelerometer

Design Infrastructure: Wireless Vehicle Accident Detection and Reporting

Village: Maliyasan, District: Rajkot (Phase VII – Part II)

NODAL OFFICER STATEMENT:

By providing this required facility to village, development and growth of village can be possible. So ultimately migration rate and urban city pressure can be reduced and livelihood of village dweller will increase.

All the design which is given as above are very helpful for future development of village and village people for their enhancement and prosperity. I admire these students to do work related to civil engineering people and hope these works is help to improve and understand their skills and make it even batter. I am sure they got deep knowledge about development of village and various infrastructure facility design of village. Lastly, we all enjoyed the informational as well as practical journey of civil engineering work.

Nodal Officer

Mr. Rakesh M. Fataniya

Darshan Institute of Engineering & Technology, Rajkot