DETAILED PROJECT REPORT

VISHWAKARMA YOJANA: VIII

AN APPROACH TOWARDS RURBANISATION

Kewada Village

Valsad District

PREPARED BY

STUDENT NAME	BRANCH NAME	ENROLLMENT NO
TARSARIYA NARENDRA A.	CIVIL	170190106061
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GOVERNMENT ENGINEERING COLLEGE, VALSAD

PROF. DHAVALKUMAR T. BAROT
(NODAL OFFICER)

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

Detailed Project Report for ,

VILLAGE: Kewada

DISTRICT: Valsad

Under

Vishwakarma Yojana: Phase-VIII

in partial fulfillment of the project offered by

GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA

during the academic year 2020-21.

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

STUDENT NAME	BRANCH NAME	ENROLLMENT NO
TARSARIYA NARENDRA A	CIVIL	170190106061
POPAT RUCHIT S.	ELECTRICAL	180193109013

Date of Report Submission:	
Principal Name and Signature:	**Dr. Vinay S. Purani**
VY-Nodal Officer Name and Signature:	**Prof. Dhaval T. Barot**
Internal(Evaluator) Guide Name and Signature:	**Prof. Dhaval T. Barot & Prof. Devendra N. Tandel**
College Name:	**Government Engineering College, Valsad**
College Stamp:	

ABSTRACT

Vishwakarma yojana is best platform for final year student. Here we improving practical knowledge. Our team vision is to improving condition of village at best mode. Eg. Established school, hospitals, post office, camera security, transportation facility , medical shop, electric power continuity , roads, street light. Etc…, work on irrigation for farming purpose, sanitization availability in village, animal husbandry, fathering, cold storage for farmer, power connectivity to all housing and govt. Institution, digitalization of village like iot, computer based learning, training for men and women in industrial area, solar fencing for farming land, other government scheme for village used like,. Pradhan mantri gram sadak yojana , gramin Jyoti yojana, Pradhan Mantri bima fasal yojana, working on water storage tank which are mostly used in summer time.

About your village description:

Village Name: - Kewada
District: - Valsad
State/Ut: - Gujarat
Population: - Near 1027
Demographic: - Gujarati And Hindi
Govt.Health Centre:- Valsad
Bus Stand:- In Range 10 Km
Railway Station:- In Range 10 Km
Atm:- In Range Of 5 Km
Petrol Pump:- In Range 4 Km
College:- In Range of 10 Km
Primary School:- available in village
No Local Park Available, Police Station:- In Range 10 Km
Gram Panchayat:- available
River Bank:- Near Auranga River

As per the information there will be no any critical condition specially in covid-19 situation.

As per our team proposed design view of village development, need to ensure basic requirement of village people, like , Solar street light, bus stand facility, availability of power supply, solar fencing guard around farm. If need to establishment of solar power plant for power supply purpose, transportation connectivity, water storage available, etc.

For the future scope of the village we need to establish small scale industry, toy industry, fishery, farming capability increasing, for security purpose need to installing CCTV in village, water availability, wi-fi, internet available, fertilizer, soil testing centre, new technology using in farming sector, innovation in industrial area and farming area, small industry for women based to improving romanisation across global. irrigation for farmer, etc,…..

Key Words: Innovation ,Technology ,Safety ,Transportation and Education

ACKNOWLEDGEMENT

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

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

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ABBREVIATIONS

SHORT NAME / SYMBOL	FULL NAME
%	Percentage
AREP	Accelerate rural electrification program
Cbb	Common bio gas plant
CCDU	Communication and capacity development unit
Cm	Centimeter
Cuf	Qubic feet
CuM	Qubic meter
DDWS	Department of drinking water supply
FWP	Food for work program
Gm	Gram
GP	Gram panchyat
Gsrtc	Gujarat state road transportation corporation
Ibb	Individual bio gas plant
ICDS	Intigrated child development service
IRDP	Integrated rural development program
JNNSM	Jawaharlal nehru national solar mission
Kg	Kilogram
KJP	Kutir jyoti yojana
Km	Kilometer
LL	Live load
M	meter
MARC	Mid-america regional council
Mm	Mile meter
MoRD	Ministry of rural development
NFHS	National family health survey
NGO	Nongovernmental organization
NGP	Nirmal gram puruskar
PMGY	Pradhan mantri gramodaya yojana
PRIS	Panchayat raj institutions
Pt%	Percentage of steel
RFT	Running peet
RGVGY	Rajiv Ghandhi vidhyut gramin yojana
RMt	Running meter
RNDWM	Rajiv ghandhi national drinking water mission
RVEP	Remote village electrification program
SHG	Self help group
SLWM	Solid and liquid waste management

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

1.1 Background & Study Area Location

Fig. 1.1 Map of Baben village

As a part of Vishwakarma Yojana one needs to visit an Ideal village, as particularly constrained to the guidelines village of Gujarat is to be selected. This is one of the crucial study and observation stage which needs to be done in order to get the picture of what an ideal village looks like. This visit of ideal village helps one to compare the allotted village to ideal village so that the gaps can be found out.

For the study of an Ideal village, we selected Baben village, located in the Surat district of Gujarat. The amount of development that this village has achieved is much higher than any ordinary village in our country. Baben village got the best gram panchayat of the year award in 2011 from the state government. Baben village is a Bench mark for the development of other villages in India. These Baben village had received Swarnim gram award in the year 2012. It had also received many such awards from the year 2007-2016.

As per the census 2011 Baben has population of 15,610 of which 8,642 are males while 6,968 are females as per report released by Census India 2011.Population of Children with age of 0-6 is 2121 which is 13.59 % of total population of Baben. Talking about the Female Sex Ratio, it is of 806 against state average of 919. Moreover, Child Sex Ratio in Baben is around 822 compared to Gujarat state average of 890. Literacy rate of Baben city is 75.70 % lower than state average of 78.03 %. In Baben, Male literacy is around 82.55 % while female literacy rate is 67.18 %. The village has got all basic facilities like sanitation, irrigation, transportation, health care, etc.. The village has got pakka houses. The roads are all weather with street lights. The standard of living of this village is much better than the ordinary village people. Farmers has got private borewells, accomplished with modern farming techniques.

Location:

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

Baben's nearest town/city/important place is Bardoli located at the distance of 2.1 kilometer

1.2 Concept: Ideal Village, Normal Village

It is important to do a compare study with the ideal village of a village to be developed. This is so, because it helps in understanding what are gaps which need to be fille.

1.2.1 ObjectivesA model village project has the following important objectives:

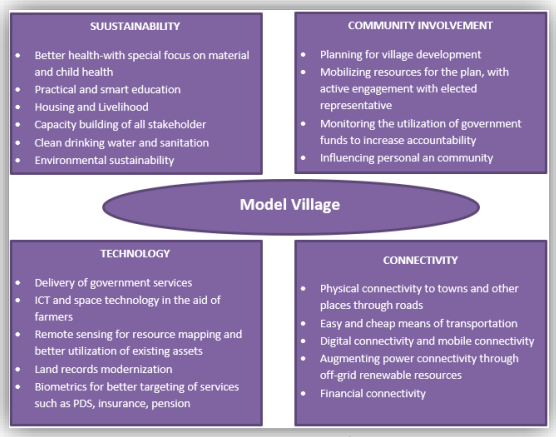

Fig. 1.2 Ideal village features

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

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

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

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

A survey of Pride India says that about 15 villages of India can be said as the Ideal villages and aim is to make 180 villages come into this category. Few of the ideal villages are selected for the study and each village have its own key features which are discussed below. Among these villages one of the villages is studied is described in detail.

Below are the few Ideal villages:

1. Ramchandrapur, Telangana

Fig. 1.3 Ramchandrapur, Telangana

This village Ramchandrapur tucked away in the upland Koheda mandal came into focus a decade ago when the villagers pledged to donate their eyes for the visually challenged.

Similarly, this village is the first in the united Andhra Pradesh tp win the Nirmal Puraskar from the then President A.P.J. Abdul Kalam in 2004-05 for hundred per cent sanitation. This tiny village was

visited by representatives from more than 70 countries, including USA and several civil servants had also visited the village for its developmental programmes taken up by involving the villagers.

Movement for eye donation and sanitation was launched by sarpanch Vakulabranam Bhanu Prakash in 2001 after his election. Initially, the villagers were reluctant to pledge their eyes, but following the motivation, they all agreed and so far more than 22 persons had donated their eye which were collected by the lions eye hospital in Karimnagar.

Ramchandrapur had shown the way to other villages on how to utilize government schemes and take up development works. The village does not have drainage system and all the water generated from each house is diverted to the plants, which were planted by the villagers in each house.

It is the first village in the state to construct sub-surface dyke on the Moyathummeda rivulet and solve drinking water problem by constructing two overhead tanks.

All the houses have smokeless chullas, cent per cent plantation in each house. Each house having latrine and toilet along with tap water facilities. There are no huts in the village.

Bhanu Prakash during his two terms tenure as sarpanch completely transformed the village and won accolades throughout the country. He constituted a cabinet in the village and allocated powers for discharging various duties.

2. Piplantri, Rajasthan

In an atmosphere where every morning, our newspapers greet us with stories of girls being tormented, raped, killed or treated like a doormat in one way or another, trust India's "village republics" to bring in some good news from time to time.

Fig. 1.4 Piplantri, Rajasthan

One such village in southern Rajasthan's Rajsamand district is quietly practicing its own, homegrown brand of Eco-feminism and achieving spectacular results.

For the last several years, Piplantri village panchayat has been saving girl children and increasing the green cover in and around it at the same time.

Here, villagers plant 111 trees every time a girl is born and the community ensures these trees survive, attaining fruition as the girls grow up.

Over last six years, people here have managed to plant over a quarter million trees on the village's grazing commons- including neem, sheesham, mango, Amla among others.

On an average 60 girls are born here every year, according to thevillage's former sarpanch Shyam Sundar Palimal, who was instrumental in starting this initiative in the memory of his daughter Kiran, who died few years ago.

In about half these cases, parents are reluctant to accept the girl children, he says. People also plant 11 trees whenever a family member dies. “Gradually, we realized that aloevera could be processed and marketed in avariety of ways. So we invited some experts and asked them to train our women. Now residents make and market alovera products like juice, gel, pickle etc,” he says.

3. Ankapur, Telangana

Fig. 1.5 Ankapur village

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

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

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

1.2.3 The Idea of a model/Smart Village

About 68.9% of our population lives in rural areas (Census 2011). Though number is expected to fall in the coming years, it is still estimated that more than half of our population would be rural even in 2050. Despite there being several past initiatives by governments at all levels – Central, State and Local – in the past, the level of improvement has not kept pace with the rising aspirations among Indians.

So, in order to stop migration, only way is to create an environment in the village which could help people of village to improve their quality of life not only in terms of economic as well as socially also.

A smart/model village is concept which is the solution to all the problems of our existing villages like poverty, irrigation, sanitation, lack of education, poor health care etc.

The idea of smart villages is universal, and hence adopted by our country in order to minimize the gap between the rural and urban life.

The idea of an “Adarsh Gram” or model village has been explored earlier as well, most notably through the Pradhanmantri Adarsh Gram Yojana, launched by the Central Government in 2009-10. The scheme was implemented in pilot mode in 1000 villages of Assam, Bihar, Himachal Pradesh, Rajasthan and Tamil Nadu, with an allocation of Rs 10 lakh per village. This limit was later raised to Rs 20 lakh per village. The target villages under the scheme were those with more than 50% of the population belonging to Scheduled Castes (SCs). Additionally, State governments have also taken

steps in this direction. Himachal Pradesh launched a Mukhya Mantri Adarsh Gram Yojana along similar lines in 2011, with the allocation of Rs 10 lakh per village.
The proposed "Sansad Adarsh Gram Yojana" of the Central Government aims to involve MPs more directly in the development of model villages. By adopting a village(s) under this initiative, an MP has the opportunity to directly benefit all sections of a village community in an integrated, efficient and participatory fashion.

A model village can be picturized as below:

- Such a village will have a fully-operational Gram Panchayat or local government that will be responsible for the holistic development of the area.
- It will provide better living standards and quality of life to people of different walks of life.
- It will provide access to improved basic amenities, including educational institutions, healthcare facilities, drinking water, sanitation, along with the rights and entitlements.
- This village will use technological innovations to achieve higher productivity in farming and to help local businesses by mobilizing self-help groups.
- It will provide residents improved infrastructure such as roads, parks, drainage system, etc.

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

Ancient Civil concepts about Indian Villages: Ancient Indian architecture was very comprehensive. It included cities, buildings, temples, sculptures, and painting. The cities consisted of roads, water supply system, public utility, bathroom, drains, buildings were also categorized according to their shapes, their direction, measurement, type of land/soil on which they were built, nature of objects used in construction etc. And most importantly, all the structures were integrated with nature. In the water supply system, the idea of dams, wells, basins, canals, rivers etc. was also considered. For centuries, construction work was done in villages and cities of India on this basis. For craft work, soil, inlays, limestone, wood, metal and gems were used. Each of these materials was properly tested and used as per their need.

The opinion of ancient sages on land use and construction:
Ancient India not only practised scientific methods of design and construction but also documented them for future generations. Here are some tips given by ancient sages on selection of site and construction

Ancient cities of India found on the basis of archaeological discoveries:
Dwarka

Fig. 1.6 Dwarkadhish Temple

Dwarka, also known as Lord Krishna's city, also narrates a similar story. Dr S R Rao discovered Dwarka in the archaeological excavation and found that the ancient city (Dwarka Nagar) was well built and settled. There was a wall around the city. The stones used for the construction of buildings did not erode despite the fact that the city was very close to the sea. Two-storey buildings, roads and water system are also found in the city. Copper, bronze and some alloys with zinc mixed up to 34 percent have also been found

during the excavation. The size of columns, windows, etc. reveals that they were designed with a complete mathematical precision.

Lothal port (Saurashtra)

Fig. 1.7 Harappan Civilization "Lothal Port"

The port of Lothal was built 2500 years ago, where not only small boats but large ships also halted. The fact that the port was a busy one a big city was also established near it. Its composition was almost like Mohanjodaro, Harappa. Roads, buildings, gardens, public utility buildings etc were part of the design of this port city. Interestingly, the cremation ground was made far from the urban settlement. The advanced civil engineering at that time is also evident from the fact that Lothal port was spread to 300m north-south and 400m east-west and to prevent it from storms and floods, 13m tall walls were built using bricks, soil and other materials. This port was more developed than the Phoenician and Roman ports built in the later times.

Electrical Concept:

Ancient Electrical concepts about Indian Villages:

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

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

Evolution of Rural Electrification in India:

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

decade, coverage had been extended to 18,689 villages; however, only 350 of the originally targeted 856 towns had been provided with electricity.

Timeline in the Evolution of India's Rural Electrification:

Fig. 1.8 India's Rural Electrification

Below is a snippet from **A WORLD BANK STUDY**, Power for All: Electricity Access Problems in India, showing the timeline in the evolution of India's Rural Electrification: As of August 2017, about 1% of the villages in India remain un-electrified (3,146 villages). However, with regard to households, around 23% (4.1 crore households) are yet to be electrified.

Evolution of Rural Electrification Around World:

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

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

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

Socio economic Details:

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

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

Literacy:

Literacy is directly proportional to the development of a village. Literacy plays a major role in social as well as economic aspects of village.

As Shown above the Male literacy is around 82.55 % while female literacy rate is 67.18 %. So, taking the average Baben has an average of 75.70 % that is less than the state literacy which is 78.03 % as per 2011 census.

Analyzing the above data, it can be said that the literacy rate of women is less as compared to men. There is difference of 15.37 % between the men and women literacy rate. There is a need to work upon the literacy of women as indicates gender inequality. In developing countries, it is essential to focus over the literacy of each and every individual irrespective of the gender. As, it is said that mother are the first guru to their children, so we need to ensure that all the women are educated. The literacy rate of the village, is about 75.70% which is less than the state average. This is because the women literacy rate is very less as compared to men. The village has good educational infrastructure such Anganwadi and primary, secondary, higher secondary schools. The village also has a Engineering college.

Health:

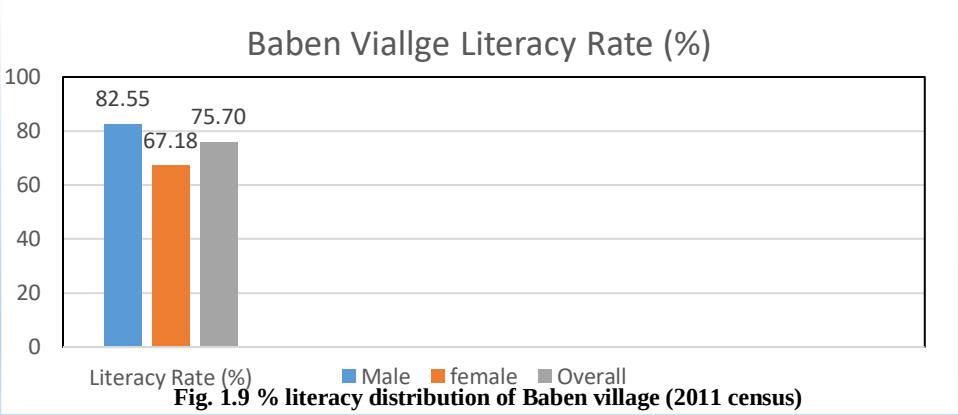

Fig. 1.9 % literacy distribution of Baben village (2011 census)

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

The village has overall good sanitation facilities, consisting of 8 public toilets, community toilet with bath facilities and waste collection from road facility.

The village also have good drinking water. Good tap water is available or the people of village. This ensures that they have access to safe drinking water.

The village consists of a Sub-Centre PHC in the village along with private clinic/ hospital. So the people of this village has health care facilities available at there nearest place i.e. in their village itself. The overall village health can be concluded as good from the fact that it consists of proper sanitation, access to safe drinking facilities and a good health care facilities.

Baben Work Profile:

As per 2011 census out of total population, 6,628 were engaged in work or business activity. Of this 5,152 were males while 1,476 were females. In census survey, worker is defined as person who does business, job, service, and cultivator and labour activity. Of total 6628 working population, 89.85 % were engaged in Main Work while 10.15 % of total workers were engaged in Marginal Work.

Religion Data 2011:

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

Table 1.1 Baben village Religious data(2011 census)

Physical Details:

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

Below Table shows physical features of the village:

Description	Information/detail
Area of Village	466 Hec.
Forest Area	-
Agricultural Land	282 Hec.
Residential Area	140 Hec.

Other Area	41 Hec.
Water Bodies	-
Nearest Town	Bardoli (1km)

Table 1.2 Baben Village of Physical data (2011 census)

Climate:

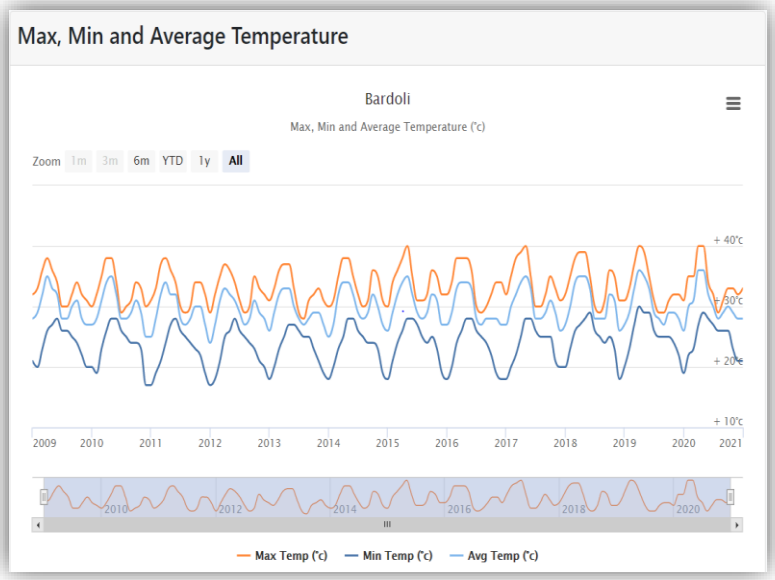

Fig. 1.10 Weather of Baben Village (as per year wise)

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

Average Rainfall:

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

Elevation:

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

Infrastructure Details:

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

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

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

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

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

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

The village Baben has all the socio-cultural facilities such as playground, library, garden, recreation facilities, community hall etc. A project named AVADH LAKE CITY has led the development of the village to a greater extent which is located in the central part of the village and works as a recreational hub for the residents as well as outsiders. Other than the above facilities 1 CNG Pump, 1 Petrol Pump, 12 Temples and 2Masjids are also located in the premises of Baben. This leads to the growth of town to a greater extent. 24hrs electricity supply is also provide to the residents from GEB.

1.4 SWOT analysis of Ideal village / Smart Village

A study undertaken by an organization to identify its internal strengths and weaknesses, as well as its external opportunities and threats.
The SWOT method serves as a tool to structure brainstorming sessions. As a result, a problem or process that's addressed using the SWOT tool may be thought of in terms of phases or a life cycle. For example, the strategic planning process consists of multiple steps or phases.
However, the SWOT analysis itself, like a brainstorming session, simply functions as a reusable tool to gain a collection of ideas regarding a particular issue or problem. For example, a business determines on each occasion, if a brainstorming session makes sense to address a strategic plan or competitive analysis. If so, the business then decides if it will use the SWOT method or an alternative tool to facilitate the session.

Strength	Weaknesses	Opportunities	Threats
➢ Primary school and anganwadies ➢ Two ponds ➢ Local businesses ➢ Religious places ➢ High bituminous road and easy access to highway ➢ parking facilities ➢ Good forest area and rainfall during a year	➢ No facility of harvesting water in village ➢ Need to upgrade anganwadi building ➢ Lack of transport facility	➢ Construction of redesign Anganwadi building ➢ Construction of Rain water harvesting system ➢ Opportunities for local business ➢ Redevelopment of vacant land ➢ Entertainment parks	➢ Eutrophication of ponds ➢ Accidents due to rough driving by college students ➢ Less local business opportunity

1.5 Future prospects of the ideal village

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

1.6 Benefits of the visits of Ideal village / Smart Village

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

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

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

4. **Learn from their mistakes:** The process of development is itself very important to make ensure right thing is done at right time. Interacting with them and knowing the development journey can help us to know the mistakes and make sue we don't do it.
5. **Finding scope of improvement in model villages:** Development is life long process and survey ideal villages can create a room for finding the improvement areas.

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

Fig. 1.11 DGVCL Office Baben Village

Baben is village with basic power infrastructure such as transformer and distribution line provided to inhabited locality too and the electricity is for any purpose in its revenue boundary. Hence, we can say this village as Electrified village. Electricity provided to public places like schools, panchayat ofices etc. The community hall has Television Facility. The village is facilitated with 32 CCTV cameras for proper monitoring and protection from thefts, damages etc. The roads are also facilitated with proper street lights for night travel. The Baben village has underground system for transmission of power supply for the half of the village. The remaining village will be underground electrified in future according to Sarpanch Bhavesh Patel. DGVLC BARDOLI DIVISION OFFICE, which supplies electricity to the whole baben village. DGVCL is only 5km away from this village. 24hrs electricity supply is also provide to the residents from GEB.

CHAPTER 2: Literature Review (Civil & Electrical Concept)

2.1 Introduction: Urban & Rural village concept

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

Urban Village concept:

State government definition:

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

National government (census office) definition:

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

Administrative units satisfying the following three criteria:

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

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

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

Rural Village concept:

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

2.2 Importance of the Rural development

- More than 60% of population of India lives in villages.
- For most of the time it is a fact that villages don't receive even basic facilities. More over due to less income sources people of villages are forced to move to city areas.
- Hence need of village development is necessary to do stop migration.
- Rural developments also bring in agricultural advancements.
- Development increases job opportunities.
- Better life for village people.

- Development of education institutes in villages is crucial job as it shapes the future of our country.
- Development bring in the Medical facilities which, most of the villages does not have.
- Development also connects the backward villages to the todays modern world which is necessary.
- It is also to protect our village life i.e our traditions and culture.

2.3 Ancient Villages / Different Definition of: Rural Urban Villages

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

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

2.4 Scenario: Rural / Urban village of India population Growth

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

The percentage of urban population to the total population of the country stands at 31.6. There has been an increase 3.35 percentage points in the proportion of urban population in the country during 2001-2011.The provisional results of Census 2011 reveals that there is an increase of 2774 towns comprising 242 Statutory and 2532 Census towns over the decade. Growth rate of population in urban areas was 31.8%.

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

Table 2.1 Population of the village

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

Gujarat Urban Population 2011

Out of total population of Gujarat, 42.60% people live in urban regions. The total figure of population living in urban areas is 25,745,083 of which 13,692,101 are males and while remaining 12,052,982 are females. The urban population in the last 10 years has increased by 42.6 %. Sex Ratio in urban regions of Gujarat was 880 females per 1000 males. For child (0-6) sex ratio the figure for urban region stood at 852 girls per 1000 boys. Total children (0-6 age) living in urban areas of Gujarat were 2,952,359. Of total population in urban region, 11.47 % were children (0-6).

Average Literacy rate in Gujarat for Urban regions was 86.31 percent in which males were 90.98% literate while female literacy stood at 70.26%. Total literates in urban region of Gujarat were 19,672,516.

Gujarat Rural Population 2011

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

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

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

Description	Rural	Urban
Population (%)	57.40%	42.60%
Total Population	34,694,609	25,745,083
Male Population	17,799,159	13,692,101
Female Population	16,895,450	12,052,982
Population Growth	9.31%	36.00%
Sex Ratio	949	880
Child Sex Ratio (0-6)	914	852
Child Population (0-6)	4,824,903	2,952,359
Child Percentage (0-6)	13.91%	11.47%
Literates	21,420,842	19,672,516
Average Literacy	71.71%	86.31%
Male Literacy	81.61%	90.98%
Female Literacy	57.78%	70.26%

Table 2.2 Urban Vs Rural Census Gujarat (2011)

2.6 Rural Development Issues - Concerns – Measures

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

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

2. **Lack of health care facilities:** For most of the villages it is still a luxury to have a proper medical care facility. It is important to establish medical care facilities. Many people die off not getting

medical facilities at time. Also, a key point to know is people in many cases avoids their small health issues which later on turns into a fatal one. So providing Health care facilities nearby could help a lot.

3. **Less income:** It is one the most concern for the village people. Income has much to do with purchasing power of the people. If we provide them with facilities but if they don't have that purchasing power, there will be no positive impact on their life. So it is important to generate income sources.

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

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

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

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

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

2. **Establishing health care facilities** are a primary requirement.

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

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

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

Norms and Standards:

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

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

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

Roads, Pedestrian Paths, Drains, Cooperative Bank, P.O. and other utilities	15- 20%

Table 2.3 Land distribution

(b) Residential Development:

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

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

Table 2.4 Residential development

(c) Road hierarchy:

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

Table 2.5 Road hierarchy

(d) Social Facilities:

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

Table 2.6 Facilities

Space Requirement

The plot size ground coverage, FAR, height and set backs of various uses shall be as per following tables

(1) The setbacks proposed here under will be limited to table 1 to 5. The setbacks along highways will be minimum as prescribed in section 12.

(2) The norms are suggestive and may be modified as per local conditions in the States/UTs.

(3) The norms of nearby urban areas may also be referred.

(a) Residential: Plotted Housing:

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

Table 2.7 Plotted Housing

(b) Commercial Use Table:

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

Table 2.8 Commercial Use Table

(c) Institutional & community facilities:

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

Table 2.9 Institutional and community facilities

(d) Educational and health:

Sr. No.	Use	Min. Plot Area in sq m	Ground coverage %	FAR	Max. height in M	Set Backs M Front	Set Backs M Front	Set Backs M Back
1	Anganwadi	500-1500	33.3%	100	10	4.5	3	3
2	Primary School	1500-3000	30%	90	10	6	3	6
3	Senior Secondary	4000-10000	25%	100	12.5	9	4.5	6

4	Nursing Home Dispensary & Diagnostic Centre	250 251-500 >501	35% 33.33% 30%	70 100 100	6 9 12	3 4.5 6	- 3 3	3 3 4.5

Table 2.10 Educational and health

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

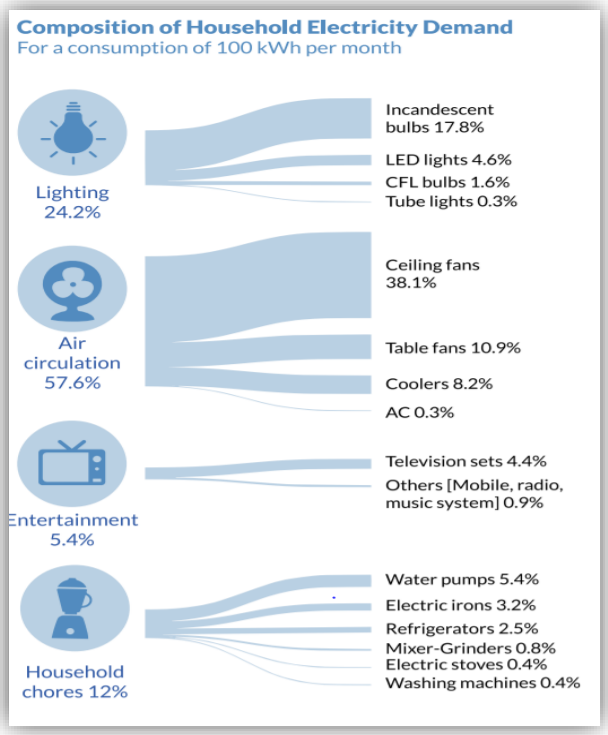

Fig. 2.1.a Composition of Electicity demand in village

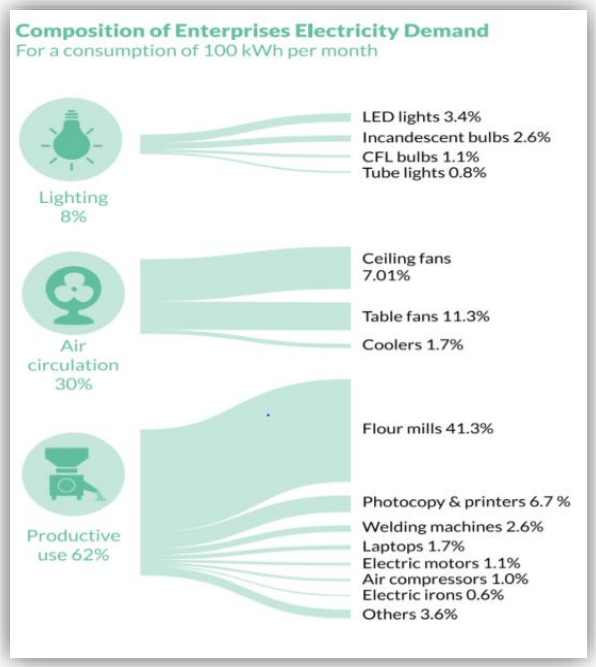

Fig. 2.1.b Composition of Electicity demand in village

In 1950, only 3,000 Indian villages had electricity. Rural electrification has been the holy grail for successive governments. While around 1,500 villages had been electrified during Independence, it was 481,124 in 1991. As many as 63,955 villages were provided electricity in the 10th five-year plan (2002-07) and 45,955 villages in the 11th plan (2007-12). 579,012 of Indian villages were electrified by 31 March 2015. It was an old saying that electricity is a luxary for many of villages of India but the scenario is changed. The results can be seen as approximately 90 percent of villages in **India** were estimated to be electrified in 2019. It is however villages don't receive a 24x7 of supply. A village is declared electrified if 10% of the households can access power, along with public institutions such as schools, the panchayat office, health centers, dispensaries and community centers.

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

Composition of Electicity demand in village:

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

As per image shown maximum use of electricity is productive use and the minimum use is lighting which is respectively 62% and 8%.The percentage use of electricity in air circulation is 30% which is in between those both usage. We know that demand of electricity will be going to increase day by day and so the peak load will also be going to increase day by day as new houses will be constructed in future. So all calculations should be done with respect to future expansion.

2.9 Other Projects / Schemes of Gujarat / Indian Government Schemes for Rural India

1. Integrated Rural Development Programme (IRDP):
The programme was launched by the Centre in March 1976 as a major instrument of the government to alleviate poverty. Its main feature was to enable selected families to cross the poverty line in a given time-frame by taking up self-employment in various activities like agriculture, horticulture, animal husbandry, weaving and handicrafts and services and business activities.
The target group consisted of small and marginal farmers, agricultural labourers and rural artisans having annual income below Rs 11,000 defined as poverty line in the Eighth Plan. Among the selected families, it is stipulated that at least 50 per cent of assisted families should be from SCs and STs. Furthermore, 40 per cent of the coverage should be of women beneficiaries. In spite of its many important features, the programme has also been criticized widely.

2. Training Rural Youths for Self-Employment (TRYSEM):
This scheme was launched in 1979 to provide technical skills (training) to rural youths (between 18-35 years) living below the poverty line, to enable them to seek employment in fields of agriculture, industry, services and business activities.
As in other schemes of poverty alleviation, in this scheme also, youths belonging to SCs and STs and ex-servicemen, who had passed ninth class, were given priority. One-third seats were reserved for women. The beneficiaries of this scheme after completion of training were absorbed in the IRDP scheme.
According to an estimate, up to 1995-96, about two lakh youths were being trained every year, of whom about 45 per cent became self-employed and 30 per cent got regular employment.

3. Food for Work Programme (FWP):
This programme was introduced in 1977 by the then Janata government with the objective to provide employment to the unemployed/underemployed village persons during the slack season. The wages paid to the workers were in kind, i.e., food grains.
The works undertaken were flood protection, maintenance of existing roads, construction of new link roads, improvement of irrigation facilities, construction of school buildings, medical and health centres and Panchayat Ghars (community halls) etc.

4. National Rural Employment Programme (NREP):
This is redesigned programme of FWP, planned for creating additional employment opportunities in the rural areas with the help of surplus food grains. It was started in 1980 as a part of the Sixth Plan (1980-85). This programme was especially for those rural people who largely depended on wage employment but had no source of income during lean agricultural period. PRIs were actively involved in this programme.

5. Pradhan Mantri Adarsh Gram Sadak Yojana (PMAGSY):
It focuses on integrated development of 100 villages with a 50 per cent population of SCs.
It is a rural development programme by the central government that began in 2009. It is mainly for the development of villages with a higher SC/ST ratio, over 50%. The idea is to merge several central government schemes to develop these villages. The schemes are – Bharat Nirman, Pradhan Mantri Gram Sadak Yojana, Sarva Shiksha Abhiyan, MGNREGA, Integrated Child Development Services, and more. This program is applicable to 44,000 villages SC/ST population above 50%. It comes under the Ministry of Social Justice and Empowerment.

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

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

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

9. Jawaharlal Nehru National Urban Renewal Mission (JNNURM):
It was launched on 3rd December, 2005. The main objective of this scheme was fast track development of cities across the country. It was focused especially on developing efficient urban infrastructure service delivery mechanism, community participation and accountability of urban local bodies and other agencies towards citizen.

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

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

3.1 Introduction: Concepts, Definitions and Practices

The smart city concept integrates information and communication technology (ICT), and various physical devices connected to the IoT (Internet of things) network to optimize the efficiency of city operations and services and connect to citizens.

Smart city technology allows city officials to interact directly with both community and city infrastructure and to monitor what is happening in the city and how the city is evolving. ICT is used to enhance quality, performance and interactivity of urban services, to reduce costs and resource consumption and to increase contact between citizens and government. Smart city applications are developed to manage urban flows and allow for real-time responses. A smart city may therefore be more prepared to respond to challenges than one with a simple "transactional" relationship with its citizens. Yet, the term itself remains unclear to its specifics and therefore, open to many interpretations.

Due to the breadth of technologies that have been implemented under the smart city label, it is difficult to distill a precise definition of a smart city. Deakin and Al Waer[11] list four factors that contribute to the definition of a smart city:

1. The application of a wide range of electronic and digital technologies to communities and cities.
2. The use of ICT to transform life and working environments within the region.
3. The embedding of such Information and Communications Technologies (ICTs) in government systems.
4. The territorialisation of practices that brings ICTs and people together to enhance the innovation and knowledge that they offer.

Deakin defines the smart city as one that utilises ICT to meet the demands of the market (the citizens of the city), and that community involvement in the process is necessary for a smart city.[12] A smart city would thus be a city that not only possesses ICT technology in particular areas, but has also implemented this technology in a manner that positively impacts the local community.

These forms of intelligence in smart cities have been demonstrated in three ways:

Fig. 3.1 Bletchley Park often considered to be the first smart community.

Orchestration intelligence: Where cities establish institutions and community-based problem solving and collaborations, such as in Bletchley Park, where the Nazi Enigma cypher was decoded by a team led by Alan Turing. This has been referred to as the first example of a smart city or an intelligent community.

Empowerment intelligence: Cities provide open platforms, experimental facilities and smart city infrastructure in order to cluster innovation in certain districts. These are seen in the Kista Science City in Stockholm and the Cyberport Zone in Hong Kong. Similar facilities have also been established in Melbourne.

Fig. 3.2 Hong Kong Cyberport 1 and Cyberport 2 Buildings

Instrumentation intelligence: Where city infrastructure is made smart through real-time data collection, with analysis and predictive modelling across city districts. There is much controversy surrounding this, particularly with regards to surveillance issues in smart cities. Examples of Instrumentation intelligence have been implemented in Amsterdam. This is implemented through:

1. A common IP infrastructure that is open to researchers to develop applications.
2. Wireless meters and devices transmit information at the point in time.
3. A number of homes being provided with smart energy meters to become aware of energy consumption and reduce energy usage.
4. Solar power garbage compactors, car recharging stations and energy saving lamps.

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

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

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

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

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

3.2 Vision-Goals, Standards and Performance Measurement Indicators

1. Technology framework

A smart city relies heavily on the deployment of technology. Different combinations of technological infrastructure interact to form the array of smart city technologies with varying levels of interaction between human and technological systems.

Digital: A service oriented infrastructure is required to connect individuals and devices in a smart city. These include innovation services and communication infrastructure. Yovanof, G. S. & Hazapis, G. N. define a digital city as "a connected community that combines broadband communications infrastructure; a flexible, service-oriented computing infrastructure based on open industry standards; and, innovative services to meet the needs of governments and their employees, citizens and businesses."

Intelligent: Cognitive technologies, such as artificial intelligence and machine learning, can be trained on the data generated by connected city devices to identify patterns. The efficacy and impact of particular policy decisions can be quantified by cognitive systems studying the continuous interactions of humans with their urban surroundings.

Ubiquitous: A ubiquitous city provides access to public services through any connected device. U-city is an extension of the digital city concept because of the facility in terms of accessibility to every infrastructure.

Wired: The physical components of IT systems are crucial to early-stage smart city development. Wired infrastructure is required to support the IoT and wireless technologies central to more interconnected living. A wired city environment provides general access to continually updated digital and physical infrastructure. The latest in telecommunications, robotics, IoT, and various connected technologies can then be deployed to support human capital and productivity.

Hybrid: A hybrid city is the combination of a physical conurbation and a virtual city related to the physical space. This relationship can be one of virtual design or the presence of a critical mass of virtual community participants in a physical urban space. Hybrid spaces can serve to actualize future-state projects for smart city services and integration.

Information city: The multiplicity of interactive devices in a smart city generates a large quantity of data. How that information is interpreted and stored is critical to Smart city growth and security.

2. Human framework

Smart city initiatives have measurable positive impacts on the quality of life of its citizens and visitors. The human framework of a smart city – its economy, knowledge networks, and human support systems – is an important indicator of its success.

Creativity: Arts and culture initiatives are common focus areas in smart city planning. Innovation is associated with intellectual curiosity and creativeness, and various projects have demonstrated that knowledge workers participate in a diverse mix of cultural and artistic activities.

Learning: Since mobility is a key area of Smart city development, building a capable workforce through education initiatives is necessary. A city's learning capacity includes its education

system, including available workforce training and support, and its cultural development and exchange.

Humanity: Numerous Smart city programs focus on soft infrastructure development, like increasing access to voluntary organizations and designated safe zones. This focus on social and relational capital means diversity, inclusion, and ubiquitous access to public services is worked in to city planning.

Knowledge: The development of a knowledge economy is central to Smart city projects. Smart cities seeking to be hubs of economic activity in emerging tech and service sectors stress the value of innovation in city development.

3. Institutional framework

According to Moser, M. A., since the 1990s, the smart communities movement took shape as a strategy to broaden the base of users involved in IT. Members of these Communities are people that share their interest and work in a partnership with government and other institutional organizations to push the use of IT to improve the quality of daily life as a consequence of different worsening in daily actions. Eger, J. M. said that a smart community makes a conscious and agreed-upon decision to deploy technology as a catalyst to solving its social and business needs. It is very important to understand that this use of IT and the consequent improvement could be more demanding without the institutional help; indeed institutional involvement is essential to the success of smart community initiatives. Again Moser, M. A. explained that "building and planning a smart community seeks for smart growth"; smart growth is essential for the partnership between citizen and institutional organizations to react to worsening trends in daily issues like traffic congestion, school overcrowding and air pollution. However, it is important to note that technological propagation is not an end in itself, but only a means to reinventing cities for a new economy and society. To sum up, it is possible to assert that any smart city initiatives necessitate the government's support for their success.

4. Energy framework

Smart cities use data and technology to create efficiencies, improve sustainability, create economic development, and enhance quality of life factors for people living and working in the city. It also means that the city has a smarter energy infrastructure. More formally, a smart city is: "… An urban area that has securely integrated technology across the information … and Internet of Things (IoT) sectors to better manage a city's assets." Employment of smart technologies enables the more efficient application of integrated energy technologies in the city allowing the development of more self-sustaining areas or even Positive Energy Districts that produce more energy than consume.

A smart city is powered by "smart connections" for various items such as street lighting, smart buildings, distributed energy resources (DER), data analytics, and smart transportation. Amongst these things, energy is paramount; this is why utility companies play a key role in smart cities. Electric companies, working partnership with city officials, technology companies and a number of other institutions, are among the major players that helped accelerate the growth of America's smart cities.

5. Data Management framework

Smart cities employ a combination of data collection, processing, and disseminating technologies in conjunction with networking and computing technologies and data security and privacy measures encouraging the application of innovation to promote the overall quality of life for its citizens and covering dimensions that include: utilities, health, transportation, entertainment and government services.

3.3 Technological Options

1.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 the 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.

"Lighting is ubiquitous--it's everywhere that people work, travel, shop, dine, and relax. Digital communications and energy-efficient LED lighting are revolutionizing urban lighting infrastructures already in place, transforming them into information pathways with the capacity to collect and share data and offer new insights that enable, and really drive, the smart city," said Susanne Seitinger, PhD., Philips Lighting, professional systems.

2.Smart transportation

A smart city supports multi-modal transportation, smart traffic lights and smart parking.

"One of the key areas that we have seen a lot of activity on has to do with mobility. Anything around transportation, traffic monitoring, parking," said Sanjay Khatri, director of product marketing and IoT services for Jasper. "These are areas where cities are seeing a very fast return on investment. It not only helps to reduce the cost of monitoring parking and making sure that they are collecting fines, it's also reducing congestion."

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, Khatri said.

Even city buses are becoming connected, so that people have real time information on when a bus will arrive at a bus stop. In Australia, traffic lights are prioritized based on the bus schedules so that traffic flows more freely during rush hours, Khatri said.

Chandi said, "it's using sensors to collect data about the movement of people, all forms of vehicles and bikes. A smart city is one that greatly reduces vehicle traffic and allows people and goods to be moved easily through various means. Intelligent traffic systems are an example of this and the achievement of autonomous vehicle transportation would be a prime example of success for a smart city, as this could reduce vehicle related deaths. All these efforts would reduce pollution as well as time stuck in traffic, resulting in a healthier population."

3. Smart data

The massive amounts of data collected by a smart city must be analyzed quickly in order to make it useful. Open data portals are one option that some cities have chosen in order to publish city data online, so that anyone can access it and use predictive analytics to assess future patterns. Companies such as Community Logiq are working with cities to help them analyze data, and they're in the Startup in Residence (STiR) program for the city of San Francisco.

"The pervasiveness of technology and the expansion of open data policies is about to unleash an economic growth engine for urban innovation that we have never seen. We are moving from analyzing data that exists within city hall, to generating new data from sensors that are deployed all across cities for use by multiple departments and people for multiple uses," said John Gordon, chief digital officer at Current, powered by GE.

Even the data collected by streetlights can be used to benefit citizens. "Hidden within the exponential volumes of data collected from connected lighting systems and other IoT devices are valuable insights and information about how citizens interact with cities. For instance, traffic data captured by streetlights can uncover a prime location for a new restaurant in a revitalized neighborhood. Predictive analytics helps cities filter and translate data into relevant and actionable information that makes city life better, easier, and more productive," Seitinger said.

4. Smart infrastructure

Cities will be able to plan better with a smart city's ability to analyze large amounts of data. This will allow for pro-active maintenance and better planning for future demand. Being able to test for lead content in water in real time when the data shows a problem is emerging could prevent public health issues, Chandi said.

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.

5. Smart mobility

"Mobility refers to both the technology and the data which travels across the technology. The ability to seamlessly move in and out of many different municipal and private systems is essential if we are to realize the promise of smart cities. Building the smart city will never be a project that is "finished." Technology needs to be interoperable and perform to expectations regardless of who made it or when it was made. Data also needs to be unconstrained as it moves between systems, with all due attention to intellectual property, security and privacy concerns. For this, public policy and legal technology needs to be state of the art," said Tom Blewitt, director of principal engineers.

6. Smart IoT devices

And finally, one of the key components that ties everything together in a smart city is IoT devices. "Whether we like it or not, sensors and actuators in our cities are here to stay. Fusing sensor information into our daily life and integrating it all with third party social networks will knit the fabric of society closer together, while leaving city leaders to grapple with serious privacy and security challenges," said Carl Piva, vice president of strategic programs at TM Forum.

Sensors are essential in a smart city, said Scott Allen, CMO of FreeWave Technologies. Allen said that a smart city has "a wide range of reporting devices such as sensors, visibility devices and other end points that create the data that makes a smart city work."

Blewitt said, " In a smart city, information will increasingly be obtained directly from purposefully deployed sensors or indirectly from sensors deployed for another purpose but which gather and share useful information. With this information, freely exchanged, complex city systems can be managed in real-time and, with sufficient integration, to minimize unintended consequences. As dependence on sensors grows, so too will the need that they be reliable and that the systems to which they are connected will be able to tolerate the inevitable failures."

Beacons are another part of IoT, and one of the problems with a smart city is the vast amount of information. Too much information can be overwhelming. Information received at a time when one is unable to take advantage of it is essentially noise, Blewitt said.

Each of these technologies work together to make a smart city even smarter. As the world's population grows, and more people move into urban areas, the need for smarter cities will increase to make the best use of available resources.

3.4 Road Map and Safe Guards

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

Sensors are small measurement devices that can be integrated with electronics to detect certain smells, sound, or levels of variations. Sensors can be passive or active. Passive sensors do not necessarily

take action; they simply collect data, and they are used mainly to measure weather conditions, such as Ozone levels, wind speed, or the sun's ultraviolet levels. Active sensor devices, on the other hand, use electronics to process data and take action.

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

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

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

3.5 Issues & Challenges

Challenge 1: Infrastructure

Smart Cities utilize sensor technology to gather and analyze information in an effort to improve the quality of life for residents. Sensors collect data on everything from rush hour stats to crime rates to overall air quality.

Complicated and costly infrastructure is involved in installing and maintaining these sensors. How will they be powered? Will it involve hard-wiring, solar energy, or battery operation? Or, in case of power failure, perhaps a combination of all three?

Major metropolitan areas are already challenged with replacing decades-old infrastructure, such as underground wiring, steam pipes, and transportation tunnels, as well as installing high-speed internet. Broadband wireless service is increasing, but there are still areas in major cities where access is limited.

Funding for new infrastructure projects is limited and approval processes can take years. Installing new sensors and other improvements cause temporary – though still frustrating – problems for people living in these cities.

Developers can help make it easier to install and utilize smart technology by considering these challenges at the very early stages of development. By beginning with the end in mind – which is

the full implementation of the solution – developers and tech companies can speed up the process of making our cities smarter by implementing easy-to-install hardware.

As an example, the City of Oshawa, in association with key stakeholders, has entered Infrastructure Canada's Smart Cities Challenge aimed at developing smart city solutions that draw attention to local problems. Using data and connected technologies, the main goal is to collaborate with residents, businesses, and academic and civic organizations to identify common problems and create innovative projects that solve their most pressing challenges.

Challenge 2: Security and Hackers

As IoT and sensor technology use expands, so does the threat level to security. This begs the question…is technology really considered "smart" if hackers can break into it and shut down an entire city?

Recent discussion involving cyber-terror threats to vulnerable and outdated power grids has everyone a bit more concerned and skeptical about technology and security.

Smart Cities are investing more money and resources into security, while tech companies are creating solutions with new built-in mechanisms to protect against hacking and cyber-crimes. With blockchain being the topic du jour in the tech industry, many developers are looking for ways to incorporate these encryption techniques to increase security in new applications.

Challenge 3: Privacy Concerns

In any major city, there's a balance between quality of life and invasion of privacy. While everyone wants to enjoy a more convenient, peaceful, and healthy environment, nobody wants to feel like they are constantly being monitored by "Big Brother."

Cameras installed on every street corner may help deter crime, but they can also install fear and paranoia in law-abiding citizens. Another valid concern is the amount of data being collected from all the smart sensors residents come into contact with each day.

Developers can help alleviate some of the anxieties of smart city residents by adding transparency and education to their solutions. By developing with the community in mind and considering how they might respond to new technology, companies can gain trust from the people their solutions are intended to help. Of course, local government officials and community boards need to be involved in the rollout and educational aspects as well.

Challenge 4: Educating & Engaging the Community

For a Smart City to truly exist and thrive, it needs "smart" citizens who are engaged and actively taking advantage of new technologies. With any new city-wide tech project, part of the implementation process must involve educating the community on its benefits. This can be done through a series of in-person town hall-style meetings and email campaigns with voter registration, as well as an online education platform that keeps citizens engaged and up-to-date.

When a community feels like it's playing a part in the overall decisions that affect daily life, and is being communicated to in a clear and thoughtful manner, it's more apt to use the technology and encourage others to use it as well. This is key to a Smart City's success.

For instance, Lyon, France has launched almost a hundred projects to improve city life, such as smart power grids, citizen empowerment, and better air quality. The city is collaborating with residents, entrepreneurs, large corporations and startups to create a 'city of tomorrow.'

Challenge 5: Being Socially Inclusive

Smart transit programs that give riders real-time updates are a great idea for a bustling city. But what if half the population of that city can't afford to take mass transit or Uber? What about a growing elderly population that doesn't use mobile devices or apps? How will smart technology reach and benefit these groups of people?

It's vital that Smart City planning involves the consideration of all groups of people, not just the affluent and technologically advanced. Technology should always be working to bring people together, rather than divide them further based on income or education levels. Thinking of these communities, in conjunction with the other problems addressed in this article, will promote the overall success of a solution beyond the realm of tech-savvy users.

Conclusion

While most everyone can agree that smart technology has the power to make our lives much simpler – especially in highly populated urban areas – implementing that technology must be done in a carefully planned and highly secure manner. Rather than just focusing on what the solution can do, developers and tech companies must also consider how it will affect the people that come into contact with it.

When technology, city governance, and communities of people come together to improve the quality of life for everyone involved, that's when a city truly becomes "smart."

3.6 Smart Infrastructure - Intelligent Traffic Management

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

Fig. 3.3 Punsari Village

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

the bus station. A wellmanaged crematorium for last rites; mortal remains of the deceased kept in pots/urns and disposed collectively at Haridwar or Suitable religious sites.

3.7 Cyber Security

Cyber security or information technology security are the techniques of protecting computers, networks, programs and data from unauthorized access or attacks that are aimed for exploitation.
Cyber security is the body of technologies, processes and practices designed to protect networks, computers, programs and data from attack, damage or unauthorized access. In a computing context, security includes both cyber security and physical security. Ensuring cyber security requires coordinated efforts throughout an information system.

E-governance and Citizen Services, such as

• Citizen engagement, public information and grievance management
• Electronic service delivery
• Surveillance, monitoring and crime control

Smart urban mobility

• Intelligent and integrated traffic management systems
• Smart parking
• Intelligent and integrated multi-modal transportation systems

Smart waste management

• Waste recycling, reduction and re-use through conversion to energy, fuel and compost

Smart healthcare

• Smart patient health management and healthcare services
• Data based public health intercessions and infectious disease surveillance, care search and scheduling
• Remote patient monitoring and telemedicine

Smart water management

• Monitoring water sources and water distribution systems for optimising water resource usage, ensuring water quality and minimising leakages

Smart trade and economy facilitation centers

• Digital business licensing and permits
• Digital land use, building registration and permits

Smart energy management

• Smart metering, smart grids and management of power
• Smart and efficient channelising of renewable energy
• Energy efficient and green buildings

Smart skill development centers

• Personalised education and online training programs
• e-career portals

Types of cyber threats:

The threats countered by cyber-security are three-fold:

1. **Cybercrime** includes single actors or groups targeting systems for financial gain or to cause disruption.
2. **Cyber-attack** often involves politically motivated information gathering.
3. **Cyberterrorism** is intended to undermine electronic systems to cause panic or fear.

3.8 Retrofitting- Redevelopment- Greenfield Development District Cooling

The fundamental idea behind modern district cooling is the use of local energy sources: heat, cold and fuel sources that under normal circumstances would be lost or remain unused. Cooling is produced centrally and the cooling media – cold water – is distributed to customers via a closed pipe network. A heat exchange process inside a substation located in the customer's premises transfers heat from the customer's internal cooling circuits into the network. This surplus heat can later be used in heating.

Sources of free cooling that can be harnessed include rivers, lakes, sea and ground water. Heat energy can also be converted into cooling through an absorption process. Depending on local circumstances, free or inexpensive heat sources can include biofuels, solar panels and surplus heat from electricity co-generation (CHP). In addition to sources of free cooling and absorption, district cooling can also make use of heat pumps that produce heat and cold energy simultaneously in the same process. Large-scale industrial chillers used in district cooling often consume less than half the electricity need of individual chillers.

Besides the use of local energy sources, another major advantage of district cooling is the ability to store cooling energy over time. One way to do this is to store cold water in tanks. Storage makes it possible to cut peak load and significantly optimize production.

District cooling systems produce chilled water, steam or hot water at a central plant and then pipe that energy out (either underground or over rooftops) to buildings for air conditioning, space heating and water heating. As a result, these buildings don't require their own chillers, air conditioners, boilers or furnaces. District cooling systems are a highly efficient way for many owners and manufacturers to effectively address each of these challenges while meeting their comfort and process cooling and heating needs. Heat sources in use for various district heating systems include, power plants designed for combined heat and power including both combustion and nuclear power plants; and simple combustion of a fossil fuel or biomass; geothermal heat; solar heat; industrial heat pumps which extract heat from, river or lake water, seawater, sewage, and waste heat from industrial processes.

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

Aspects of green design: Sustainability, Eco-sensitivity, Energy efficiency, Climate-responsiveness, User-friendliness

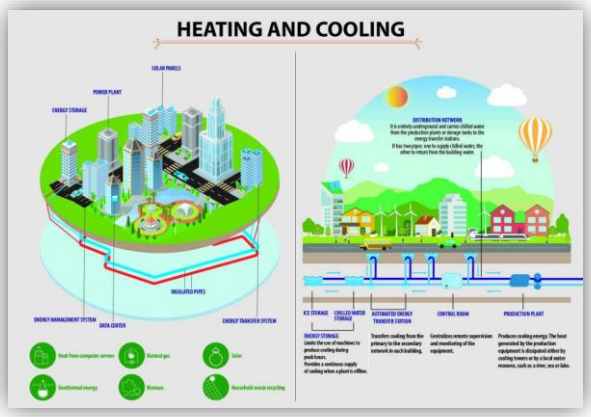

Fig. 3.4 Smart City heating and cooling

3.9 Strategic Options for Fast Development

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

1. Involve Citizens and Other Stakeholders

Before you begin to define your smart city strategy, you must understand the needs of your target group. Getting citizens and other stakeholders from civil society, NGOs, business, etc. on board right

from the start is essential. It enables you to define the added value that your smart city concept should provide to end users.

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

3. Encourage Initiatives, Self-Sustaining Business Models And Other Contributions From The Private Sector
Businesses increasingly see themselves as both global and local citizens. They are willing to engage in activities that strengthen their local environment and will often invest significantly in them. Draw on this support. Not everything has to be financed from the public pocket – many smart city solutions, such as parking guidance and information (PGI) systems, can be financed by the private sector.

4. Avoid Isolated Solutions – Look Beyond E-Government And Actively Apply Best Practices
Many smart city concepts today focus on individual and not integrated solutions. Think about the whole range of action fields in your city and ensure that the interfaces between the different sectors are digital in order to foster cross-sector activities. Actively look for best practices and apply them.

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

6. Set up Innovation Labs To Foster An Inspiring Ecosystem
Create an ecosystem for innovation and entrepreneurship by providing facilities such as "maker spaces", "living labs", or "business incubators". Importantly, ensure that these facilities have the necessary regulatory room to maneuver. Provide technical and financial support wherever possible.

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

8. Involve Infrastructure Operators in Designing, Financing And Implementing Initiatives
Most major cities own and operate their infrastructure via intermediary companies, such as public utilities, public transit operators, and so on. These players have an important role in designing, financing and implementing smart city concepts.

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

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

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

The problem of access to safe drinking water and sanitation facilities in urban areas of India is a major concern. There is a need to reuse treated wastewater in order to meet the current and future demands for water.

The consistent increase in the rate of growth of India's population has also led to the increase in demand for water, particularly in the urban areas where the rate of increase is highler compared to rural areas. In 2001, urban population was 285 million and assuming water supply of 135 litres per capita per day, the domestic water demand is estimated at around 38,475 million litres per day (MLD), whereas as in 2011 urban population was 377 million with a domestic water demand of 50,895 MLD. It shows that growth in urban population leads to additional water demand of 12,420 MLD in urban areas. The water supply of 135 litres per capita per day (LPCD) as a service level benchmark should be given for domestic water use in urban local bodies. However, currently as per Central Public Health and Environmental Engineering Organisation (CPHEEO), an average water supply in urban local bodies is 69.25 LPCD. This indicates that there is a vast gap between the demand and supply of water in urban areas of India.

The problem of access to safe drinking water and sanitation facilities in urban areas of India is also a major concern. It is estimated that by 2050, half of India's population will be living in urban areas and will face acute water problems. At present, 163 million people do not have access to safe drinking-water and 210 million people lack access to improved basic sanitation in India. In urban areas, 96% have access to an improved water source and 54% to improved sanitation. Whereas in rural areas, which accounts for 72% of India's population lives, only 84% have access to safe water and only 21% for sanitation. In addition, there is a lack of wastewater treatment facilities to treat the wastewater of a growing population. There is a need to reuse treated wastewater in order to meet the current and future demands for water.

The prevention of pollution of water sources is extremely critical in order to continue to supply water of quality standards. Available data suggests that pollution levels have increased in surface water as well as groundwater. More than 100 million people in urban areas exposed to poor water quality. The a lack of sufficient infrastructure, services and funds to support water and wastewater treatment facilities required for an urban area further exacerbates the problem. Moreover, the drainage and solid waste collection services are not adequate in most of the urban areas. The systems are either poorly planned and designed, or operated without inadequate maintenance. Use of natural capacities of soil and vegetation (green infrastructure) can be applied to absorb and treat waste water. Natural systems are found to be more cost-effective and require low building, labour and maintenance costs.

The time has come to have a retrospect view on the water use and misuse to take serious actions that will lead towards sustainable urban water management. Sustaining healthy environments in the urbanized world of the 21st century represents a major challenge for human settlements, development and management. Again, flexible and innovative solutions are needed to cope with sudden and substantial changes in water demand for people and their associated economic activities.

In order to meet the future urban water challenges, there needs to be a shift in the way we manage urban water systems. An Integrated Urban Water Management approach must be adopted which involves managing freshwater, wastewater, and storm water, using an urban area as the unit of management. The approach encompasses various aspects of water management, including environmental, economic, technical, political, as well as social impacts and implications. This will be one of the key topics of discussions at the 4th India Water Forum (IWF) to be organised by The Energy and Resources Institute (TERI) in association with the Ministry of Water Resources River Development and Ganga Rejuvenation, Government of India. The international convention has the

broad aim of facilitating water for all in a safe and sustainable way, thereby aiming to achieve SDG 6.
This event will provide a platform to highlight current and future water related issues and recognize good water governance practices and solutions through discussions among water experts from various fields such as academics, research, policy, industry and civic society.
More than 90% of the urban population has access to drinking water, and more than 60% of the population has access to basic sanitation. However, access to reliable, sustainable, and affordable water supply and sanitation (WSS) service is lagging behind. Are the Services Reliable? No Indian city receives piped water 24 hours a day, 7 days a week. Piped water is never distributed for more than a few hours per day, regardless of the quantity available. Raw sewage often overflows into open drains. Are the Services Technically and Financially Sustainable? Less than 50% urban population has access to piped water. The Non-Revenue Water (NRW: due to leakages, unauthorized connections, billing and collection inefficiencies, etc.) is huge, estimated between 40-70% of the water distributed. Operations and maintenance cost recovery through user charges is hardly 30-40%. Most urban operations survive on large operating subsidies and capital grants.

3.11 Initiatives in village development by local self-government

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

Rural Local Governments (or Panchayat Raj Institutions):

- Zilla Panchayat
- Mandal or Taluka Panchayat
- Gram Panchayat

Initiation by Local People:

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

3.12 Smart Initiatives by District Municipal Corporation

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

Take example of Pune city. The city has managed to tackle the waste of over 1,700 tones that it generates daily, while ensuring minimization of land fill, freeing up urban land for more productive

purposes. At present, the Pune Municipal Corporation (PMC) has combined an integrated approach with decentralized waste management by installing 25 bio-methane plants that produce 600 kW of electricity and compost as a byproduct

.

The 300 TPD plant by Noble Exchange Environment Solutions Pvt. Ltd (NEX) that converts food waste to bio-CNG, is a 300 tpb (total plumbum) vermi-compost project by Ajinkya Biofert and Disha. It uses the Rochem Separation System that processes mixed waste to produce 300 TPD of refuse derived fuel (RDF). This DBOT project by NEX, which converts food waste into valuable bio fuel, has already started producing 45 TPD of bio-CNG and 150 tones of organic manure, based on the anaerobic digestion system. At maximum capacity, it can process 300 tonnes of waste, making it the largest biogas plant in India. Another example is Jabalpur. With the installation of a 600 tone per day (TPD) municipal solid waste plant, the Jabalpur Municipal Corporation has become India's first to install a Smart WTE facility producing 11 MW of energy. The plant, installed by Council's lead partner Essel Infraprojects Ltd, has used refuse-derived fuel (RDF), biomethanisation and an advanced technology called combustion. Although these technologies work differently, all of them eliminate waste and produce energy.

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

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

Government projects:

Name of Authority - National Highways Authority of India (NHAI)
Name of Contractor - Unique Construction
Project Name - Road up gradation (Kamrej-Chalthan) Project
Project Brief - The project envisages six laning of Kamrej-Chalthan section from 248.10 km to 264.35 km of NH-8 with long term remedial measures for four black spots on Kamrej Bharuch section of NH-8.
Sector – Transport
Sub-Sector - Roads and bridge
Project Status - Pre-construction Stage

NGO list:

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

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

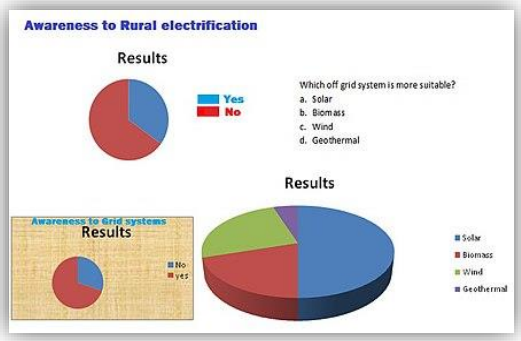

Fig. 3.5 Awareness of Rural Electrification

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

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

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

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

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

Other power sources: Beyond natural resources, some tech companies invented alternative energies such as transforming pig dung into biogas power and excess wax apple wood sticks to biomass energy. The former can produce around 25 kW of energy and the technology was introduced in the Discovery Channel.

3.15 Electrical concept (Design Ideal and Prototype model)

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

Energy management:

- Smart meters and management
- Renewable sources of energy

CHAPTER 4: About Kewada Village

4.1 Introduction

Information of Kewada village is as follows:

4.1.1 Introduction About Kewada Village

Kewada village is located in Valsad Tehsil of Valsad district in Gujarat, India. It is situated 4km away from Valsad, which is both district & sub-district headquarter of Kewada village.

The total geographical area of village is 167 hectares. Kewada has a total population of 1,027 peoples. There are about 243 houses in Kewada village. Valsad is nearest town to Kewada which is approximately 4km away.

In Kewada village population of children with age 0-6 is 84 which makes up 8.18 % of total population of village. Average Sex Ratio of Kewada village is 938 which is higher than Gujarat state average of 919. Child Sex Ratio for the Kewada as per census is 1154, higher than Gujarat average of 890.

Kewada village has higher literacy rate compared to Gujarat. In 2011, literacy rate of Kewada village was 85.47 % compared to 78.03 % of Gujarat. In Kewada Male literacy stands at 87.98 % while female literacy rate was 82.74 %

4.1.2 Justification/ need of the study

The Goal of research proposal is to present and justify the need to study a research problem and to present the practical ways in which this research should be conducted. There are number of schemes of the Government which are being operated and run for rural development in the rural areas of the country. Evolution taken up so far for these schemes has been more or less in a piecemeal form, i.e. generally for each scheme separately. It has become difficult to get an overall picture of the development in totality in the rural areas and is difficult to assess the impact of any one particular scheme, since most of the schemes are complementary and supplementary and most of the time, they all are contributing to the impact. Hence a view has been formed to take up studies on trial basis to assess the impact of the important schemes as a whole in rural development in selected village

4.1.3 Study Area (Broadly define)

Kewada village is located in Valsad Tehsil of Valsad district in Gujarat, India. It is situated 4km away from Valsad, which is both district & sub-district headquarter of Kewada village. Kewada is a medium size village located in Valsad Taluka of Valsad district, Gujarat with total 243 families residing. The Kewada village has population of 1027 of which 530 are males while 497 are females as per Population Census 2011. In Kewada village population of children with age 0-6 is 84 which makes up 8.18 % of total population of village. Average Sex Ratio of Kewada village is 938 which is higher than Gujarat state average of 919. Child Sex Ratio for the Kewada as per census is 1154, higher than Gujarat average of 890.

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Literacy of Kewada Village

Kewada village has higher literacy rate compared to Gujarat. In 2011, literacy rate of Kewada village was 85.47 % compared to 78.03 % of Gujarat. In Kewada Male literacy stands at 87.98 % while female literacy rate was 82.74 %.

Kewada Village Census 2011 Data ---Census 2011

Description	Census 2011 Data	Description	Census 2011 Data
Village Name	Kewada	**Total Person Literates**	806
Teshil Name	Valsad	**Total Male Literates**	432
District Name	Valsad	**Total Female Literates**	374
State Name	GUJARAT	**Total Person Illiterates**	221
Total Population	1027	**Total Male Illiterates**	98
Total Area	167 (Hectares)	**Total Female Illiterates**	123
Total No of House Holds	243	**Scheduled Cast Persons**	3
Total Male Population	530	**Scheduled Cast Males**	1
Total Female Population	497	**Scheduled Cast Females**	2
0-6 Age group Total Population	84	**Scheduled Tribe Persons**	384
0-6 Age group Male Population	39	**Scheduled Tribe Males**	195
0-6 Age group Female Population	45	**Scheduled Tribe Females**	189

Table 4.1 Kewada Village Census Data (2011)

4.1.4 Objectives of the study

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

- To assess problems, constrains in the effective implementation.
- To know the basic requirement of village.
- To provide the basic facilities in rural areas like Education, Health, irrigation, electric power etc.
- To suggest strategies and policies that would enable Government of India to increase the pace of rural development.

- To assess the adequacy of these schemes in solving and providing solution to problems of rural development.
- To provide the impact of these various Programmes.
- To gauge the general opinion of the people towards these schemes and programs of the government

4.1.5 Scope of the Study

The main aim of project is to solve the problems of villagers which are affecting mainly to the villagers like better facilities or normal infrastructural facilities. In this the different design scopes are there for village. The aim of project is to develop the village with job opportunity for villagers. The study will focus the development trend, intensity of growth of the village, and find out the problems related to the socio-cultural or physical development of the area, social infrastructure services, and the administrative systems of the village. The study of village gives the reason where there is need of sustainable facilities like infrastructure facilities, community hall, primary health center, post office, general market, pure drinking water, road network, schools, electricity, sanitation, library, Anganwadi, overhead tank, police station, fire station, etc. are available or not. Rural settlement engulfed in urban limits during the process of development, and also those located in the fringe areas of large cities, can be termed as urban villages.

4.1.6 Methodology Frame Work for development of your village

To achieve the aim by passing through the objectives, the study will be done in the following Methodology, described as follows:

A) Literature study:
The various theories and case studies to be referred to the understanding of various issues related to the urban, to define the "Fringe villages", to study the various issues of "Fringe villages"

B) Field Visit:
The field visit will be starts from collection of revenue maps and 'gametal' maps if possible, along with the map and other basic information of the study areas.

C) Primary Survey and Interview:
The primary surveys such as household surveys, questionnaire survey, to know the real status of the infrastructure services and quality of life they are living in the particular area and the major problems and issues they are facing, questionnaire survey of the real estate developers to know the scope and trend and scope of the development and status of the market and demand of that place.

D) Data Analysis:
An analysis form is used for finding a requirement of village as per government norms. A data collected during village survey is also used for an analysis government data on paper data.

E) Issues findings, development of Strategy:
From the above study in the detail of the literature review, situation analysis, study of the existing institutional framework, primary and secondary data analysis and mapping the best appropriate strategy to be formulated with possible recommendation, implementation strategy and allocating the roles and responsibilities of the different local bodies which give a scope for villagers to show their ability and chances of job opportunity.

F) Final Proposal:
Strategic theme-based proposal for Fringe villages from analysis in the form of R-Urban Town.

4.1.7 Available Methodology for development of related to Civil/Electrical

Civil methodology available for development	Methodology available for the development of Electrical
➢ Anganwadi ➢ Panchayat office ➢ Overhead rectangular water tank ➢ Primary school ➢ Drainage system ➢ Underground water tank ➢ General store	➢ Providing electrical supply to each house ➢ Implementing Ujjwala Yojana ➢ Electrical pumps for irrigation ➢ Street lights

4.2 Kewada Village Study Area Profile

Kewada village is located in Valsad Tehsil of Valsad district in Gujarat, India. It is situated 4km away from Valsad, which is both district & sub-district headquarter of Kewada village. The village area is approximately 166.88 Hect., out of which 150.43 Hect. is Agricultural area, 16.45 Hect. Residential.

The nearest Railway Satiation to this village is Valsad Railway station which is 5.1 km away. The nearest Air Port to the village is Daman Air Port which is about 26 km from the village. The nearest Town from the village is Valsad which is 4.6 km from the village and nearest district is Navsari (36.7 km) from the village.

4.2.1 Study Area Location with brief History land use details

Location:

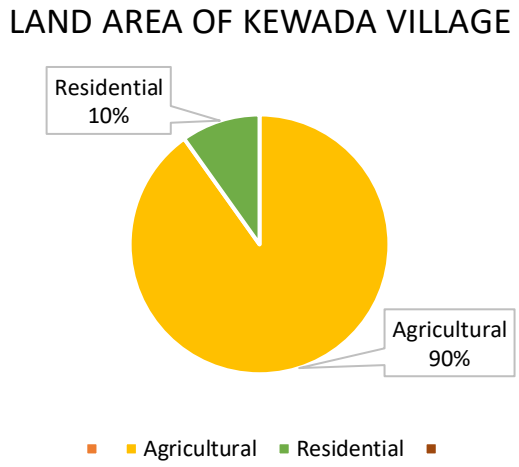


Fig. 4.1 Kewada Village Land Use (%) (2011 Census)

Kewada Village is located in Valsad Tehsil of Valsad district in Gujarat, India. It is situated 4km away from Valsad, which is both district & sub-district headquarter of Kewada Village.

The nearest Town from the village is Gundlav which is 2.0 km from the village and nearest district is Navsari (36.7 km) from the village.

Brief History of Land use: The village area is approximately 166.88 Hect., out of which 150.43 Hect. is Agricultural area, 16.45 Hect. Residential.

4.2.2 Base Location map, Land Map, Gram Tal Map

Fig. 4.2 Satellite Map of Kewada Village

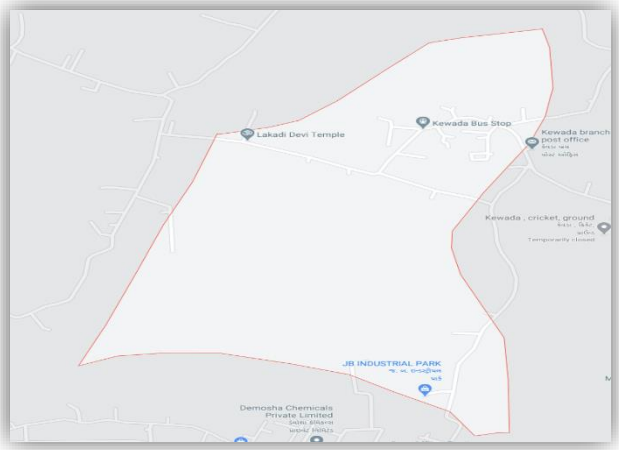


Fig. 4.3 Kewada Village Map

4.2.3 Physical & Demographical Growth

Demographics:

The Kewada village has population of 1027 of which 530 are males while 497 are females as per Population Census 2011.

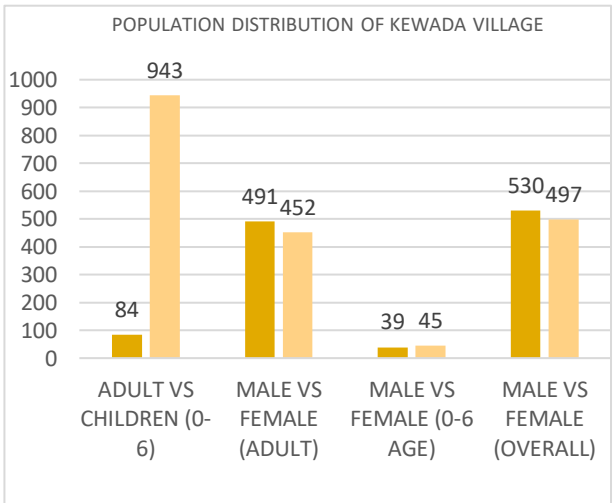
In Kewada village population of children with age 0-6 is 84 which makes up 8.18 % of total population of village. Average Sex Ratio of Kewada village is 938 which is higher than Gujarat state average of 919. Child Sex Ratio for the Kewada as per census is 1154, higher than Gujarat average of 890.

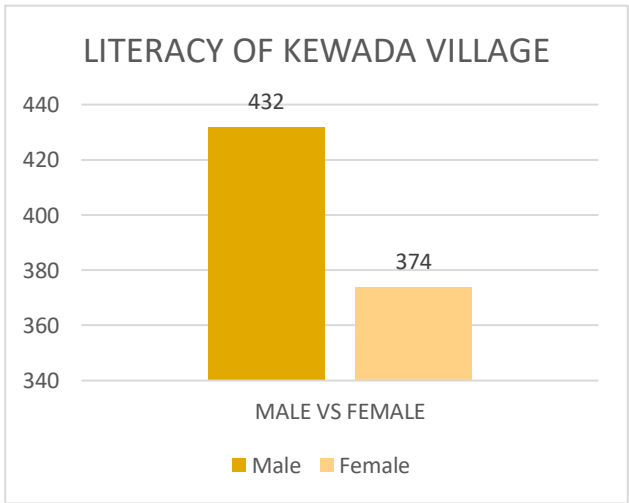
Population Distribution:

Sex Ratio: Average Sex Ratio of Kewada village is 938 which is higher than Gujarat state average of 919. Child Sex Ratio for the Kewada as per census is 1154, higher than Gujarat average of 890.

Literacy: Kewada village has higher literacy rate compared to Gujarat. In 2011, literacy rate of Kewada village was 85.47 % compared to 78.03 % of Gujarat. In Kewada Male literacy stands at 87.98 % while female literacy rate was 82.74 %.

Fig. 4.4 Kewada Village Literacy Distrbution (2011 Census)





Cast wise distribution:

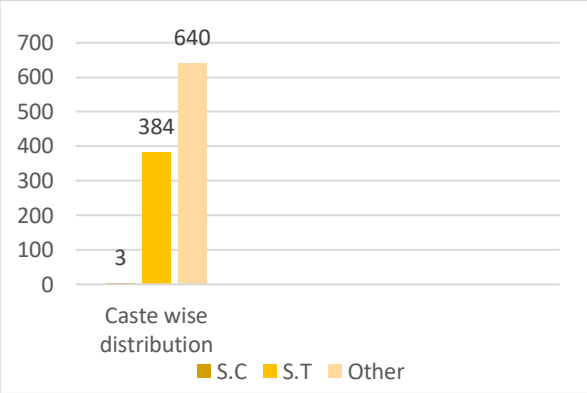


Fig. 4.5 Kewada Village Caste wise Population Distrbution (2011 Census)

4.2.4 Economic generation profile / Banks

The economic status of Kewada gram panchayat is not well as compared the ideal village like Baben. Kewada panchayat collects some money as various taxes and funds from the various sources of income are housing tax, income tax, water tax, electricity bills, cleaning charges, taxes from the House hold. And the other development work is done in village by the Grant Which is given by the State government or Central Government

There is no Bank in Kewada Village. Villagers have to Go to Gundlav village which is near to Kewada Village at the 2 Km Distance.

4.2.5 Actual Problem faced by Villagers and smart solution

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

Following are the various problems faced by the village:

Problems:

- No Drainage Facility
- Infrastructure of primary school undeveloped.
- Transportation issue
- Illumination problems in Panchayt Office, Dairy, School and S.H.C
- No solid waste management system
- Bad condition of Gam Talav

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

Solutions:

- Drainage system should be designed.
- Solid waste management system to be build.
- Solar Lights can be installed at Panchayat Office, Dairy, School and S.H.C
- Bus Stand Should be made.
- Gam talav Development.

4.2.6 Social scenario -Preservation of traditions, Festivals, Cuisine

Festivals:

The Village folk Culture is dance including garba, dandiya, raas, etc.

Traditional wear: They wear traditional cloths like chaniyacholi, kediyo, dhoti, kachhado, gujrati sari, adivasi wear etc

Cuisine: The regular food is Gujrati thali, Indian food, the villagers prefers the vegetables to eat which is they grow in their farm.

4.2.7 Migration Reasons / Trends

In Kewada Village some people are migrating now a days because of better opportunity for jobs, Business, High living standard, good facilities, etc. People are migrating to Valsad and Surat! Because Surat is one of the biggest economic hub of Gujarat. People earn more money in the city rather than village that's why people migrate from village to city.

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

Data collection is first and the foremost work which is need to be done in order to understand the village profile. The data collection need to be done is a proper and systematic way in order to have a clear picture of village. During this covid times it was a tough work for us to do, but we managed to do it with the positive response of the sarpanch and the online media.

4.3.1 Describe Methods for data collection

Below are the ways by which we did our data collection:
Online Research: We surfed the internet for the collection of data of the village especially regarding the 2011 census.

Interacting with the Sarpanch: We have interacted with the sarpanch of the Kewada village Mrs. Prabhavatiben Mukeshbhai Patel. In this interaction we filled the techno survey forms and discussed the various problems with the sarpanch. We particularly focused over knowing the various problems of the village.

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

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

4.3.2 Primary details of survey

Demography: The Kewada village has population of 1027 of which 530 are males while 497 are females as per Population Census 2011. In Kewada village population of children with age 0-6 is 84 which makes up 8.18 % of total population of village. Average Sex Ratio of Kewada village is 938 which is higher than Gujarat state average of 919. Child Sex Ratio for the Kewada as per census is 1154, higher than Gujarat average of 890.

Infrastructure: The village consists of water storage with 2 tanks of total capacity of 95000 Ltr. The village also have drinking water facilities, with R.O plant under-construction. The government buildings of the village has electrification. Village also has irrigation facilities like tube well.Village has 2 anganwadies and 1 primary school also and it has one panchayat office also.In village there are two water ponds also.

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

Literacy: Kewada village has higher literacy rate compared to Gujarat. In 2011, literacy rate of Kewada village was 85.47 % compared to 78.03 % of Gujarat. In Kewada Male literacy stands at 87.98 % while female literacy rate was 82.74 %.

Health and Health Care Facilities: The village people have good health conditions and village have sub PHC.

Transportation: Within the village the roads are in good condition. Within the village the mode of transportation is rickshaws.

Water Facilities: The village has good water facility for drinking and their domestic use. Also have 11 water bodies and tube wells for irrigation. The village does not have R.O facility and is in under construction.

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

The village has no specified size of house, but the Financially Capable villagers have good constructed House and and poor villagers have small size or medium size house. There is no geo tagging done in the Kewada Village.

4.3.4 No of Human being in One House

As per population and house hold number the average Human being in the one House is 4. Each House has 4 persons in the house

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

The village has no specific material. All the material which is required is Transported to village from the nearest town like Gundlav and Valsad. The Out sourced materials are sand Aggregates, Cement, Blocks, Steels and bitumen which is used for the construction of road and building

4.3.6 Geographical Detail

The village is most of forest land with a total land are of 166.88 acers divided as follows:
Agricultural area: 150.43 Hect.

Residential: 16.45 Hect.

Elevation, Latitude and Longitude:
Elevation above MSL: 13 meters

Latitude: 20.6335374

Longitude: 72.9741067

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

Caste	Population
Scheduled Cast Persons	3
Scheduled Cast Males	1
Scheduled Cast Females	2
Scheduled Tribe Persons	384
Scheduled Tribe Males	195
Scheduled Tribe Females	189

Table 4.2 Caste wise distribution

4.3.8 Occupational Detail - Occupation wise Details / Majority business

Total working population of Kewada is 577 which are either main or marginal workers. Total workers in the village are 577 out of which 362 are male and 215 are female. Total main workers are 371 out of which female main workers are 257 and male main workers are 114. Total marginal workers of village are 206.There are many Mango farms in the village.

4.3.9 Agricultural Details / Organic Farming / Fishery

About 90 % of the village land is agricultural land i.e. about 150.43 hect. So, the village have majority occupation as farming. There are no farmers using organic farming and doing fishery.

4.3.10 Physical Infrastructure Facilities - Manufacturing HUB / Ware House

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

4.3.11 Tourism development available in the village for attracting the tourist

There is no tourism spot in the village.

4.4 Infrastructure Details (With Exiting Village Photograph)

4.4.1 Drinking Water / Water Management Facilities

The village has 400 Taps available in their village which provide drinking water. The R.O plant is to be started. There are 6 uncovered well in the village which are inadequate. The village also have 25 hnd pumps in the village with working condition.There are 48 private tube wells in the village There are water tanks in the village with a total capacity of 95,000 ltr. which are:

Overhead Tanks: (20,000 ltr.) (4 no.)
(5000 ltr.) (3 no.)

4.4.2 Drainage Network / Sanitation Facilities

Fig. 4.6 Public toilet under construction (Kewada Village)

Drainage Network: The village does not have any proper drainage facility available in the village. The village has open drainage 2 km to khadi and pond.

Sanitation Facilities: The village houses does have private toilets. There were no public toilet before but, now there is a pubic toilet being built in the village.
The photo of the public toilet constructing in the village is as below:

Fig. 4.7 Village Road (Kewada Village)

4.4.3 Transportation & Road Network

Road Network	Transportation Facility
Village approach Road: 3 km to NH-48 **Main Road:** 3 km **Internal Streets:** 8 **Nearest NH:** NH-48 (3 km)	**Nearest Railway Station:** Valsad (8 km) **Nearest Bus Station:** Gundlav (2km) Internally people can travel through their private vehicles or Auto Rikshaw.

4.4.4 Housing condition

The village houses are both pakka and kuchaa. Village had 10 kuchha and 390 pakka house. Below is a house with bad condition:

Fig. 4.8 House (Kewada Village)

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

Heath Infrastructure:
The village consists of a sub PHC in the village.

Education Infrastructure: The village has 1 primary school and 2 Anganwadi. Out of 2 Anganwadi one is under construction.

Community Hall: The village has one community hall in village.

Library: There is no library available in the village.

Temples: The village has many small temples located within the village.

Administration Facility: The village has one anganwadi also.

Fig. 4.9 House (Kewada Village)

Fig. 4.10 Primary School (Kewada Village)

Fig. 4.11 Temples (Kewada Village)

Fig. 4.12 Anganwadi (Kewada Village)

Fig. 4.13 Panchayat office (Kewada

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

The public buildings like Panchayat office, community hall, primary schools, Anganwadi, water tanks etc. exists in in the village. The Panchayat office requires to be redesign as it is inadequate. Also, the toilets of primary school need a reconstruction.

4.4.7 Technology Mobile/ WIFI / Internet Usage Detail's

There is no Wi-Fi facility available at the panchayat office and not yet to the people of village. The internet usage of the of the village is average. The internet is usually used by the youth of the village and some adults.

4.4.8 Sports Activity as Gram Panchayat

There are no such sports events conducted by the village panchayat.

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

There are no such public garden, park and playground in the village. Though there are ponds in the village but are also not in very good condition.

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

There are no so such facilities.

4.4.11 Any other details

The is a post office in the village and street light project is going on.

4.5 Electrical Concept

4.5.1 Renewable energy source planning particularly for villages

There is no renewable energy source, there are solar street light in the village but in bad condition.In renewable source solar power plant or solar cells on a particular building is the idea. About this new idea also we are thinking to provide. Solar panel design is also being done on village by us.

4.5.2 Irrigation Facilities

There are irrigation facilities in the village. There are 48 tube wells, 1 canal, 25 well and 2 ponds in the village.This facilities are not enough so we have given the design of pond and underground water tank design to the village. After this the water storage capacity of village will increase and it will be more beneficial to the villagers.

The pond design is with pond liner. Pond liner will ultimately reduce the seepage and it will be more beneficial because the seepage loss water will reduce and people can take benefit of that extra water for irrigation or for any purposes.
The Design of water tank which is given that may apply for any building which consist vast built up area like panchayat office and anganwadi in which this harvesting system can be implemented so that the water can be stored and in season of no water we can use that water with proper treatment.

4.5.3 Electricity Facilities with Area

Fig. 4.14 Electric transformer and pole (Kewada Village)

The area is equipped with good electrical network. The village receive more than 6 hours of electricity. The electric supply is also provided for the farming.
The village has no problem of electricity as per requirement it is getting electricity.
The village has no any big electricity unit like industry so the requirement is less.
The village receives electricity for 8 hours from dakhsin Gujarat vij company limited for farming purpose and irrigation. The electricity for agriculture purpose is 3 phase A.C. supply and for general or domestic purpose single phase 230v A.C. supply is received for 24 hours by the villagers. All the public places are electrified with minor faults.
Village also have solar street lights as renewable source of electricity but the street lights are not in much good condition.

4.6 Existing Institution like - Village Administration – Detail Profile

4.6.1 Bachat Mandali

There is no such bachat madali in the village.
Bachat mandali exists in nearer village gundlav which is approx. 2 km from kewada.

4.6.2 Dudh Mandali

There is Dudh co-operative society in the village.
Dudh mandali also exists to the nearer village gundalav.

4.6.3 Mahila forum

There is no Mahila forum in village.

4.6.4 Plantation for the Air Pollution

The village has not done any activity regarding this. But, there is enough vegetation in the village. The village is already about 8 km far from Valsad city and the city is also not more urbanized so there is already no any chace of more pollution. Village already have good amount of forest area

also. Village is already located in south india which is one part of western ghats also so this part is already green.
As per the current urbanization trand the plantation is also required in kewada due to industrialization and all.
Almost there is only agricultural and residential area in village. Forest area is not certain.

4.6.5 Rain Water Harvesting - Waste Water Recycling

There is no such type of planning in the village for Rain Water Harvesting. Though they require rain water harvesting.
Currently there are open water bodies in village which does indirect rain water harvesting like ponds bur there is no specific things which stores the water.

4.6.6 Agricultural Development

There is 150.43 Hectare of agricultural land in village.
The village has good irrigation facilities in the village proving a good environment for the farming.
Also village has good farming equipment. The techniques has evolved over the time.
Village is having already two ponds and there ate lots of tube wells also.
As per current scenario village is not having any water crisis for irrigation.

4.6.7 Any Other

There are no other administration institution.
Village is having 16 water bodies.
It has one Panchayat Office.
Village has two Anganwadies.
Village has total 7 water tanks which has total capacity of 95000 litre of water.
Village is having one SHC.
Village is having one Community hall without TV.

CHAPTER 5: Technical Options with Case Studies

5.1 Concept (Civil)

5.1.1 Advance Sustainable construction techniques / Practices and Quantity Surveying

The term 'advanced sustainable construction technology' covers a wide range of modern techniques and practices that encompass the latest developments in materials technology, design procedures, quantity surveying, facilities management, services, structural analysis and design, and management studies.

Various Advance techniques:

- **Building information modeling (BIM).**

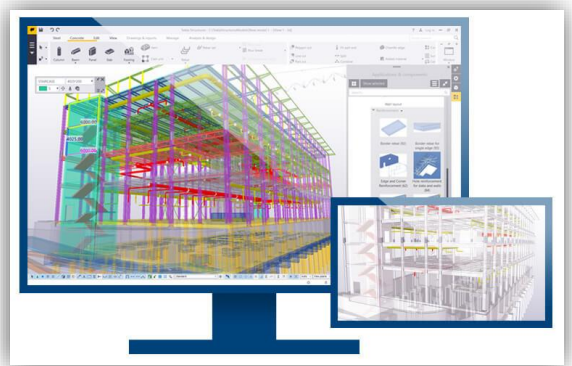


Fig. 5.1 Building information modeling

Building information modeling (**BIM**) is a process supported by various tools, technologies and contracts involving the generation and management of digital representations of physical and functional characteristics of places. Building information models (BIMs) are computer files (often but not always in proprietary formats and containing proprietary data) which can be extracted, exchanged or networked to support decision-making regarding a built asset. BIM software is used by individuals, businesses and government agencies who plan, design, construct, operate and maintain buildings and diverse physical infrastructures, such as water, refuse, electricity, gas, communication utilities, roads, railways, bridges, ports and tunnels.

The concept of BIM has been in development since the 1970s, but it only became an agreed term in the early 2000s. Development of standards and adoption of BIM has progressed at different speeds in different countries; standards developed in the United Kingdom from 2007 onwards have formed the basis of international standard ISO 19650, launched in January 2019.

- **Construction Innovation Hub**.

Fig. 5.2 Construction Innovation Hub

CIH is tasked with changing the way buildings and infrastructure are designed, manufactured, integrated and connected in the built environment and as a catalyst for change driving collaboration. It is hoped will develop, commercialize and promote digital and manufacturing technologies for construction, to build smarter, greener and more efficient buildings.

Fundamental to the CIH approach is the recognition that the way buildings are constructed is outdated- a building is

typically hand- built, nearly every time to order, using bespoke designs and different supply chains. If the car industry used this model, costs would rise, quality would vary widely and there would be higher running costs and risks to safety and the environment.

- **Site investigation and surveying.**

Fig. 5.3 Site investigation and surveying

Before the engineer can design a foundation intelligently, he must have a reasonably accurate conception of the physical properties and arrangement of the underlying materials. The field and laboratory investigations required to obtain this essential information are called soil exploration or site investigation.

The primary objective of a site investigation is to determine as accurately as may be required:

- The nature and sequence of strata;
- The ground water conditions at the site;
- The physical properties of soil and rock underlying the site;
- The mechanical properties, such as strength and compressibility of different soil or rock strata
- Other specific information, when needed, such as the chemical composition of the groundwater, and the characteristics of foundations of the adjacent structure.

5.1.2 Soil Liquefaction

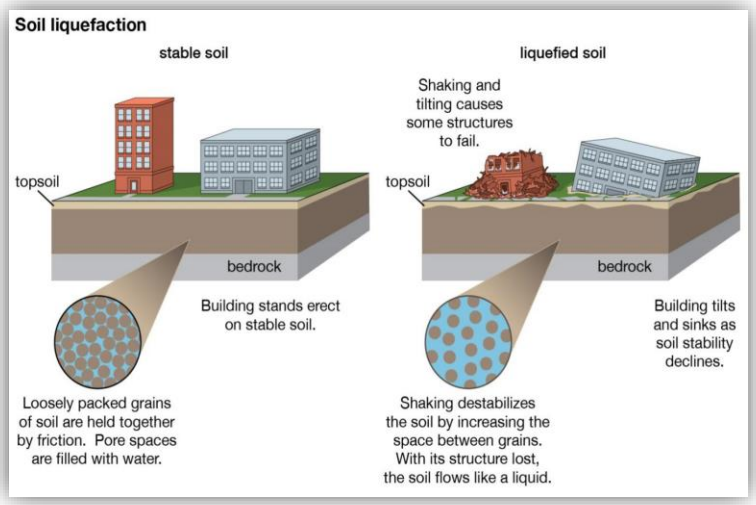


Fig. 5.4 Soil liquefaction

Soil liquefaction, also called **earthquake liquefaction**, ground failure or loss of strength that causes otherwise solid soil to behave temporarily as a viscous liquid. The phenomenon occurs in water-saturated unconsolidated soils affected by seismic S waves (secondary waves), which cause ground vibrations during earthquakes. Although earthquake shock is the best known cause of liquefaction, certain construction practices, including blasting and soil compaction and vibro-flotation (which uses a vibrating probe to change the grain structure of the surrounding soil), produce this phenomenon intentionally. Poorly drained fine-grained soils such as sandy, silty, and gravelly soils are the most susceptible to liquefaction.

Granular soils are made up of a mix of soil and pore spaces. When earthquake shock occurs in waterlogged soils, the water-filled pore spaces collapse, which decreases the overall volume of the soil. This process increases the water pressure between individual soil grains, and the grains can then

move freely in the watery matrix. This substantially lowers the soil's resistance to shear stress and causes the mass of soil to take on the characteristics of a liquid. In its liquefied state, soil deforms easily, and heavy objects such as structures can be damaged from the sudden loss of support from below.
Buildings constructed on loose soil pitch and tilt easily when liquefaction occurs, since the soil no longer supports the structures' foundations. In contrast, structures anchored to bedrock or stiff soils in earthquake-prone areas suffer less damage, because less vibration is transmitted through the foundation to the structure above. In addition, buildings anchored to bedrock have a reduced risk of pitching and tilting.

5.1.3 Sustainable Sanitation

Fig. 5.5 Sanitation Chain

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

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

5.1.4 Transport Infrastructure / system

Smart transport and smart transport infrastructure contribute to the building and designing of a smart city by making it more valuable (with a better use of parking facilities), livable (less noisy, free of accidents, more respectful of environment at large), more connected (internet networked for using information from the users (for adapting the services and capacities to serve the customer) and for providing it to them (localization of road accident or incidents with public transportation) and more interconnected (stations becomes kinds of cities inside city).
No matter how advanced the city gets in terms of technology and machinery, it can be termed smart only if it could analyze, predict and incorporate things on its own. Well Artificial Intelligence and Internet of things are certainly the answer to this and would very much sustain to be successful in proving and making the infrastructure smarter and efficient. Let us have a look at some of the innovative smart city solutions which is adapted in various niches of the society.

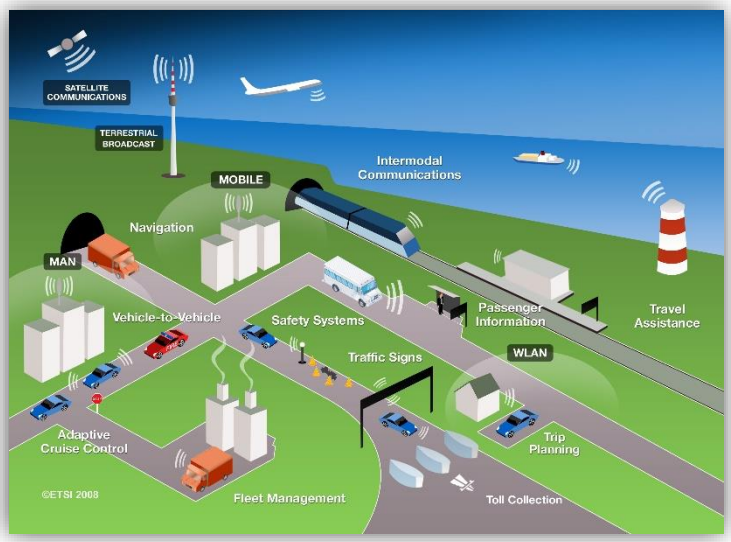


Fig. 5.6 Future Intelligent System

Safety and Security Solutions

Whether in generation, transmission or distribution, utilities must protect their infrastructure, their property, and their personnel from vandalism, theft and malicious attacks. Traditional security measures have included access control, intrusion detection, and video surveillance. Now, thanks to continually accelerating advancement, the capabilities of today's technologies to deter, detect, delay, assess, communicate and respond to physical and cyber security threats far surpass those of even a few years ago.

Energy Efficiency and Monitoring

Companies operating combined heat and power units or boiler systems can obtain quick and easy access to relevant system data via the Master Energy Control (MEC) Remote web portal. The data can be called up with any commercially available desktop PC or smartphone. The visualization of current operating values ensures that there is a comprehensive overview of the system, as well as convenient and cost-effective remote monitoring. MEC Remote also enables comprehensive remote support from Bosch service experts. For example, fault analyses or parameterization can be carried out quickly and efficiently. This results in optimized service costs and increased system availability.

Mobility and Fleet Management

Today's telematics services offer fleet operators detailed real-time information for intelligent fleet management. The services allow them to reduce total costs per vehicle, schedule inspections and repairs more effectively, and manage vehicle capacity utilization more conveniently. This management process aims at greater transparency in terms of vehicle condition and servicing. The benefits such as scheduling of inspection and repairs reduces a lot of time and cost thereby increasing fleet productivity.

Building Connectivity and Automation

The Connected Building solution links together key building equipment inside commercial buildings. The software analyses and interprets building data and transforms it into valuable information. It enables building owners and managers to remotely monitor and control their buildings along with infrastructure. It gradually enables new services for data driven business models and optimizes usage efficiency though space management. Predictive maintenance here too offers cost saving and higher efficiency.

E-Governance and Data Management

The central communication and integration platform links municipal and public services. It connects city and community stakeholders together with certain parts of the public infrastructure and other service providers. Today's technology and workforce has the potential to turn scrap into gold and develop new smart city services even faster and secure than before. The data available is presented in a better way considering the community related information. Another important step could be the usage of mobile application which would provide real time information and services.

Electronic Mobility and Charging

The free charging apps allow drivers of electric vehicles to conveniently charge their cars using public charging infrastructure. Using the apps, you can locate and use just about any web-enabled public charging point. Electro mobility made easy, whenever and wherever you want. Through faster e-mobility, drivers can go online, search and reserve available charging. Moreover they get access to all public charging points on a given platform under a single contract making them barely think about the charging time and cost.

Climate Changes and Monitoring

The micro-climate monitoring system is a comprehensive air quality monitoring system that helps measure and evaluate the concentration of air pollutants in a specific region. Both, governments and industries, can leverage data metrics collected from the system to devise stringent air pollution control measures. Evaluation and prediction of current and future trends on ambient air pollution levels and Integration with real time safety and compliance tracking system.

Well adapted solutions mentioned above is still not feasible to many of the developing countries, Systematic approach and continuous development is efficiently the demand of the hour and the most important resource. Let us also have a look at some of the newest products in the market, which would necessarily bring the initial changes.

5.1.5 Vertical Farming

Fig. 5.7 Vertical Farming

Vertical farming is a method of producing crops that's quite different from what we normally think of as farming. Instead of crops being grown on vast fields, they're grown in vertically, or into the air. This normally means that the "farms" occupy much less space than traditional farms: think farming in tall, urban buildings vs. farming outdoors in the countryside.

Vertical farming is credited to Dickson Despommier, a professor of ecology at Columbia University, who came up with the idea of taking urban rooftop gardens a step further, and creating vertical farming "towers" in buildings, that would allow all of a building's floors, not just the rooftop, to be used for producing crops.

Most vertical farms are either hydroponic, where veggies are grown in a basin of water containing nutrients, or aeroponics, where the plants' roots are sprayed with a mist that includes water and the nutrients required to help the plants grow. Neither require soil for the crops to grow. Usually artificial grow lights are used, though in places blessed with an abundance of natural sunlight, it might be a combination.

And, in some places, it seems to be working quite well. Sky Greens is in Singapore, a country with a population of more than 5.5 million on a main island that's just 26 miles wide and 14 miles long. In a four-story rotating greenhouse, the company produces 1 ton of greens each day, impressive for a country that imports about 93 percent of its produce, since there's little available land.

Back in the States, AeroFarms, based out of Newark, NJ, operates several farms. Its global headquarters is a 70,000-sq. ft. vertical farming behemoth, the largest in the world, and can harvest up to 2 million pounds of produce annually. Additionally, AeroFarms helps area children get a little closer to the foods they eat. In a partnership with a local elementary school, students actually harvest their own greens in a 50-sq. ft. AeroFarms unit in their dining hall.

Benefits of Vertical Farming:
While vertical farming is still relatively new, there are some real benefits:

1. There's year-round crop production.
Say goodbye to seasonal crops. Because vertical farms can control all of the technology required to grow the produce, there's really no such thing as the wrong season. If a head of lettuce needs a certain amount of humidity and light, a vertical farm can arrange that. A growing season of just a few months is replaced with a year-round production.
Bonus: without things like bugs and weeds, vertical farms don't need to use pesticides and other harmful chemicals to ensure plants keep growing.

2. They're weatherproof.
Every farmer knows that unseasonably cold or hot temperatures can affect an entire harvest, while a natural disaster like flood or hurricane can derail them for years. In a controlled environment like a vertical farm, there's no need to fear Mother Nature.

3. They use less water conservation.
Generally, vertical farms use less water than traditional farms. Most data points to a 70-percent reduction in water use compared to normal farms. As water becomes more scarce, particularly in communities already suffering from droughts, this is huge.

4. There's less spoilage.
Without the risk of fluctuating weather conditions or pesky critters, there's a lot less food waste. On traditional farms, up to 30 percent of harvests are lost each year. (3) On vertical farms, that number goes way down.
Additionally, the food from vertical farms is usually sold locally, reducing transportation emissions and time from farm-to-table. Instead of several days of transport, during which foods can go bad, produce can be in the hands of a consumer in just hours.

5. They take up less space.
In vertical farming, one acre of indoor space is the equivalent of 4-6 outdoor acres. (4) A lot less space is necessary to produce the same amount of produce, particularly useful in cities, where outdoor land is limited. Instead of building out, vertical farms allow people to build up.
They also create farms out of places that already exist, like abandoned warehouses and buildings. AeroFarms' space, for instance, was a nightclub space that was abandoned. There's no need for new construction, because we can breathe new life into old spaces.

How Vertical Farming Works:
There are four critical areas in understanding how vertical farming works:
1. Lighting
2. Physical layout
3. Growing medium
4. Sustainability features.

Firstly, the primary goal of vertical farming is producing more foods per square meter. To accomplish this goal, crops are cultivated in stacked layers in a tower life structure. Secondly, a perfect

combination of natural and artificial lights is used to maintain the perfect light level in the room. Technologies such as rotating beds are used to improve lighting efficiency.

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

Advantages and Disadvantages of Vertical Farming:

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

Advantages:

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

Disadvantages:

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

5.1.6 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure

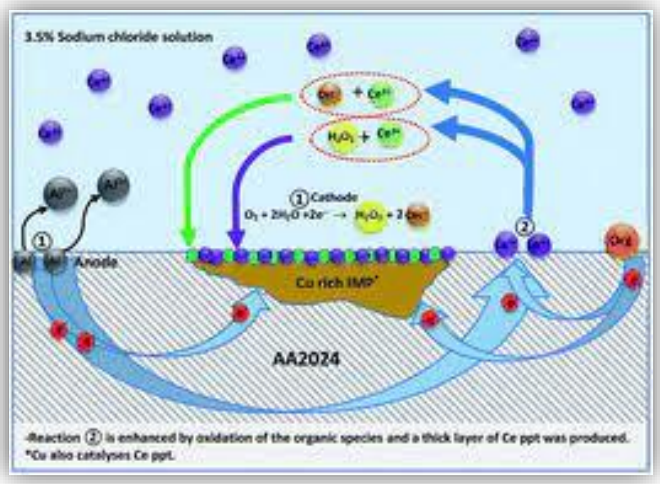


Fig. 5.8 Corrosion Prevention Mechanism

In the case of Reinforced concrete structure the ingress of moisture or air may lead to corrosion of steel, cracking and spalling of concrete cover thereby reducing durability of concrete structure. Repair ha been suggested as the protective solution for damaged structure due to corrosion. Though concrete is quite strong mechanically, it is highly susceptible to chemical attack and thus structure gets damaged and even fail unless some preventive measures are adopted to counteract this and thereby increasing the durability of structure.

Overall, there is very little published empirical evidence that provides insight into the durability of silane treatments and their long-term residual protection (i.e. following at least 10 years of service). Such a gap in knowledge is undesirable given the scale of infrastructure treated with hydrophobic treatments such as silanes.

5.1.7 Sewage treatment plant

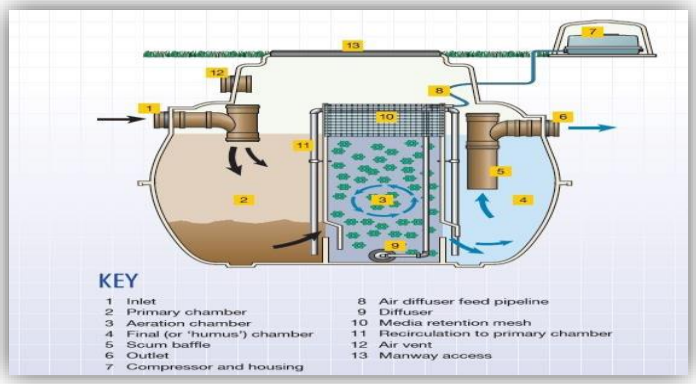


Fig. 5.9 Sewage Treatment plant

Human health and environment are mainly affected by the direct disposal of industrial and human effluents into natural resources without any treatment. Sewage treatment is necessary to reduce the toxicity of sewage and maintain a safe and healthy environment, as well as promote human welfare.

Sewage Treatment Process

Sewage contains a huge amount of organic matters which are toxic. Microorganisms are widely used in the sewage treatment plant for removing this toxic organic matter. Sewage or wastewater treatment plant consists of two stages.

Primary Treatment:

It involves the removal of large or small-sized components in the wastewater through physical processes.

Biological Treatment:

Aerobic microorganisms are inoculated into the sewage treatment plant. These microbes utilize the organic components of the sewage and reduce the toxicity. This can be measured by BOD (Biological oxygen demand).

After the biological treatment, the sludge is pumped from the treatment plant into a large tank. This large tank consists of anaerobic bacteria which lead to the digestion of sludge. During digestion, biogas is produced and it is used as an energy source. Hence, Sewage treatment plant design and sewage management play a crucial role in the maintenance of human welfare.

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

5.1.8 Technical Case study on “Motera Stadium”

Redevelopment of Motera stadium is planned with the main objective of building an iconic structure and world’s largest stadium in terms of seating capacity, which is said to be 1,10,000 seats. The study includes tracking of the project for minimizing the delays and cost over runs using appropriate measures and emphasizes on the execution, control and monitoring of the activities. It includes the study of various departmental management like material management, Equipment management, Quality management, Safety management, Contract administration. An attempt to understand and apply lean and last planner concepts was made.

The Motera stadium is the home ground of the Gujarat Cricket Association. Despite the immensity of the project, the stadium was constructed within a period of three years. The stadium consists of

four team dressing rooms and facilities, 76 corporate boxes, state-of-the-art club facilities with three practice grounds, an indoor cricket academy, and an Olympic-size swimming pool.
The stadium was planned and designed by POPULOUS a sports-architecture firm based in Australia and was constructed in collaboration with India's top contractor Larsen & Toubro.
Just like any other stadium, Sardar Patel Stadium follows the exposed-concrete design. While stadiums are generally built with repetitive structural elements, the Sardar Patel Stadium was constructed with precast concrete segments to ensure faster and high-quality construction.

About Project:

- Demolition of Old Motera Stadium: Sept'15-Dec'15
- Proposal for New Motera Stadium (Tender Floating) : January'16
- Client: GCA (Gujarat Cricket Association)
- Site Area: 63 Acres
- Project Cost: 700 Cr
- Project Duration: 2 years (construction period) Dec'16-Dec'18
- Type of Contract: Design and Build

Major Stakeholders:
Client: Gujarat Cricket Association
Consultant: STUP Consultants Pvt. LTD
Contractor: L & T Construction
Salient Features:

- World's largest seating capacity of 1,10,000 spectators.
- Hi-tech facilities like gym, restaurant, club house, practice grounds, cricket academy and sports research centre.
- Provision for parking of maximum possible vehicles (4200 four wheelers, 12000 two wheelers).
- STP (sewage treatment plant) plant set up space for treating of sewage and proper disposal of waste.

Master Plan and overall job layout
The entire Main Stadium is divided into 8 Zones:
ZONE-1: VIP Pavilion (complete in-situ)
ZONE-4: Media centre (Precast+ cast in-situ)
ZONE-2, 3, 5, and 6: Typical bay construction (Precast)
ZONE-7, 8: Ramp (cast in-situ)

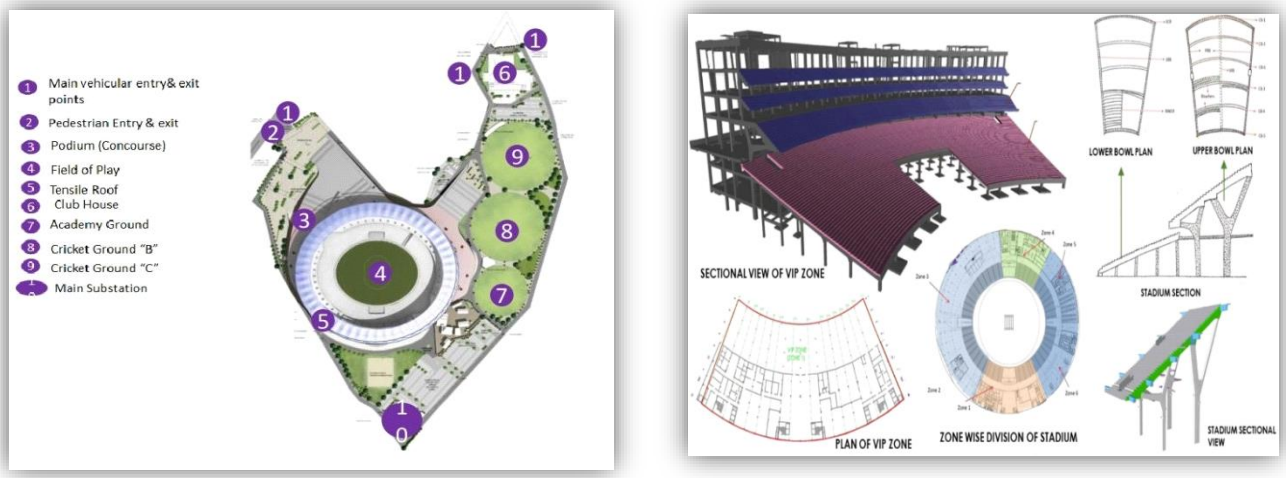


Fig. 5.10 Work Plan and design

Overall Construction Methodology

- Site mobilization of all the resources including manpower and soil testing before commencement date.
- Mobilization, Surveying and setting out the plan on site.
- Excavation and foundation works of VIP/zone 1 and zone 2 in progress IV.
- Zone 1, 2, 3 and 4 podium in progress and zone 5 excavation in progress V.
- Zone 1, 2, 3, 4 and 5 completion of podium slab and zone 6 foundation works in progress VI.
- Zone 1, 2 and 4 Upper bowl bleacher erection, VVIP (suite) level slab and then steel truss erection in progress.
- Zone 3, 5 and 6 raker beam and bleacher erection in progress.
- In zone 1, 2 and 4 Completion of upper bowl bleacher erection, inner lower bowl raker element erection in progress Zone 3, 5 and 6 Upper bowl bleacher erection in progress.
- Zone 1, 2 and 4 completion of plant room level, inner lower bowl raker element erection in progress.
- Zone 3, 5 and 6 Upper bowl bleacher erection in progress.
- Zone 1 steel roof erection started inner lower bowl raker element erection in progress.
- Zone 3, 5 and 6 completion of upper bowl bleacher, steel roof erection in progress.
- Zone 1 steel roof erection in progress. Zone 6 lower bowl bleacher erection in progress.
- Completion of roof membrane erection.
- Overall completion of stadium as well as other structures and then handing over.

Type of Bay Details:

Precast Elements to be erected are:

I. Upper Bowl Elements:
- H grid Y column (HY)
- G grid Y column (GY)
- Primary Radial Beam (PRB)
- Circumferential Beam (CB)
- Secondary Radial Beam (SRB)
- Bleacher Seating Unit (BL)

II. Lower Bowl Elements:
- Lower Radial Beam (LRB)
- Lower Circumferential Beam (LCB)
- Raker Seating Unit (R)

III. Staircase Connecting Upper and Lower Bowl:
- Vomitory Staircase (VMSL,VMSF)
- HY Staircase (PLS, PSF)

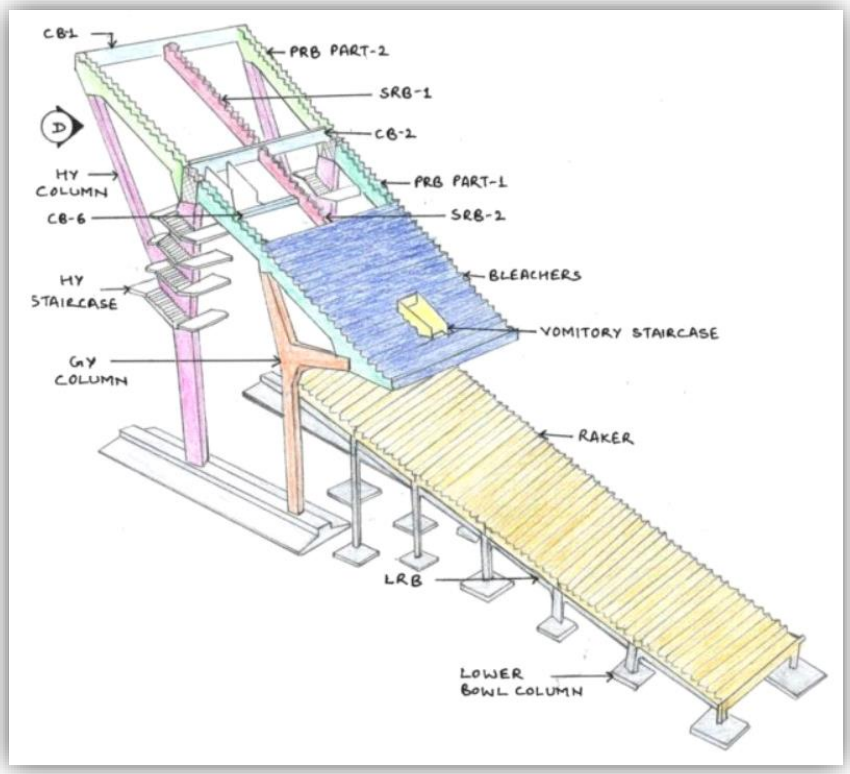


Fig. 5.11 Bay Details

5.2 Concept (Electrical)

5.2.1 Programmable Load Shedding

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.

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.

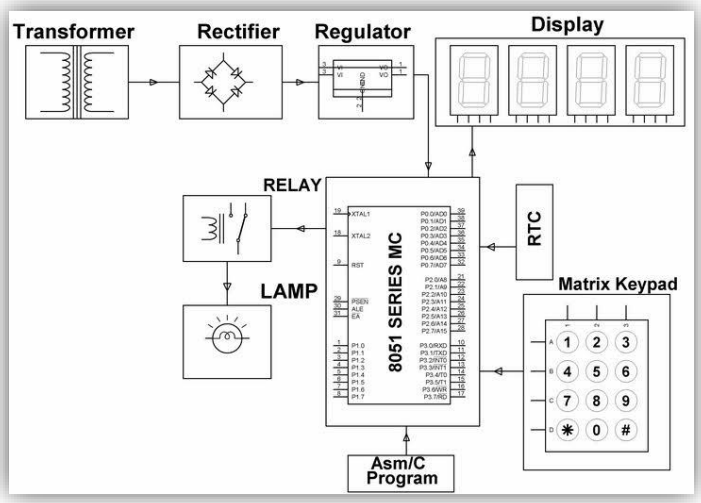


Fig. 5.12 Circuit Diagram

Load shedding is what electric utilities do when there is a huge demand for electricity that exceeds the supply. Thus, in a distribution system it needs to be precisely controlled for specific period of time. Programmable load shedding time management system is a reliable circuit that takes over the manual task of switch ON/OFF the electrical devices with respect to time. It uses real time clock (RTC) interfaced to a microcontroller of 8051 family. While the set time equals to the

real time, then microcontroller gives command to the corresponding relay to turn ON the load and then another command to switch OFF as per the program. Multiple ON/OFF time entry is the biggest advantage with this project.

5.2.2 Railway Security System using IoT

The Rail Budget 2015 proposed all-embracing use of Information Technology and eGovernance initiatives in Railway functioning, from SMS alert service for passengers, provision for Wi-Fi at Railway Stations, digitized mapping of rail land. Corporate India termed the budget, as 'Technology-Enabled Traveler-Centric'.

Some of the technology initiatives that were announced:

- Open Wi-Fi would be made available at 400 railway stations across the country
- Digitized mapping of Rail land will be initiated to counter encroachment.
- An integrated customer portal is being put in place for customers to access various railway services at one place
- An 'Operation five minutes' will be introduced for issuing unreserved tickets. Under this facility, ticketless passengers can get regular tickets within five minutes of entering station. Unreserved ticket purchase is also expected to be made simpler through smart phones and debit cards
- SMS alert service would be introduced to inform passengers about train arrival and departure
- Mobile charging facility would be made available in all trains and stations. The facility will be extended to general coaches as well.
- Railway helpline number 138 will become operational 24×7. Toll free number 182 will be created for security related complaints.
- CCTVs to be introduced in select trains and suburban trains for women safety
- E-catering will be launched for select meals from an array of choices, ordering food through IRCTC websites at the time of booking tickets.

Indian Railways can have remarkable improvement in asset management using IoT for Rolling Stock like Coaches, Wagons and Locomotives. The optimal use of assets can be facilitated once their exact location is known in real time. Track maintenance can become better and manpower can be effectively utilized.

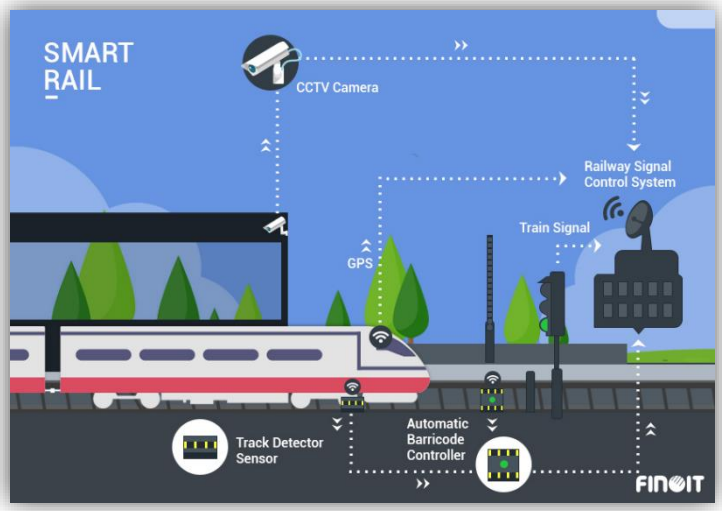


Fig. 5.13 Smart Rail

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

of time and effort is wasted in pursuing the supplies, gaining access to information of vendor. All this can be automated using IoT. The role of purchase department can be limited just to give the purchase order, the balance work can be handled by intelligent systems when the network has information on consignments, stock position etc. IoT is the future, and it has already arrived.

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

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

A “thing” can join in IoT, only when it is tagged as ‘smart’. For becoming ‘smart”, common things or objects, a few actions are needed;

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

5.2.3 Management through Energy Harvesting Concept:

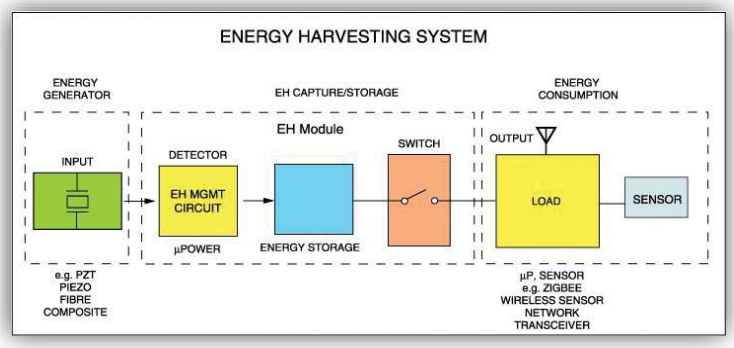


Fig. 5.14 Energy Harvesting System

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

Operation:

The devices converting ambient energy into electrical energy have attracted much interest in both the military and commercial sectors. Some systems convert motion, such as that of ocean waves, into electricity to be used by oceanographic monitoring sensors for autonomous operation. Future applications may include high power output devices (or arrays of such devices) deployed at remote

locations to serve as reliable power stations for large systems. Another application is in wearable electronics, where energy harvesting devices can power or recharge cellphones, mobile computers, radio communication equipment, etc. All of these devices must be sufficiently robust to endure long-term exposure to hostile environments and have a broad range of dynamic sensitivity to exploit the entire spectrum of wave motions.

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

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

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

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

5.2.4 Moisture Monitoring System

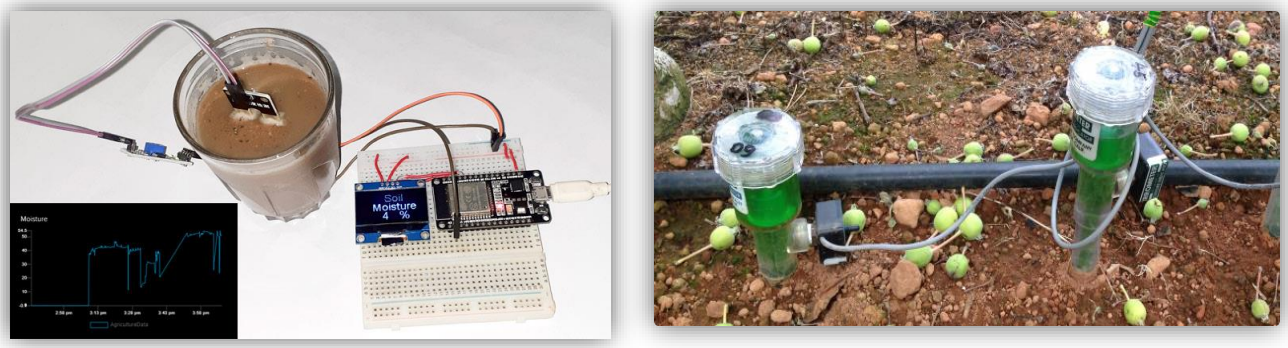


Fig. 5.15 Node-MCU Based Moisture Monitoring System

This is where an autonomous moisture monitor for plants system can help. The system timely monitors the moisture level of the soil. If at the time of monitoring it comes to

know that the moisture level of the soil is lower than recommended then it will raise an audio-visual alert.
Planting a tree in an environment where the seed or the plant would not get water adequately through natural sources like rain or ground water in its initial phases has been always a matter of concern for tree planters.
This alert is then received by the care taker of the plant. When the care taker waters the plant the alarm goes off and the monitoring cycle continues. In this system we use a timer IC to time the monitoring process. A moisture level sensor is used to detect the moisture level of the soil. An LED is used to give visual alarm and a Buzzer is used to give audio alarm to the care taker of the plant. Thus, in this project with the help of a simple combinational circuit and a sensor we can help save a plant by maintaining the moisture level of the soil of the plant, thus keeping the plant healthy.

5.2.5 Home Automation using IoT / Any other methodology

Fig. 5.16 Home Automation

Home automation or **domestics** is building automation for a home, called a **smart home** or **smart house**. A home automation system will monitor and/or control home attributes such as lighting, climate, entertainment systems, and appliances. It may also include home security such as access control and alarm systems. When connected with the Internet, home devices are an important constituent of the Internet of Things ("IoT").

A home automation system typically connects controlled devices to a central hub or "gateway". The user interface for control of the system uses either wall-mounted terminals, tablet or desktop computers, a mobile phone application, or a Web interface that may also be accessible off-site through the Internet.

While there are many competing vendors, there are increasing efforts towards open-source systems. However, there are issues with the current state of home automation including a lack of standardized security measures and deprecation of older devices without backwards compatibility.

Home automation has high potential for sharing data between family members or trusted individuals for personal security and could lead to energy saving measures with a positive environmental impact in the future.

The home automation market was worth US$5.77 billion in 2013, predicted to reach a market value of US$12.81 billion by the year 2020.

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

- Lighting control
- HVAC
- Lawn/Gardening management
- Smart Home Appliances

- Improved Home safety and security
- Home air quality and water quality monitoring
- Natural Language-based voice assistants
- Better Infotainment delivery
- AI-driven digital experiences
- Smart Switches
- Smart Locks
- Smart Energy Meters

5.2.6 PC Based Electrical Load Control

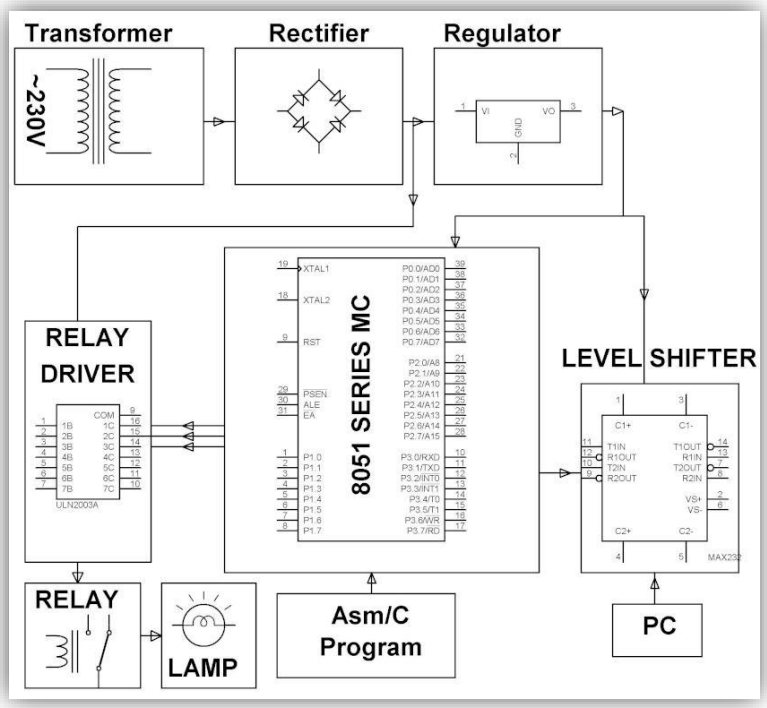


Fig. 5.17 Electrical load control

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.

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.

An **electrical load** is an electrical component or portion of a circuit that consumes (active) electric power, such as electrical appliances and lights inside the home. The term may also refer to the power consumed by a circuit. This is opposed to a power source, such as a battery or generator,which produces power. The PC based electrical load control system can be built with 8051 series Microcontroller, Level Shifter IC, DB Connector, Relays, Relay Driver, Transformer, Diodes, Capacitors, Resistors, LED, Crystal, Lamps, Keil compiler and Language: Embedded C or Assembly.
Keil an ARM Company makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards, and emulators for ARM7/ARM9/Cortex-M3, XC16x/C16x/ST10, 251, and 8051 MCU families.

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

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

5.2.7 Electrical Parameters Measurements

Standard Electrical Units of Measure:

Volt (V):

Volt is the electrical unit of voltage.

One volt is the energy of 1 joule that is consumed when electric charge of 1 coulomb flows in the circuit.

$$1V = 1J / 1C$$

Ampere (A):

Ampere is the electrical unit of electrical current. It measures the amount of electrical charge that flows in an electrical circuit per 1 second.

$$1A = 1C / 1s$$

Ohm (Ω):

Ohm is the electrical unit of resistance.

$$1\Omega = 1V / 1A$$

Watt (W):

Watt is the electrical unit of electric power. It measures the rate of consumed energy.

$$1W = 1J / 1s$$

$$1W = 1V \cdot 1A$$

Decibel-milliwatt (dBm):

Decibel-milliwatt or dBm is a unit of electric power, measured with logarithmic scale referenced to 1mW.

$$10dBm = 10 \cdot \log_{10}(10mW / 1mW)$$

Decibel-Watt (dBW):

Decibel-watt or dBW is a unit of electric power, measured with logarithmic scale referenced to 1W.

$$10dBW = 10 \cdot \log_{10}(10W / 1W)$$

Farad (F):

Farad is the unit of capacitance. It represents the amount of electric charge in coulombs that is stored per 1 volt.

$$1F = 1C / 1V$$

Henry (H):

Henry is the unit of inductance.

$$1H = 1Wb / 1A$$

siemens (S):

siemens is the unit of conductance, which is the opposite of resistance.

$$1S = 1 / 1\Omega$$

Coulomb (C):

Coulomb is the unit of electric charge.

$$1C = 6.238792 \times 10^{18} \text{ electron charges}$$

Ampere-hour (Ah):

Ampere-hour is a unit of electric charge.

One ampere-hour is the electric charge that flow in electrical circuit, when a current of 1 ampere is applied for 1 hour.

$$1Ah = 1A \cdot 1hour$$

One ampere-hour is equal to 3600 coulombs.

$$1Ah = 3600C$$

Tesla (T):
Tesla is the unit of magnetic field.
$1T = 1Wb / 1m^2$
Weber (Wb):
Weber is the unit of magnetic flux.
$1Wb = 1V \cdot 1s$
Joule (J):
Joule is the unit of energy.
$1J = 1\ kg \cdot m^2 / s^2$
Kilowatt-hour (kWh):
Kilowatt-hour is a unit of energy.
$1kWh = 1kW \cdot 1h = 1000W \cdot 1h$
Kilovolt-amps (kVA):
Kilovolt-amps is a unit of power.
$1kVA = 1kV \cdot 1A = 1000 \cdot 1V \cdot 1A$
Hertz (Hz):
Hertz is the unit of frequency. It measures the number of cycles per second.
$1\ Hz = 1\ cycles / s$

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

- Wh – **The Watt-Hour**, The amount of electrical energy consumed by a circuit over a period of time. Eg, a light bulb consumes one hundred watts of electrical power for one hour. It is commonly used in the form of: **Wh** (watt-hours), **kWh** (Kilowatt-hour) which is 1,000 watt-hours or **MWh** (Megawatt-hour) which is 1,000,000 watt-hours.
- dB – **The Decibel**, The decibel is a one tenth unit of the Bel (symbol B) and is used to represent gain either in voltage, current or power. It is a logarithmic unit expressed in **dB** and is commonly used to represent the ratio of input to output in amplifier, audio circuits or loudspeaker systems.
- θ – **Phase Angle**, The Phase Angle is the difference in degrees between the voltage waveform and the current waveform having the same periodic time. It is a time difference or time shift and depending upon the circuit element can have a "leading" or "lagging" value. The phase angle of a waveform is measured in degrees or radians.
- ω – **Angular Frequency**, Another unit which is mainly used in a.c. circuits to represent the Phasor Relationship between two or more waveforms is called Angular Frequency, symbol **ω**. This is a rotational unit of angular frequency $\mathbf{2\pi f}$ with units in *radians per second*, **rads/s**.

5.2.8 Technical Case Study on Sensing Soil Moisture Content

INTRODUCTION:

On the basis of Case Study of International Research Journal of Engineering and Technology Continuous increasing demand of food requires the control in highly specialized greenhouse vegetable rapid improvement in food production technology. In a production and it is a simple, precise method for country like India, where the economy is mainly based on irrigation. It also helps in time saving, removal of human agriculture and the climatic conditions are isotropic, still error in adjusting available soil moisture levels and to we are not able to make full use of agricultural resources Maximize their net profits.

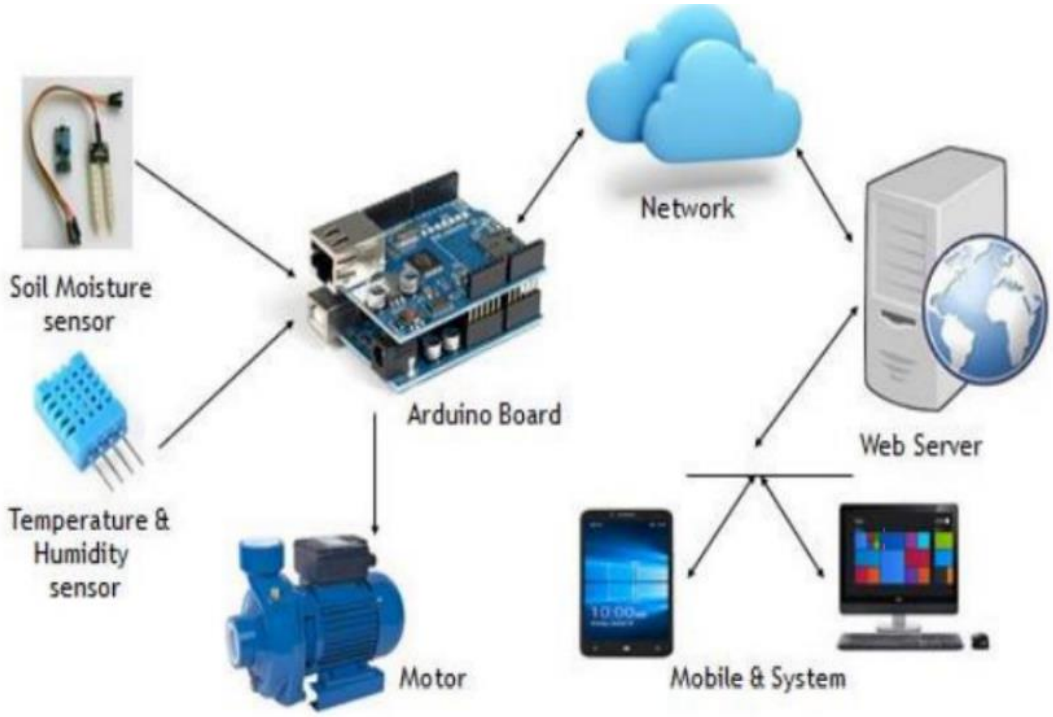


Fig 5.18 Block Diagram of the system of Soil moisture content

The main reason is the lack of rains & scarcity of land Irrigation is the artificial application of water to the soil reservoir water. The continuous extraction of water from usually for assisting in growing crops. In crop production earth is reducing the water level due to which lot of land is it is mainly used in dry areas and in periods of rainfall coming slowly in the zones of un-irrigated land. Another shortfalls but also to protect plants against frost. Very important reason of this is due to unplanned use of Types of Irrigation water due to which a significant amount of water goes to surface irrigation waste. Localized irrigation in modern drip irrigation systems, the most significant Drip Irrigation advantage is that water is supplied near the root zone of sprinkler irrigation. The plants drip by drip due to which a large quantity of water is saved.

IRRIGATION:

Little water is lost to deep percolation if the proper amount is applied. Drip irrigation is popular because it can Irrigation system uses valves to turn irrigation ON and increase yields and decrease both water requirements and OFF. These valves may be easily automated by using labor. Controllers and solenoids. Automating farm or nursery Drip irrigation requires about half of the water needed by irrigation allows farmers to apply the right amount of sprinkler or surface irrigation. Lower operating pressures water at the right time, regardless of the availability of and flow rates result in reduced energy costs.

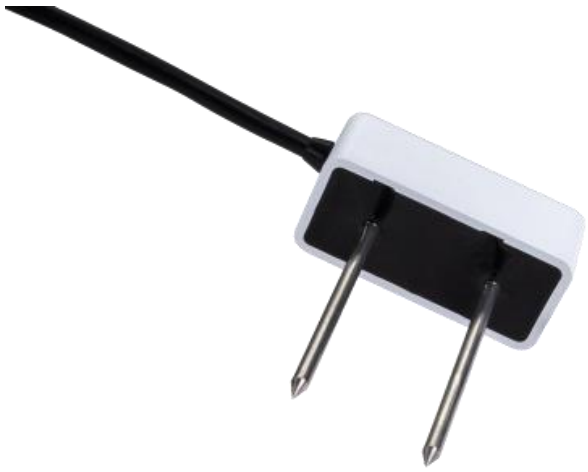


Fig. 5.19 Soil Moisture meter with steel casings

A higher labor to turn valves on and off. In addition, farmers using

degree of water control is attainable. Automation equipment are able to reduce runoff from over Plants can be supplied with more precise amounts of watering saturated soils, avoid irrigating at the wrong time water. Disease and insect damage is reduced because plant of day, which will improve crop performance by ensuring foliage stays dry. Operating cost is usually reduced. Adequate water and nutrients when needed. Automatic Federations may continue during the irrigation process Drip Irrigation is a valuable tool for accurate soil moisture because rows between plants remain dry.

The capacity of soil to retain water is a function of soil texture and structure. When removing a soil sample, the soil being evaluated is disturbed, so its water-holding capacity is altered. Indirect methods of measuring soil water are helpful as they allow information to be collected at the same location for many observations without disturbing the soil water system.

The new soil moisture sensor uses Immersion Gold which protects he nickel from oxidation. Electrodes nickel immersion Fig. 1 Overview of Automated Irrigation System gold (ENIG) has several advantages over more conventional (and cheaper) surface plating such as The above fig 1 explains about important parameters to be HASL (solder), including excellent surface planarity measured for automation of irrigation system are soil (particularly helpful for PCB's with large BGA packages), moisture.

SOIL MOISTURE:

Soil moisture is an important component in the Atmospheric water cycle, both on a small agricultural scale and in large scale modelling of land/atmosphere interaction. Vegetation and crops always depend more on the moisture available at root level than on precipitation occurrence. Water budgeting for irrigation planning, as well as the actual scheduling of irrigation action, requires local soil moisture information. Knowledge of the degree of soil wetness helps to forecast the risk of flash floods, or the occurrence of fog.

The relation which monitors and controls all the activities of drip between content and potential is not universal and depends irrigation system efficiently. The present proposal is a on the characteristics of the local soil, such as soil density model to modernize the agriculture industries on a small and soil texture. Scale with optimum expenditure. Using this system, one the basic technique for measuring soil water content is the can save manpower, water to improve production and gravimetric method. Because this method is based on ultimately profit. Direct measurements, it is the standard with which all other methods are compared.

CHAPTER 6: Swatchh Bharat Abhiyan (Clean India)

Need of Swatchh Bharat mission:

The need for maintaining the right cleanliness, sanitation and hygiene in any country/ community is very essential. It is perhaps the most basic step for preventing the diseases. Young children are mainly affected by poor hygiene/cleanliness and diarrhoea as well malnutrition are two leading causes of under-5 deaths in India. According to a study by WHO, lack of cleanliness leads to an annual loss of over Rs. 6500 every year to each Indian. Unhygienic surroundings are the main reason behind several diseases that are prevalent in the country. A UN report has said that currently, nearly 60 percent of India‟s population practice open defecation which puts them at risk of diseases like cholera, diarrhoea, typhoid. The water of river Ganga is also unsafe for bathing because it contains faecal coliform bacteria (120 times higher than the permitted levels) in large amounts and again the reason is open defecation in our country. World Bank report in 2006 also said that, India losses 6.4% GDP annually because of the poor hygiene and sanitation. It is therefore imperative to have sanitation and hygiene intact, both at personal and community level, to improve health of masses. To promote robust maintenance of cleanliness, the Department of School Education and Literacy, Ministry of Human Resource Development, Government of India has flagged a leaflet Swachh Bharat and Swachh Vidyalaya Campaign detailing the number of government schools without toilets the average cost of constructions, maintenance and repair of toilet blocks and inviting donor individuals or corporates or institutions. This is not a new initiative by current government, earlier UPA government also launched Nirmal Bharat Abhiyan which became integral part of Total Sanitation Campaign (TSC). The main aim of Nirmal Bharat Abhiyan was to provide universal household sanitation coverage by 2012 but it did not create the desired impact even though money poured from government coffers. So Modi government led the launch of Clean India Mission on Mahatma Gandhi birthday (2nd October, 2014) with the aims to provide every rural family with a toilet by 2019.

6.1 Swatchhta needed in allocated village -Existing Situation with photograph


Fig. 6.1 Current situation of village

The village looked clean at its glimpse but when we surveyed its various corner we came to a conclusion that there is need to make people understand the situation prevailing in their village. Like the roads, houses and surrounding appeared clean. But the people used to dump their waste/garbage at a place near by their residence which was actually not visible easily. But from sanitation point of view, it was not acceptable. Because in long run and even during rainy season it can give rise to various deadly diseases like malaria, dengue, etc. Also there is no facility of garbage collection.

6.2 Guidelines - Implementation in allocated village with Photograph

Fig. 6.2 Awareness regarding SBA

To achieve “Swachhta”, the main guidelines are as under:

- Motivate communities and Panchayati Raj Institutions to adopt sustainable sanitation practices and facilities through awareness creation and health education.
- Encourage cost effective and appropriate technologies for ecologically safe and sustainable sanitation.
- Develop, wherever required, community managed sanitation systems focusing on scientific Solid & Liquid Waste Management systems for overall cleanliness in the rural areas.

- Create significant positive impact on gender and promote social inclusion by improving sanitation especially in marginalized communities.
- Bring about an improvement in the general quality of life in the rural areas, by promoting cleanliness, hygiene and eliminating open defecation
- Accelerate sanitation coverage in rural areas to achieve the vision of Swachh Bharat.

6.3Activities Done by Students for allocated village with Photograph

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

CHAPTER 7: Village condition due to Covid-19

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

Interaction with the sarpanch and talati we came to know that various steps were taken by them under the guidance of district collectorate and government of Gujarat such as:

- Supplying foods packages by means of various NGOs and government body.
- 'Doctor at your door step on call' facility implementation initiated by honorable collector sir.
- Establishing quarantine center and isolation center in the village.
- Immediate response to the villagers for help.
- Providing free food for NFSA as well as Non-NFSA ration card holders.
- House to house surveillance by medical them for Covid-19 awareness and detection.

7.2 Activities Done by Students for allocated village with Photographes

Fig. 7.1 Helping the needy

Fig. 7.2 awareness online drive

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

Various mock drills were carried out by the students on web media since it wasn't feasible to go there physically at prevailing situation of Covid.

Students have done the work of spreading awareness for covid precautions.

With the help of Nodal Officer under the Unnat Bharat Abhiyan they have distributed "kadha" for Immunity boosting. This work was highly appreciated by the people.

7.3 Any other steps taken by the students / villagers

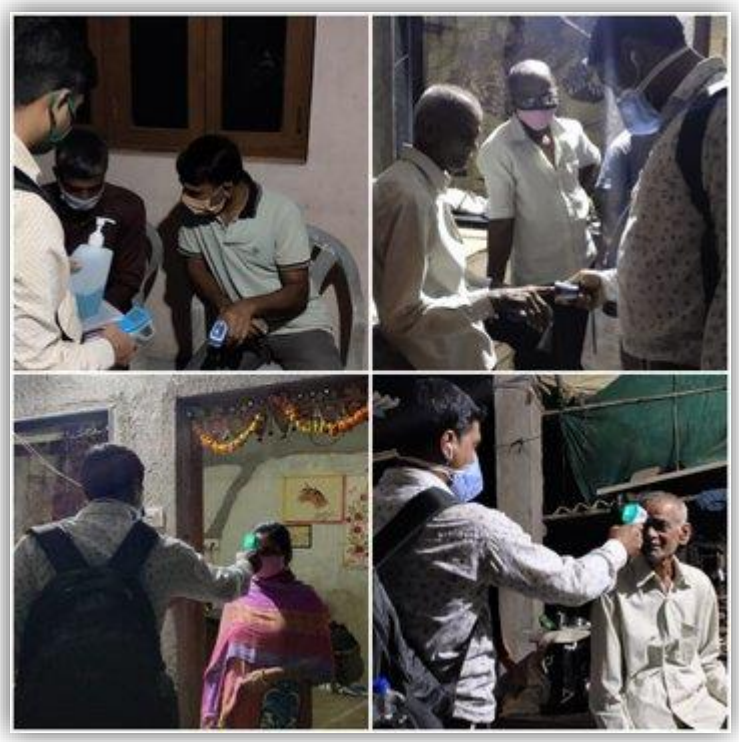


Fig. 7.3 awareness & surveillance drive

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

W.r.t. COVID 19 pandemic, village authorities in close collaboration with higher has taken various initiatives. Close consultation and guidance of the State as well as District authorities is being maintained to ensure that lock down conditions are not violated and norms of social distancing are scrupulously followed to contain the spread of the disease.

Various initiatives were taken at the individual panchayat level which may be followed by others as examples of best practices. Some of them are:

Migrant labour from state who have been found going to their native place on foot at village have been provided shelter and been given rice, drinking water by the officials.

During lockdown and post lockdown thermal scanning and house to house surveillance drive was done by the volunteering and health working of the district.

CHAPTER 8: Sustainable Design Planning Proposal (Prototype Design)- Part- I (Scenario / Existing Situation / Proposed Design in Auto cad / Recapitulation Sheet / Measurement Sheet / Abstract Sheet / Sustainability of Proposal / Any other software)

8.1 Design Proposals

The design proposal are as per the need of the village. As the part of Vishwakarma Yojana part 1 below are the design proposal:

8.1.2 Physical design (Civil): POND

Outcomes of the Design

Currently two ponds are there in Kewada. But as per recommendation by villagers one pond design is been done. This pond is designed for 274 cubic meter full storage capacity. Villagers can use this pond for various purposes like irrigation, drinking and the pond also may help in rain water harvesting

Pond design

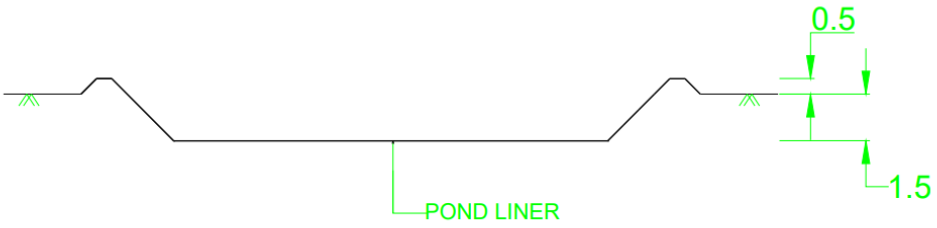


Fig. 8.1 Section X-X (Pond)

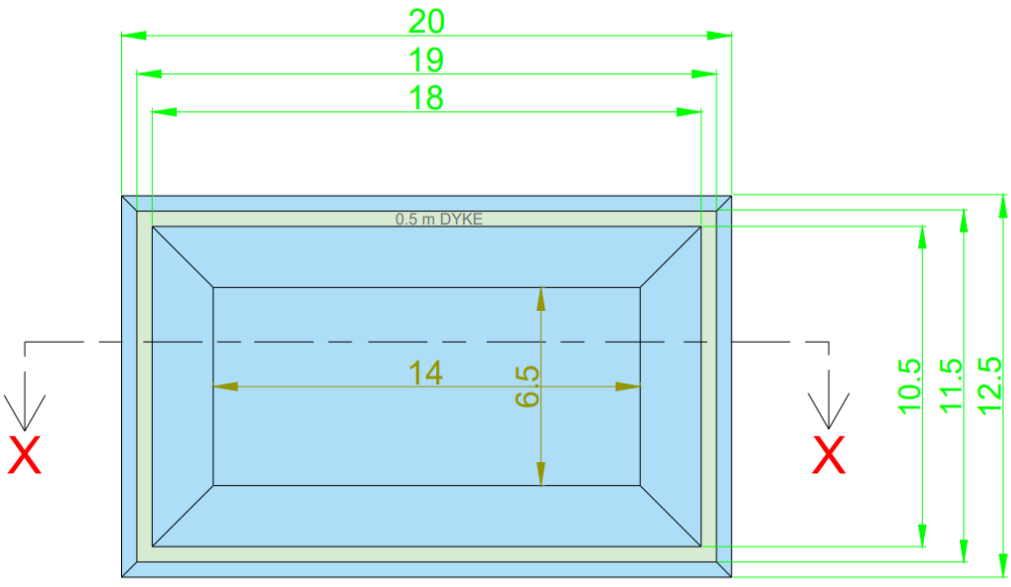


Fig. 8.2 Plan (Pond)

All dimensions are in meters

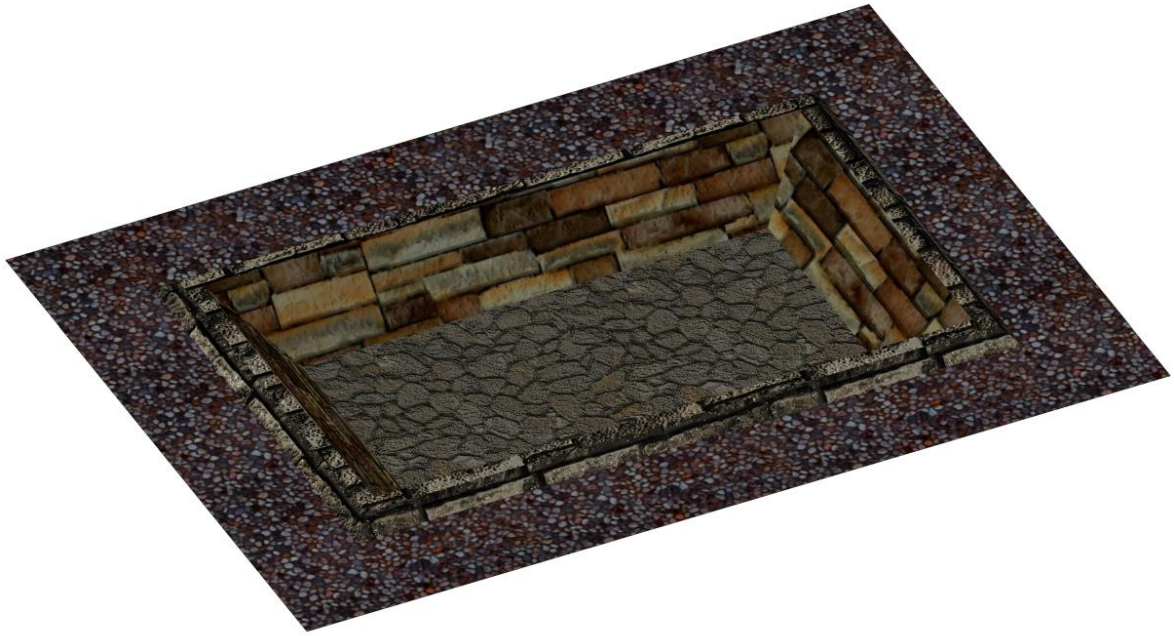


Fig. 8.3 3D Model (Pond)

TOTAL AREA	250 Sq.m	ALL DIMENSIONS ARE IN METRE

Table 8.1 Measurement Sheet (Pond)

Sr.No.	Item Description	No.	Length (m)	Width (m)	Height (m)	Quantity	Unit
1.	Excavation	1	-	-	-	187	m^3
2.	Embankment	1	-	-	-	32.5	m^3
3.	Pond liner	1	-	-	-	245	m^2

Table 8.2 Abstract Sheet (Pond)

Sr.No.	Item Description	Quantity	Rate	Per	Amount (Rs.)
1.	Excavation	187 m^3	90	m^3	16830
2.	Embankment	32.5 m^3	400	m^3	13000
3.	Pond liner	245 m^2	120	m^2	29400
				Total Rs.	59230
		Add 1.5% water charge			888
		Add 10% contingencies charge			5923
		Total estimated cost in Rs.			66041

8.1.3 Physical design (Civil): BUS STOP

Kewada village don't have any transport facilities except private autos. The bus stop design is suggested on the basis of gap analysis and villagers request, so that bus stops at village on a better way. Passengers board and alight from the bus stop in proper way and also can sit on bus stop for waiting. Ultimately Kewada village will have transport facility.

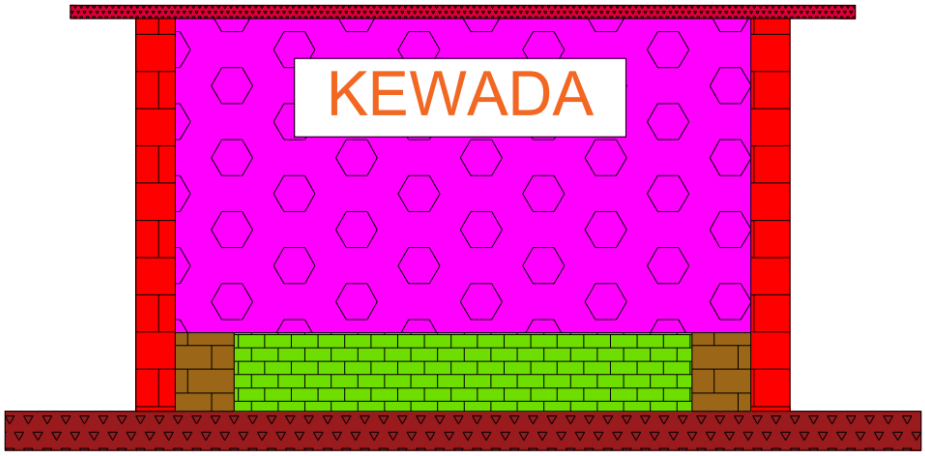


Fig. 8.4 Elevation (Bus Stand)

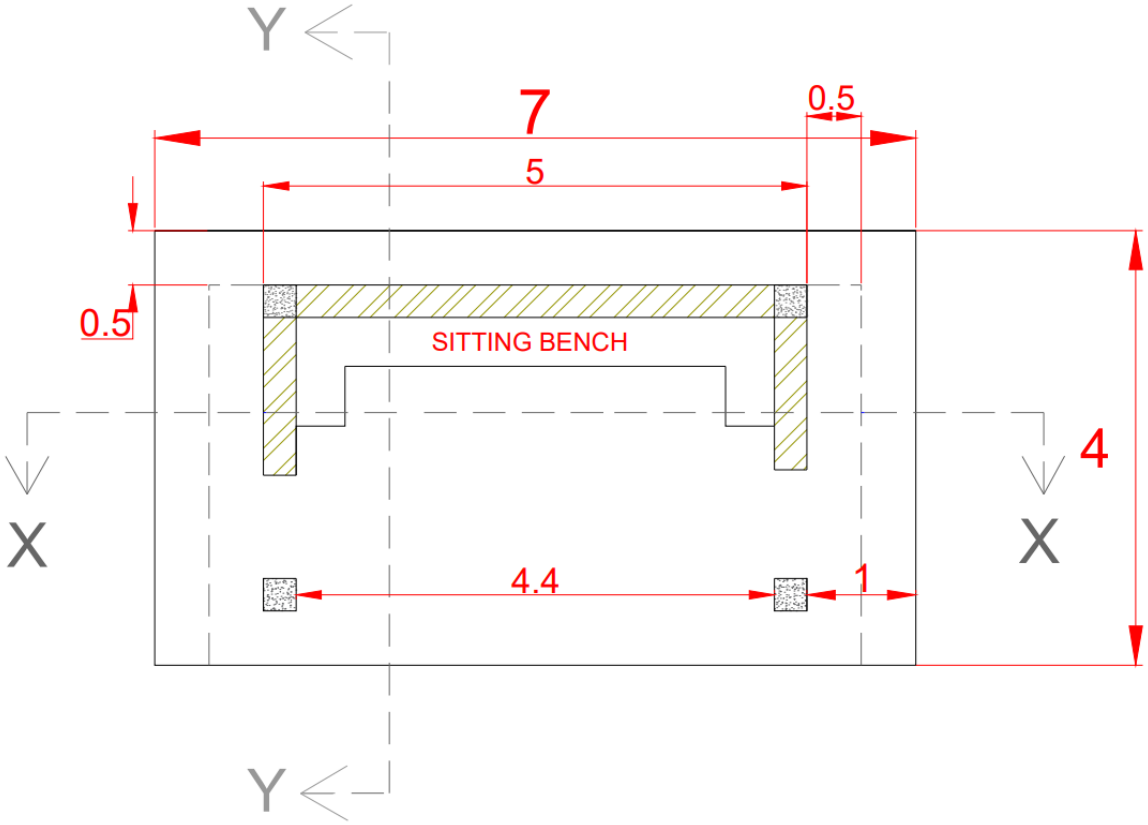


Fig. 8.5 Plan (Bus Stand)

All dimensions are in meters

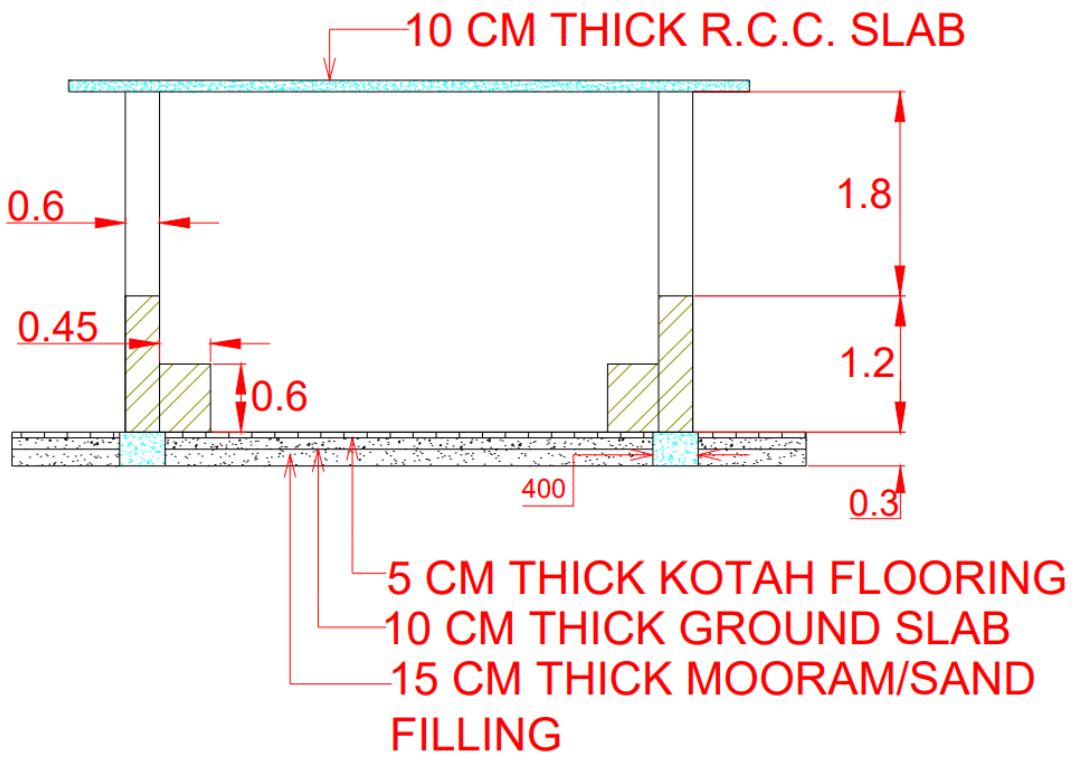


Fig. 8.6 Section X-X (Bus Stand)

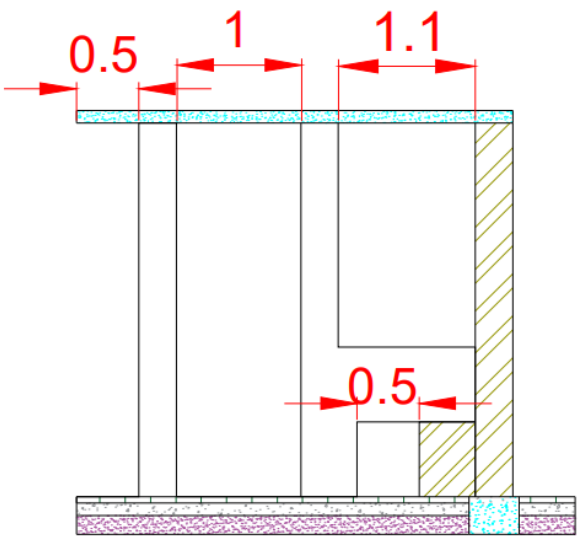


Fig. 8.7 Section Y-Y (Bus Stand)

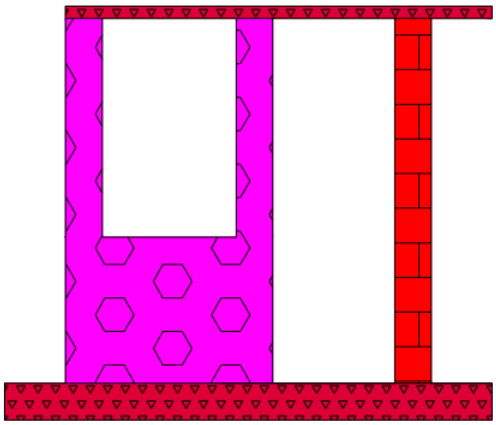


Fig. 8.8 L.H.S View (Bus Stand)

All dimensions are in meters

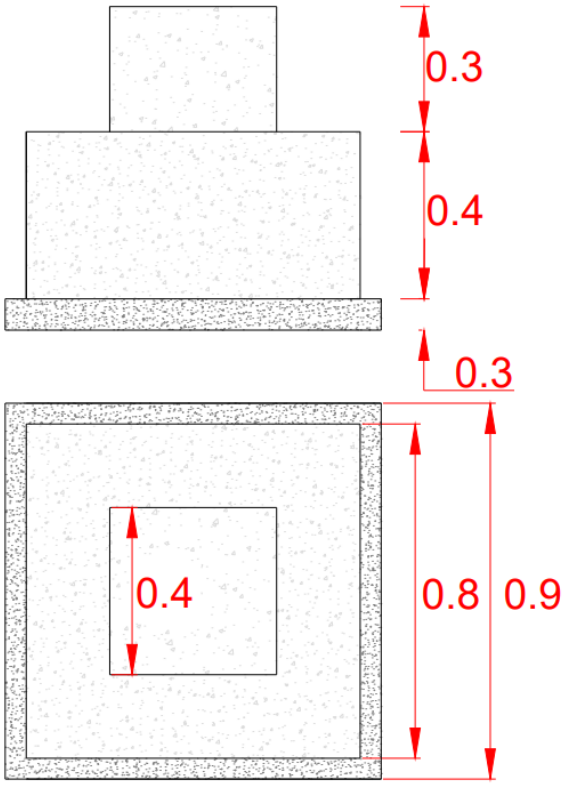


Fig. 8.9 RCC Square Footing (Bus Stand)

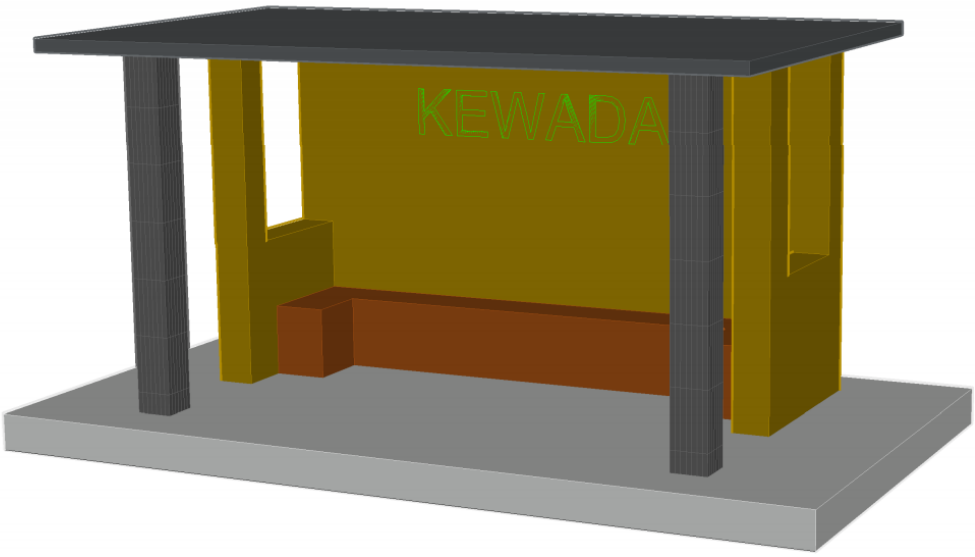


Fig. 8.10 3D Model (Bus Stand)

All dimensions are in meters

All dimensions are in meter	
Design type	Bus stop
Plinth area	28 sq.m
Scale	1:1

Table 8.3 Measurement Sheet (Bus

Sr.No.	Item Description	No.	Length(m)	Width(m)	Height(m)	Quantity	Unit
1.	Excavation	4	0.9	0.9	1.0	3.24	m^3
2.	P.C.C.	4	0.9	0.9	0.3	0.972	m^3
3.	Footing	4	0.8	0.8	0.4	1.024	m^3
		4	0.4	0.4	0.3	0.192	m^3
						1.216	m^3
4.	Plinth beam	2	5.0	0.3	0.3	0.9	m^3
		2	2.4	0.3	0.3	0.432	m^3
						1.332	m^3
5.	Sand filling	2	1.0	4.0	0.15	1.2	m^3
		2	5.0	0.5	0.15	0.75	m^3
		1	4.4	2.4	0.15	1.584	m^3
						3.534	m^3
6.	Ground slab	2	1.0	4.0	0.10	0.80	m^3
		2	5.0	0.5	0.10	0.50	m^3
		1	4.4	2.4	0.10	1.056	m^3
						2.356	m^3
7.	Column	4	0.3	0.3	3.0	1.080	m^3
8.	Roof slab	1	6.0	3.5	0.10	2.10	m^3
9.	Brick work	2	0.3	0.3	3.0	0.54	m^3
		2	1.0	0.3	1.2	0.72	m^3
		1	4.4	0.3	3.0	3.96	m^3
		1	4.4	0.45	0.6	1.188	m^3
		2	0.45	0.50	0.6	0.27	m^3
						6.678	m^3
10.	Kotah flooring	1	7	4		28	m^2
11.	Plastering	8	0.3		3.0	7.2	m^2
		8	0.3		3.0	7.2	m^2

		2	0.95		1.2	2.28	m²

		2	0.15		1.2	0.36	m²
		2	0.95		0.6	1.14	m²
		2	0.45		0.6	0.54	m²
		2	0.5		0.6	0.6	m²
		1	3.5		0.6	2.1	m²
		1	4.4		2.4	10.56	m²
		1	5.0		3.0	15	m²
		2	7.0		0.3	4.2	m²
		2	4.0		0.3	2.4	m²
						53.58	m²

Table 8.4 Abstract Sheet (Bus Stand)

Sr.No.	Item Description	Quantity	Rate	Per	Amount (Rs.)
1.	Excavation	3.24 m³	90	m³	292
2.	P.C.C.	0.972 m³	3500	m³	3402
3.	Footing	1.216 m³	4100	m³	4986
4.	Plinth beam	1.332 m³	4100	m³	5461
5.	Ground slab	2.356 m³	4100	m³	9660
6.	Column	1.080 m³	4100	m³	4428
7.	Roof slab	2.100 m³	4100	m³	8610
8.	Brick work (CM- 1:6)	6.678 m³	3500	m³	23373
9.	plastering	53.58 m²	204	m²	10930
10.	Kotah flooring	28.00 m²	600	m²	16800
11.	paint work	53.58 m²	204	m²	10930
				Total Rs.	98872
		Add 1.5% water charge			1483
		Add 10% contingencies charge			9887
		Total estimated cost in Rs.			110242

8.1.4 Social design (Civil): ANGANWADI

Kewada village consists already two aanganwadis. But both are too old so need to repair or redesign. So as per the recommendation of villagers through techno survey, redesign is been done. And this anganwadi will have better facilities and convenience to the children for their better curriculum activities

Anganwadi

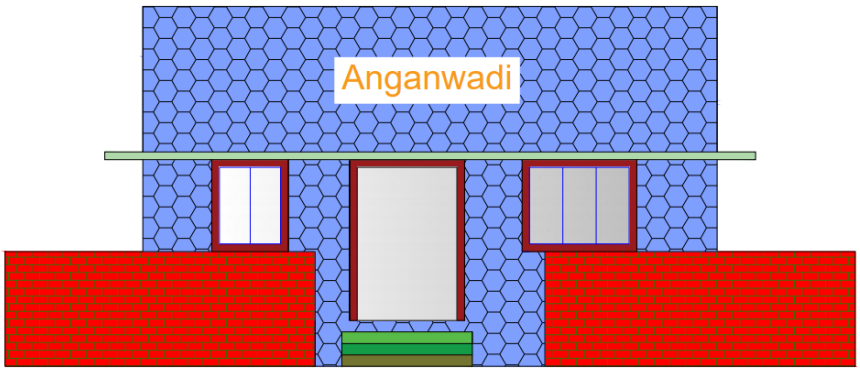


Fig. 8.11 Elevation (Anganwadi)

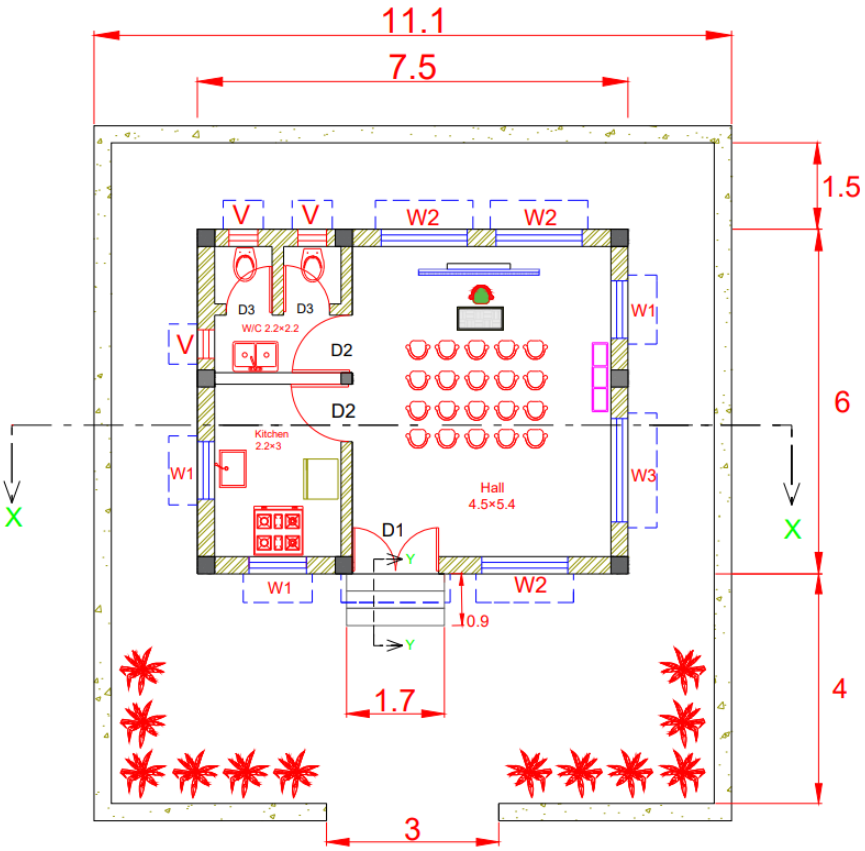


Fig. 8.12 Plan (Anganwadi)

All dimensions are in meters

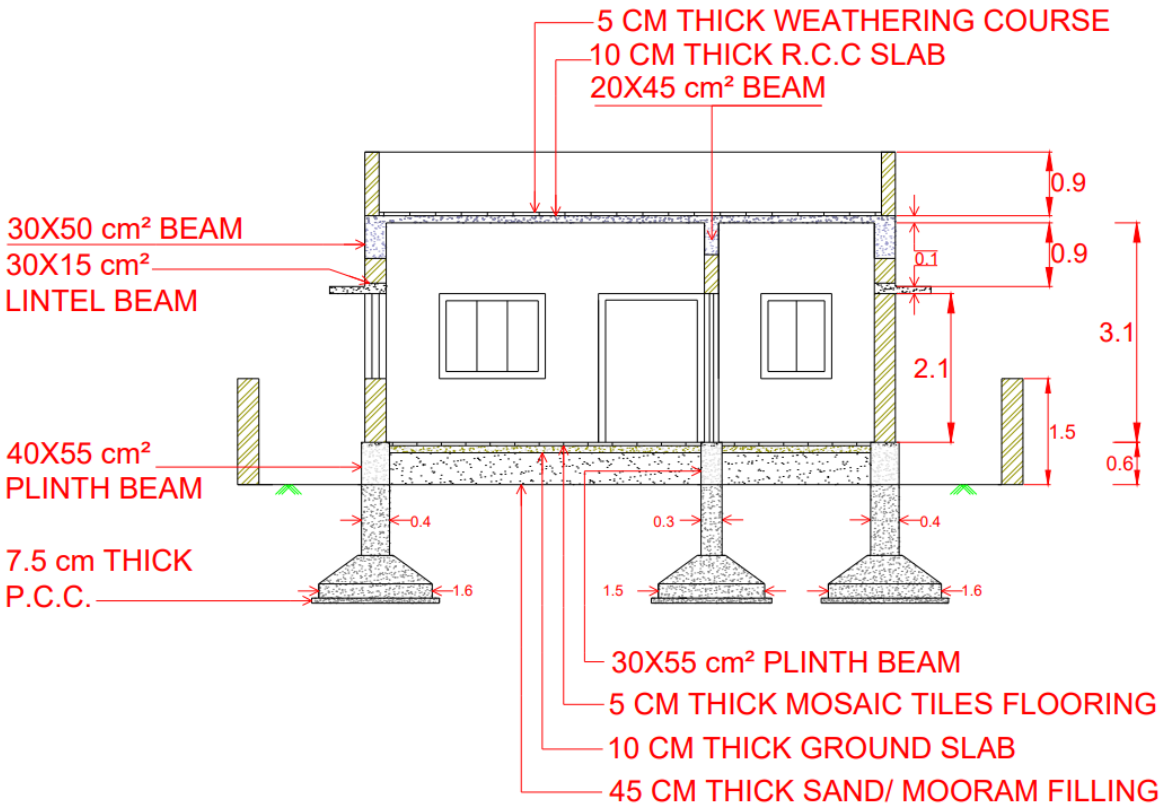


Fig. 8.13 Section X-X (Anganwadi)

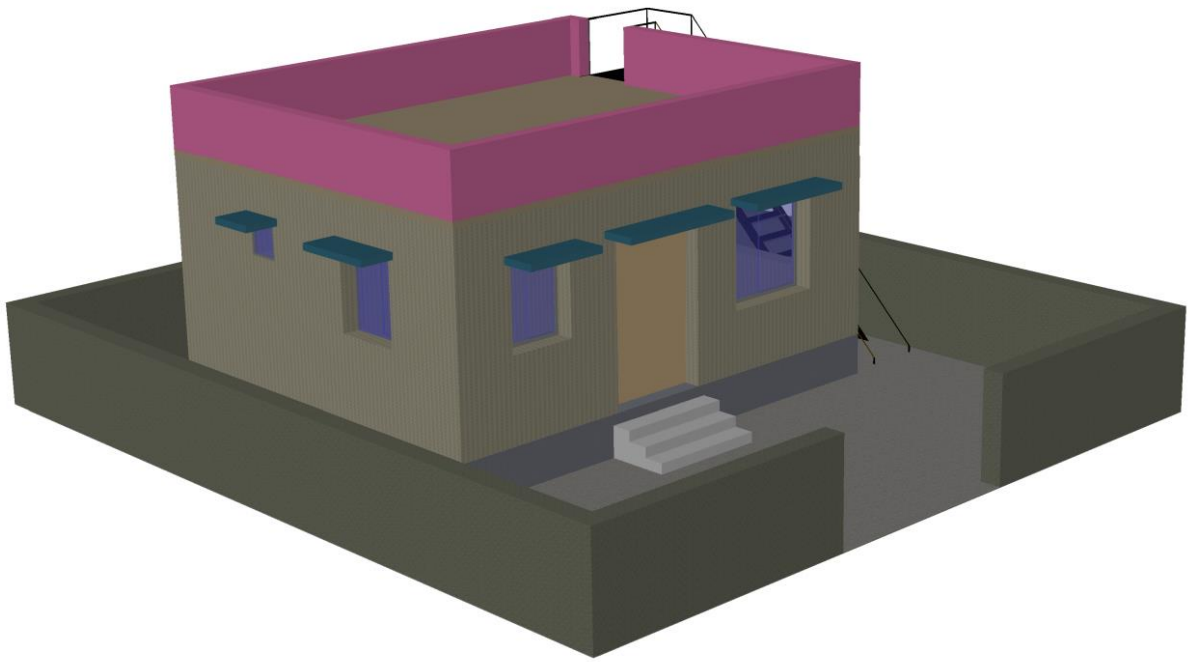


Fig. 8.14 3D Model (Anganwadi)

All dimensions are in meters

Table 8.5 Schedule of Openings

No	DETAILS	SYMBOL	SIZE	Nos.
1.	DOOR	D1	1.5×2.1	1
2.	DOOR	D2	1×2.1	2
3.	DOOR	D3	0.8×2.1	2
4.	WINDOW	W1	1×1.5	3
5.	WINDOW	W2	1.5×1.5	3
6.	WINDOW	W3	1.8×1.5	1
7.	VENTILATIO	V	0.5×0.5	3

Table 8.6 Plot Area Statement

Total area	134.31 sq.m
Built up area	46.53 sq.m

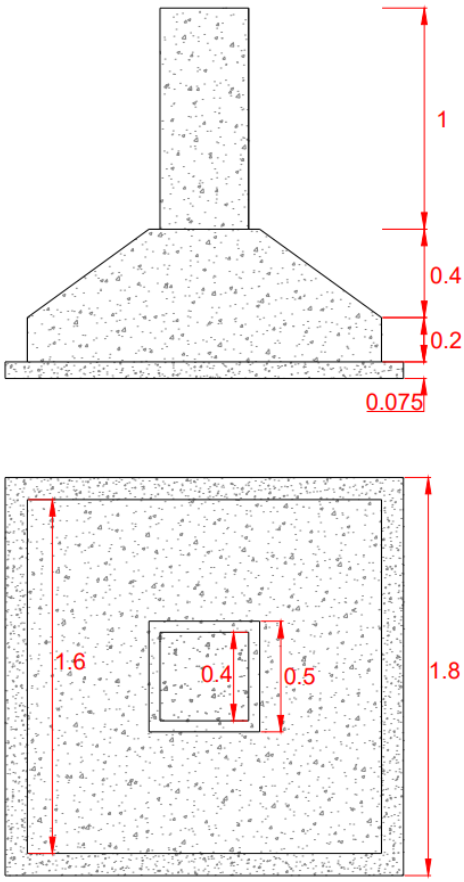


Fig. 8.15 RCC Square Footing (Anganwadi)

All dimensions are in meters

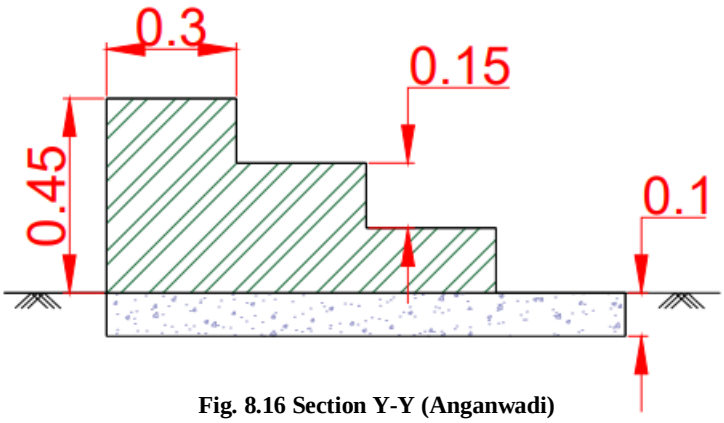


Fig. 8.16 Section Y-Y (Anganwadi)

Table 8.7 Measurement sheet of anganwadi

Sr. No.	Item Description	No.	Length (m)	Width (m)	Height (m)	Quantity	Unit
1	Excavation	8	1.8	1.8	1.675	43.416	m³
		1	1.7	1.7	1.675	4.84	m³
						48.256	m³
2	P.C.C.		1.8	1.8	0.075	1.944	m³
		1	1.7	1.7	0.075	0.217	m³
						2.17	m³
3	Footing	8				10.32	m³
		1				1.09	m³
						11.41	m³
4	Plinth beam	1	25.8	0.4	0.6	6.192	m³
		1	11.8	0.3	0.6	2.124	m³
						8.32	m³
5	Sand filling	1	6.5	5	0.45	14.625	m³
6	Ground slab	1	2.1	2.1	0.1	0.441	m³
		1	2.9	2.1	0.1	0.609	m³
		1	4.4	2.1	0.1	0.924	m³
		1	4.4	2.9	0.1	1.276	m³
						3.25	m³
7	Column	8	0.3	0.3	2.6	1.872	m³
		1	0.2	0.2	2.6	0.104	m³

						1.976	m³
8	Roof beam	1	25.8	0.3	0.5	3.87	m³
		1	12.1	0.2	0.45	1.089	m³
						4.959	m³
9	Roof slab	1	7.5	6	0.1	4.5	m³
10	Brick work upto roof	1	23.4	0.3	2.6	18.252	m³
		1	10.6	0.2	2.65	5.618	m³
						23.87	m³
15	Tiles flooring	1	4.5	5.4		24.3	m²
		1	2.2	3		6.6	m²
		1	2.2	1		2.2	m²
		2	1	1		2	m²
		1	1.5	0.3		0.45	m²
		2	1	0.2		0.32	m²
		2	0.8	0.2		2.2	m²
						36.27	m²
16	Weathering course	1	7.1	5.6		39.76	m²
17	Inside plastering	1	4.5	5.4		24.3	m²
		2		5.4	3.1	33.48	m²
		2	4.5		3.1	27.9	m²
		1	2.2	3		6.6	m²
		2	2.2		3.1	13.64	m²
		2		3	3.1	18.6	m²
		1	2.2	1		2.2	m²
		2	2.2		3.1	13.64	m²
		2		1	3.1	6.2	m²
		2	1	1		2	m²
		4	1		3.1	12.4	m²
		4		1	3.1	12.4	m²
		2	7.1	0.9		12.78	m²
		2	5.6	0.9		10.08	m²
						199.22	m²
	Deductions	4	1	2.1		8.4	m²
		4	0.8	2.1		6.72	m²
		1	1.5	2.1		3.15	m²
		3	1	1.5		4.5	m²
		3	1.5	1.5		6.75	m²
		1	1.8	1.5		2.7	m²
		3	0.5	0.5		0.75	m²
						32.97	m²

	Total Inside plastering		199.22 - 32.97			166.25	m²
18	Outside plastering		7.5		4.1	61.5	m²
				6	4.1	49.2	m²
						110.7	m²
	Deductions	1	1.5	2.1		3.15	m²
		2	1	2.1		4.2	m²
		2	0.8	2.1		3.36	m²
		3	1	1.5		4.5	m²
		3	1.5	1.5		6.75	m²
		1	1.8	1.5		2.7	m²
		3	0.5	0.5		0.75	m²
						25.41	m²
	Total Outside plastering		110.70 - 25.41			85.29	m²

Table 8.8 Abstract sheet of anganwadi

Sr.No.	Item Description	Quantity	Rate	Per	Amount (Rs.)
1.	Excavation	48.256 m³	90	m³	4343
2.	P.C.C.	2.170 m³	3500	m³	7595
3.	Footing	11.41 m³	4100	m³	46781
4.	Plinth beam	8.320 m³	4100	m³	34112
5.	Ground slab	3.250 m³	4100	m³	13325
6.	Column	1.976 m³	4100	m³	8102
7.	Roof beam	4.959 m³	4100	m³	20332
8.	Roof slab	4.500 m³	4100	m³	18450
9.	Lintel beam	0.5535 m³	4100	m³	2270
10.	Chajja	0.725 m³	4100	m³	2972
11.	Brick work (CM - 1:6)	22.178 m³	3500	m³	77623
12.	Inside plastering	166.25 m²	204	m²	33915
13.	Outside plastering	85.29 m²	197	m²	16802
14.	Tiles flooring	36.27 m²	600	m²	21762
15.	Weathering course	39.76 m²	600	m²	23856
16.	Inside paint work	166.25 m²	204	m²	33915
17.	Outside paint work	85.29 m²	197	m²	16802

			Total Rs.	382957
		Add 1.5% water charge		5745
		Add 10% contingencies charge		38296
		Total estimated cost in Rs.		426998

8.1.5 Electrical Design 1: Automatic intensity controlled solar street light

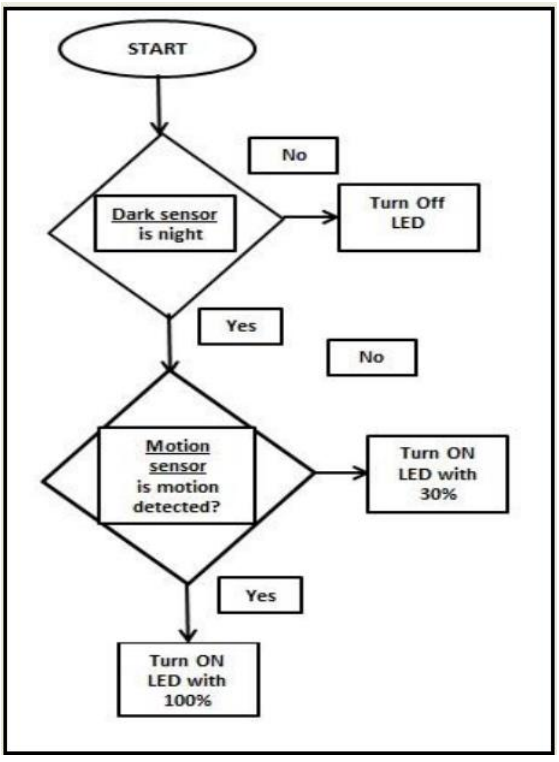
Fig. 8.17 Existing condition of Street lights

Current condition through which! Problem No. 1 identified:

During the village visit for the survey work with help of visual inspection it was identified that Street lights were in damaged condition and on some roads, street light was not installed. And the villagers were facing problem of darkness during the night and they have to use torch and mobile lights compulsorily due to animals related problems. So from all the above points the need smart solar street lights was experienced. Current condition is as shown in pictures.

Solution: To improve the existing condition with help of smart Solar Street Lights:

Nowadays a range of solar LED Street lighting make their presence felt everywhere and these lights are environmentally friendly and are easy to install and give high-intensity LED output. The solar LED street lights system convert sun energy to electricity and the system is prompted to turn on as the darkness approaches. Therefore, these lights automatically switch on after the sunset and after sunrise it switches off. The components required for system design are solar panels, led lights, rechargeable battery, pole and connecting cables.



About the circuit diagram and its working:

The solar-powered led street lights activate from dusk to dawn. The LED street light automatically turns ON after the dusk and turns OFF after the dawn. The designing of the entire system includes: Solar panels, LED light, Rechargeable battery, Controller, Pole, and Interconnecting cables. The solar panel or PV cell in the solar street light is one of the most essential parts. These cells are available in two types: monocrystalline and polycrystalline. The monocrystalline conversion rate is higher than the polycrystalline. The light energy used by the solar panels from the sun is used to change solar energy into electricity, which can be used in various applications. LEDs are used in modern street lights to provide brighter light with low energy consumption. The energy consumption of the LED fixture is lesser than the high-pressure sodium fixture, which is commonly used in traditional street lights. Compare to the other lamps, LED lights do not produce light in

all directions. The design of lamps can be affected by the uniqueness of the LEDs. The single LED o/p is not equal to the incandescent and fluorescent lamps. But, a bunch of LEDs will give bright light than these two lamps. The advantages of LEDs mainly include Eco-friendly, durable, zero UV emissions, and long life. The rechargeable battery is one kind of electric battery and it has electro-mechanical reactions to adjust so it is also called a secondary cell. A controller is a very significant device in the solar street light, used to decide the status of the charging and lighting by a switch on or switch off. The cable is used to interconnect the LED, solar panel and battery box which is fixed on the top of the pole. This cable is used to connect a Photovoltaic module to the controller, controller to the lamps, and battery. A strong pole is mandatory for every street light and also for a solar street light. There are various components such as panels, batteries, and fixtures fixed on the top of the pole. In this light, the i/p operating voltage is 12V DC which is a nominal system voltage, and the light o/p at the height of 12 feet is a minimum of 09 LUX (unit of luminance).

Solar energy is converted into electrical energy in form of D.C. supply. Now this Direct current is given to the charge controller for controlling current and voltage with respect to the amount of charge battery consists of and stored in form of chemical energy into the battery. Now this energy is used by light emitting diodes. And the used of energy is controlled by micro-controller and everything depends on the situation and the prevailing condition. Micro controller gets the signal from various transducers and depending upon the signal it decides that light should be on or off and accordingly it generates the control signal based on the feedback achieved from the transducers. So if there is day time then the transducer will give zero signal to the controller and control signal will also remain zero so the street light will stay in on condition and if there is darkness then control signal generated by the transducer will be one and the controller will also generate high signal so the light will be in on condition during the night time. Now there is motion sensor also attached with this circuit so in normal condition vehicle motion is not detected, so light glows with 30% intensity, if vehicle passes through the road then motion will be detected, then light glows with full intensity. Hence this way smart solar street light works.

Number of smart solar street lights required in Kewada village = 15

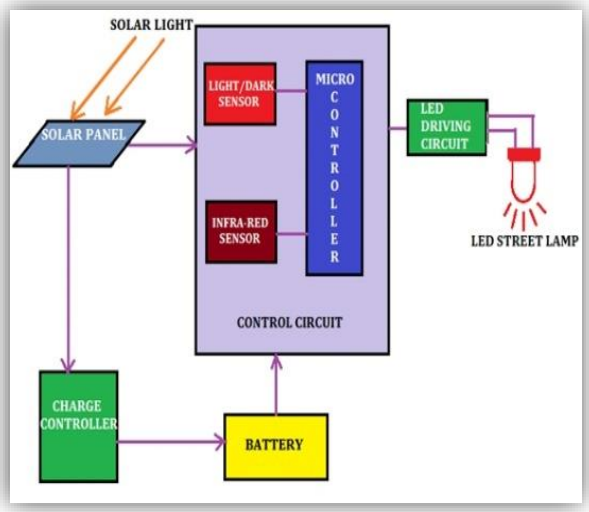


Fig. 8.18 Design of Solar Street light

Components	No. of components	Cost per unit (Rs.)
Led lamp	1	100
Solar panel	1	2300
Battery	1	1850
Charge controller	1	350
Pole	1	1400
Total cost per unit		**6,000**
Total cost		**90,000**

Table 8.9 Costing for Solar Street light

8.1.6 Electrical Design 2: A.C. to A.C. converter - single phase to three phase

Current condition through which Problem identified:
Farmers were interacted during the village visit and during that interaction. Famers told their problem that three phase power supply is only available for 8 hours a day and single-phase power is available for rest of the day, so the pump can only run for the power supply availability hours and the power supply availability scheduled is changes every week, So, during the night schedule, Farmers have to stay awake whole night for watering the crops. Which was a problem which can be technically solved.

Solution to improve the existing condition using Single phase to three phase converters
In the past single phase to three phase converter is complicated due to the use of capacitors and reactors with autotransformer converters. Such kind of system was expensive and less efficient, so to overcome this! Power electronics components are used. At the beginning of solid state power electronics devices, these were normally used as swithces. Beyond the power switches different circuit topology were invented with the help of power electronics devices such as three-phase to three-phase, single phase to single phase and three-phase to single phase conversion systems. There are some villages and rural areas in which the single phase supply is only available and we know that farmers get three phase supply only for eight hours, so it is very difficult to get a three phase supply for irrigation purposes in villages! Therefore it is better to convert single phase supply to three phase supply using converter. This system fits the requirements in major village areas as well as rural areas where only a single-phase supply is available.

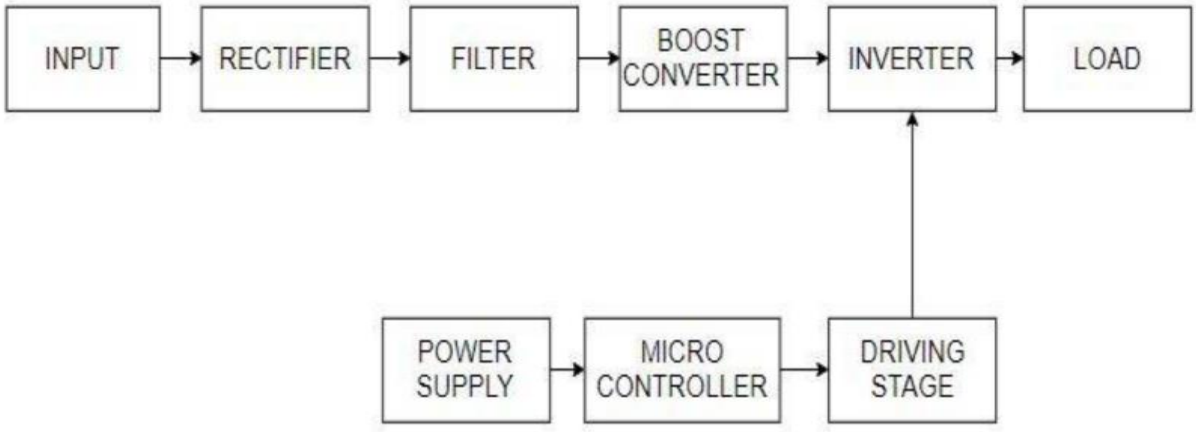


Fig. 8.19 Block diagram of single phase to three phase converter

The block diagram consists of mainly two parts, a converter stage and driving stage. The AC supply is given as the input to the rectifier block. The rectifier rectifies the AC signal to corresponding DC which may not be pure DC and contain some AC parts or harmonics portion which is needed to be filtered and need to be regulated by means of series inductor, parallel capacitor filter or any electronic voltage regulator i.e. dc-dc converter named chopper and buck-boost converter, the pulsating DC is then filtered using a capacitor or inductor filter then the output will be of pure DC without any type of alternating of harmonic components. Now this filtered pure direct current supply output is given to the inverter block which is controlled by the driving stage. The gate of the Insulated Gate Bipolar junction Transistors are controlled from a controller, in which the output of the controller is a sine Pulse Width Modulation. The appropriate sine Pulse Width Modulation program is loaded into the controller. The controller is energized from the 5V battery. The output of the inverter is given to the load.

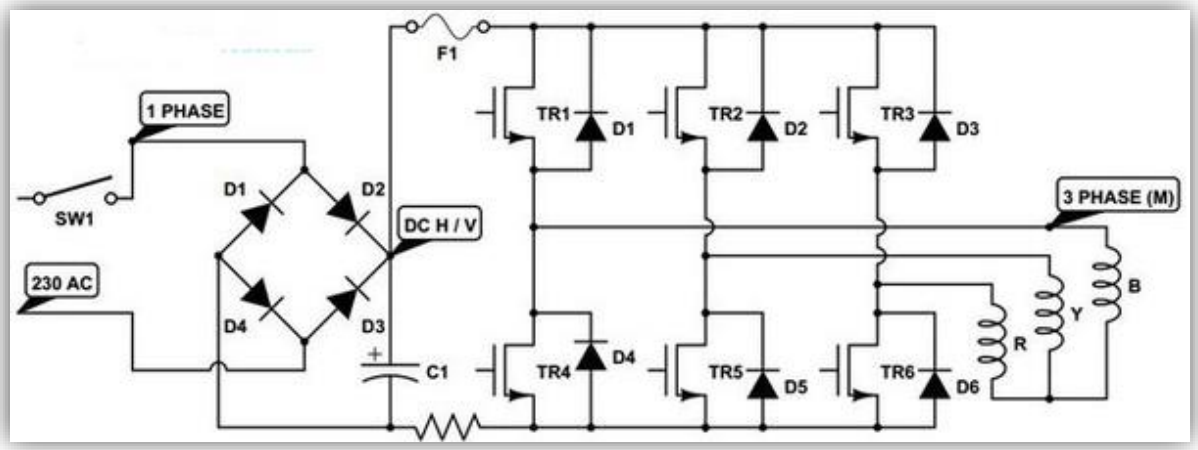


Fig. 8.20 Circuit diagram of A.C. to A.C. converter

As shown in above circuit diagram that the single phase 230V supply is given to the input of the rectifier with the help of a autotransformer which is used to adjust the AC input voltage and the rectifier circuit will convert the single phase AC to DC. The filter is connected to reduce the harmonics present in the AC and gives the pure DC, the fuse is connected to protect the circuit and the resistor is connected to limit the current. The output of rectifier will not be sufficient for the inverter to give the output of line to line voltage 415V AC. So a boost converter is designed and kept in between rectifier and inverter circuit which will boost the DC value from 300V to 600V, as then boost converter circuit is connected to six leg inverter which consists of IGBTs to convert to three phase AC. Each gate of IGBT is connected to of microcontroller. In microcontroller the embedded program of sine PWM is loaded and which drives the IGBT. We are giving 230v supply to rectifier, during positive half of the input two diodes are triggered and for negative half of input another two diodes are trigger and AC supply is converted to DC. In inverting stage we are using six IGBTs as inverter. Upper side three IGBT are called as positive group IGBT and lower side three IGBT are called as negative group IGBT. IGBT work in 120 degree mode of operation in which one IGBT from positive group and another two from negative group and after that one from negative group another from positive group. Same procedure is followed by whole inverter circuit. Diodes are connected across each IGBT to limit the reverse current flowing through the inverter. In this way we are getting the three phase from middle of two IGBTs.

Components	No. of components	Cost per unit
Rectifier with filter	1	500
3 phase inverter circuit	1	1000
Chopper circuit	1	300
Miscellaneous	-	100
Total		**1900 Rs**

Table. 8.10 Cost estimation of A.C. to A.C. Converter

With the help of this A.C. to A.C. converter farmers will be able to do get three phase supply continuously for 24 hours A phase converter is a device that converts electric power provided as single phase to multiple phase or vice versa.

The majority of phase converters are used to produce three-phase electric power from a single-phase source, thus allowing the operation of three-phase equipment at a site that only has single-phase electrical service. Phase converters are used where three-phase service is not available from the utility, or is too costly to install due to a remote location. A utility will generally charge a higher fee for a three-phase service because of the extra equipment, including transformers, metering, and distribution wire

8.1.7 Electrical Design 3: Touchscreen based automation system

Current condition through which Problem identified:
Currently in Kewada village, there's no technology based on automation, Infact! Villagers are also not aware about what is automation and new technology So, there is everything is manually done.

Improvement can be done with help of modern touchscreen based automation system:
Touch screen based automation system is a system that controls the appliances automatically such as fans, fridge, lights and all type of other appliances which are mostly used by humans. With the passage of time, the world is becoming advance more and more as well as our daily used items are also becoming smart and smart. Similarly, home appliances are also becoming smart and smart therefor it is so much necessary that their control should be also smart means their control should be automatically. Currently, we have been using wall switches for controlling the home appliances which are installed at different walls of our homes. Sometimes, it is very difficult for the user to operate these switches specially for the elder and physical handicapped user.

So many systems are available in market which have been using for controlling the appliances automatically, but they are not so much efficient and reliable as well as their cost is also so much high. Beside this these systems are also do not have touch screen facility for controlling the home appliances. On concentrating the above issues here, we have designed a device that is called a touch screen based home automation system. This system has designed with the help of touch screen LCD, ac transformer, bridge rectifier, voltage regulator, RF transmitter, encoder and microcontroller 18F452 belongs to pic family. This system is more efficient, more reliable and less costly as compared to other systems. The block diagram of this touch screen based home automation system with all their essential components is shown in figure.

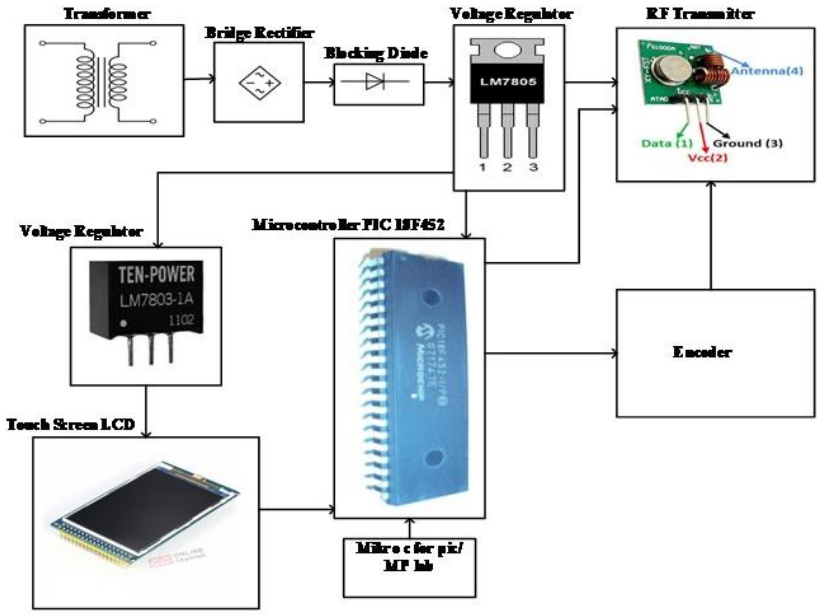


Fig. 8.21 Block diagram with circuit components of touch screen based automation system

About the circuit and it's working

In this system devices are controlled through the touch panel which is interfaced with controller. Using this method we can control any device. Here we are controlling i.e., ON/OFF the devices through the touch panel. Whenever we touch the touch panel it will sense and fetches this information to the microcontroller. Microcontroller will process this information and accordingly ON/OFF the devices. Order of switching the devices will be programmed predefined in the IC. This touch screen based home automation system turned no or off the home appliances automatically when is directly connected with 220V ac supply. When is connected with 220V ac supply then single-phase ac transformer steps down 220V ac into 6 or 9V ac. Because this touch screen based home automation system mostly consists of electronics components therefore these ac voltages are converted into dc with the help of bridge rectifier. Then these dc voltages are regulated into 5V dc with the help of voltage regulator. LM 8705 voltage regulator have been used here. Microcontroller and RF transmitter are operated at 5V dc therefore these are powered up with this voltage regulator.

Similarly, the touch screen LCD panel operated at 3V dc therefore it is powered up with separate 3V voltage regulator and here LM 7803 voltage regulator have been used for this purpose.
Microcontroller is basically the main intelligent controller of this touch screen based home automation system. It is programmed in c language with the help of software and is interfaced with RF transmitter, encoder and touch screen LCD. This whole system consists of two circuits one is RF transmitter circuit which consists microcontroller with touch screen LCD panel and second one is RF receiver circuit which consist of microcontroller and RF receiver as well as with output load. For demonstration purposes we can connect different loads at output side of RF receiver circuit. These both RF transmitter and RF receiver circuits work on the base of radio frequency waves. When we shell press switch 1 from touch screen LCD panel then microcontroller will receive this signal and will give the signal high to RF transmitter. Because RF transmitter is coupled with RF receiver through radio frequency waves therefor RF receiver will receive this signal and then this will switch on the load 1. Similarly, we can easily switch on or off all the loads.

Applications and Advantages Touch Screen Based Home Automation System

1. This touch screen based automation system could be installed in domestic and agriculture land for controlling their loads automatically.

2. This system could be installed in that remote areas where conventional switches are permitted to use such as highly inflammable areas.

3. This system is less costly, more efficient and more reliable as compared to other home automation systems.

Components	No. of components	Cost per unit
Rectifier with filter	1	50
Transformer	1	100
Voltage regulator	1	10
Radio frequency transmitter		500
Touch screen LCD		1000
Controller circuit		300
Miscellaneous	-	240
Total	**2200 Rs**	

Table. 8.11 Cost estimation of touch screen based automation system

So! by this way of using touch screen based automation system, Villagers can control there devices from the liquid crystal display itself, without going to the switch board for manual control of their devices. Villagers will get benefit of new technology and will be awared of this

8.2 Reason for Students Recommending this Design

- Anganwadi: There was no anganwadi available in village and students were having trouble for studying.
- Bus stop: There is no bus stop in village for transportation facility
- Pond: To solve the irrigation
- problem A.C. to A.C. converter - single phase to three phase: To make the availability of 3 phase supply more than 9 hours in a day.
- Automatic intensity controlled solar street light: To increase the use of renewable energy and to fulfill the need of street light.
- Touchscreen based automation system: To make the irrigation system digital, time saving and accurate.

8.3 About designs Suggestions / Benefit of the villagers:

1. **Anganwadi** :- As there is no anganwadi or school available in the village, there was a big problem to students, they have to travel daily at far distance. So anganwadi was the most needed design for this village. Villagers will get good benefit for educational purpose of the students.

2. **Bus stop** :- There was no Bus stop in the village. So as per the need of villagers , the design of Bus stop is constructed, so the villagers and sarpanch of the village will get benefit about the bus facility. They can easily access the transportation facilities.

3. **Pond** :- There is a problem of irrigation in the village at some areas so the the design of pond is made, which will give benefit to the villagers and specially to the farmers for harvesting the crops.

4. **A.C. to A.C. converter - single phase to three phase** :- In the Kewada village farmers get 3 phase supply only for 8 hours a day, so the water pump of farmers are not useful during not availability of 3 phase supply so To make the availability of 3 phase supply more than 8 hours in a day, which will give benefit to the farmers as water is available 24 hours a day.

5. **Automatic intensity controlled solar street light** :- In kewada village there is lack of street lights and the existing solar street lights are not in working condition so, to solve the problem as per the need we have designed solar street light which will benefit the villagers during the night and the solar energy is also renewable energy that's why it will also motivate villagers to use renewable energy and to save electricity.

6. **Touchscreen based automation system** :- In Kewada village people are not awared about modern technology and automation. So, the control of each and every devices are done manually, now with the help of touchscreen based automation the villagers and farmers will be easily able to control there devices remotely.

CHAPTER 9: Proposing design for future development of village

For the future development of Kewada village we are proposing the design for the future semester.

1. **Panchayat Office :** We will design panchayat office for the village which doesn't exist right now. And that design will be full with all facilities with better design periods and all which is not in existing panchayat office that all will be designed by us.

2. **Public toilet :** We will design Public toilet for the village so that the village will be free from open defecation and it'll also reduce the diseses spread due to open defecation in village.Public toilet will be more beneficial at hygiene point of view. The people have already got the lesson from this corona pandemic about how much the hygiene is important so no more explaination will also be required.

3. **Underground water tank :** We will design Underground water tank for the rain water harvesting purpose so that the shortage of water may reduced. This water tank is also being provided for the harvesting purpose so that there will not be more shortage of water in village and people can use it without any inconvenienve.

4. **Solar irrigation system** : If in case the supply of electricity is not reached up to village. Solar energy is the most available source of energy in the world. Solar based irrigation system: A suitable alternative for farmers in the present state of energy crisis in village. (also it is an eco-friendly – green way for energy production) Requires only an initial investment. An automatic irrigation system using solar power, controller and moisture sensor is used to pump water from bore well to a tank, to control the flow rate of water from the tank to the irrigation field. Thus also optimizes the use of water.

5. **Piezoelectric Speed Breaker Electricity Generator Design:** We will design speed Breaker for the safety of village so that during crossing the road in village people feel safe And this bump will be smarter so that the driver will also not get inconvenience during Driving and it also will not damage the vehicle like old bumps.

6. **Intelligent water level indicator with controller**: Water tank overflow is a common problem which leads to the wastage of water. Though there are many solutions to it like ball valves which automatically stop the water flow once the tank gets full. But being an electronics enthusiastic we would like an electronic solution for it!

CHAPTER 10 : Conclusion

Initially we discussed and studied about vishwakarma yojna.what we have to do in vishwakarma project and what knowledge we can gain by this project with respect to improvement of the village. After this stage, We visited our smart village Kewada and we have done techno economic survey and filled it's survey form and on the basis of that, we have done gap analysis about village. And then we have found the difference between this village and ideal Village. We have studied about the facility of ideal village.

During the visit of our allocated village Kewada we have interacted villagers discussed about village problems and basic requirements of village also we discussed about difficulties faced by village people. We came to know that, In village there is less use of renewable energy sources and the people are not that much Aware from electric energy conservation and advantages of renewable sources. After that we started planning different facilities required in the village. We started designing gram panchayat, Anganwadi, Bus stop, Etc.

The designs under Vishwakarma yojna project phase VIII is an approach of government and students towards Rurbanisation, which will be helpful for better physical development of the village with respect to upgradation.

These amenities designed under this project will be helpful for better development of village As physically as well as socially, which improves the overall lifestyle of people along with nation With preserving nature bit by bit.

After analysing very much deeply and have done conversation with sarpanch of Kewada village we have decided number of designs to be prepared and which designs to be prepared with respect to the need of villagers and development of the village in the views of renewable energy. All the designs made are highly energy efficient which are made under the best supervision so the village will be able to use new technology and villagers also will enjoy the upgraded technology.

CHAPTER 11 : References

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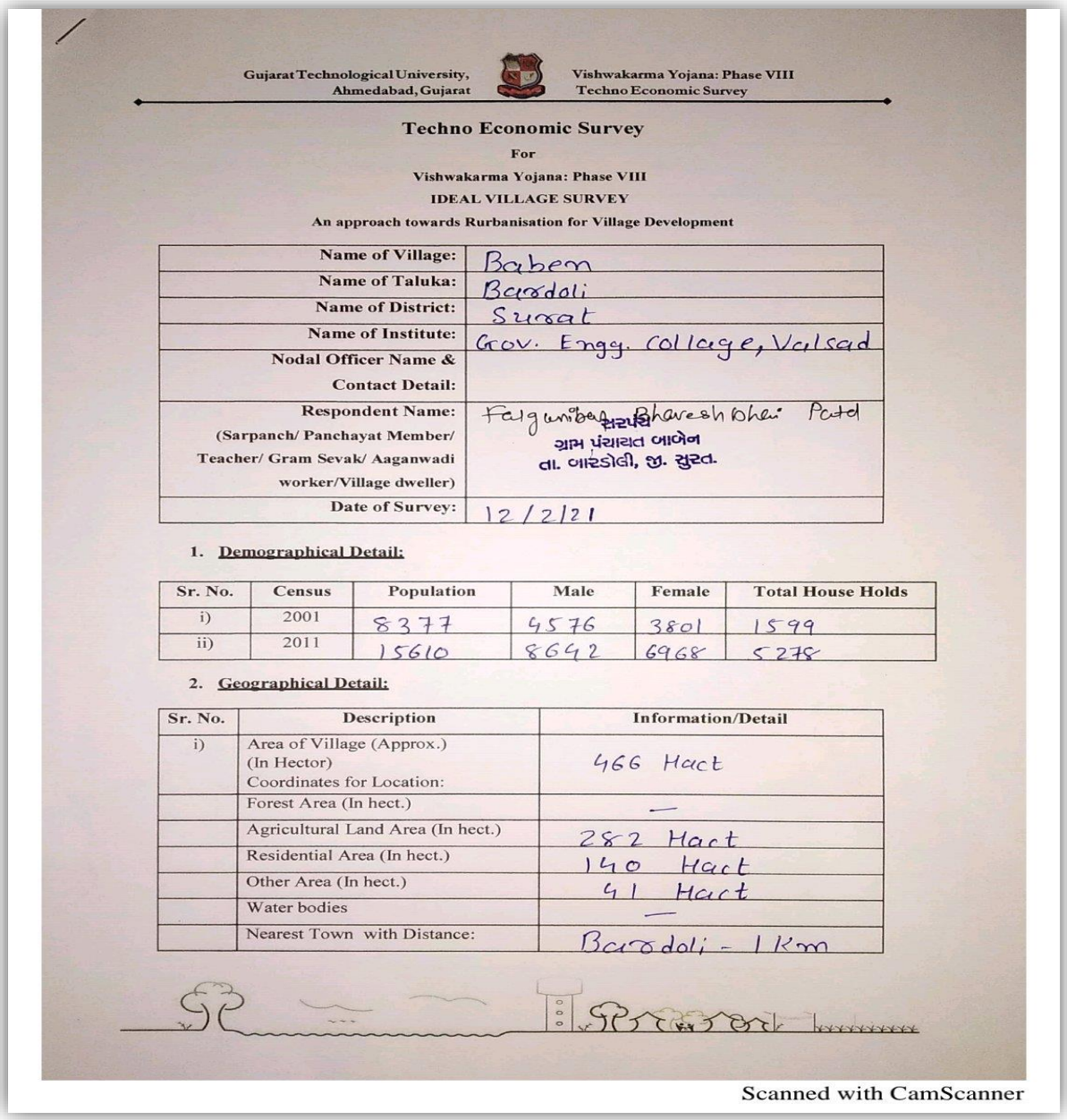
CHAPTER 12 : ANNEXURE

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



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Techno Economic Survey

Techno Economic Survey

For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

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

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	8377	4576	3801	1599
ii)	2011	15610	8642	6968	5275

2. **Geographical Detail:**

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

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3. Occupational Details:

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

4. Physical Infrastructure Facilities:

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

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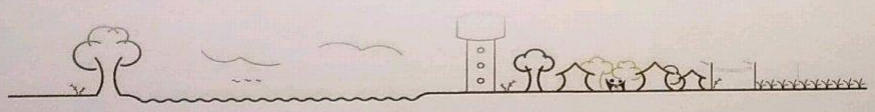
E.	Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM				
	Village approach road	All weather	—	—	All weather
	Main road	Yes	—	—	All weather
	Internal streets	Yes	—	—	All weather
	Nearest NH/SH/MDR/ODR Dist. in kms.	Yes	—	—	NH-53 5 Km
Suggestions if any:					
F.	**Transport Facility**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



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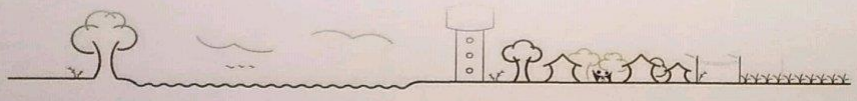
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	–	–	–
	Renewable Energy Source Facilities (Y/ N)	No	–	–	–
	LED Facilities	Yes	–	–	–
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes	–	–	8 Nos
	Location Condition	Good	–	–	–
	Community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

5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks



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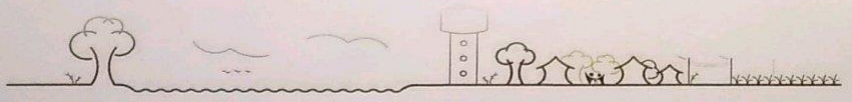
K.	Health Facilities:				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	Yes	–	–	Sub-center PHC
	Private Clinic/Private Hospital/ Nursing Home	Yes	–	–	Private clinic & Hospital
	If any of the above Facility is not available in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

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

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



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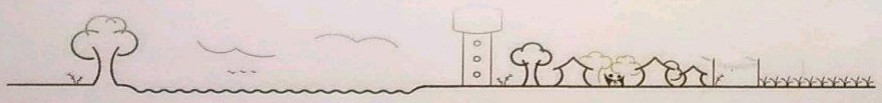
	Condition:				
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	Yes - Good	Yes - -	- - -	- - -
	Public Garden Location: Condition:	Yes 2 Nos Good	- - -	- - -	- - -
	Village Pond Location: Condition:	Yes 1 Nos Good	- - -	- - -	- - -
	Recreation Center Location: Condition:	Yes 4 Good	- - -	- - -	- - -
	Cinema/ Video Hall Location: Condition:	-	-	-	-
	Assembly Polling Station Location: Condition:	-	-	-	-
	Birth & Death Registration Office Location: Condition:	Panchayat - Good	- - -	- - -	- - -
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
	Suggestions if any:				
N.	Other Facilities				
	Post-office				
	Telecommunication Network/ STD booth				



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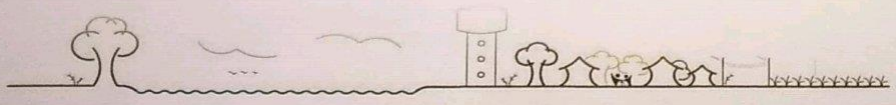
	General Market	Small	Yes	–	–
	Shops (Public Distribution System)	–	–	–	–
	Panchayat Building	Yes	1 Nos	–	Good
	Pharmacy/Medical Shop	Yes	2-3	–	Good
	Bank & ATM Facility	Yes	3-4	–	Good
	Agriculture Co-operative Society	Yes	1 Nos	–	Good
	Milk Co-operative Soc.	–	–	–	–
	Small Scale Industries	–	–	–	–
	Internet Cafes/ Common Service Center/Wi Fi	–	–	–	–
	Other Facility	No	–	–	–
Suggestions if any:					

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

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

7. **Data Collection From Village**

Village Base Map Available: Hard Copy/Soft Copy	Yes



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Vishwakarma Yojana: Phase VI
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Recent Projects going on for Development of Village	
Any NGO working for village development	

8. Additional Information/ Requirement:

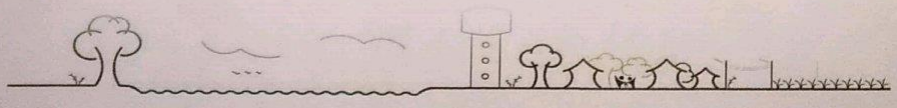
Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Repair & Maintenance of Existing Public Infrastructure facilities(School Building, Health Center, Panchayat Building, Public Toilets & any other)		
2.	Additional Information/ Requirement	All facilites available	-

9. Smart Village Proposal Design

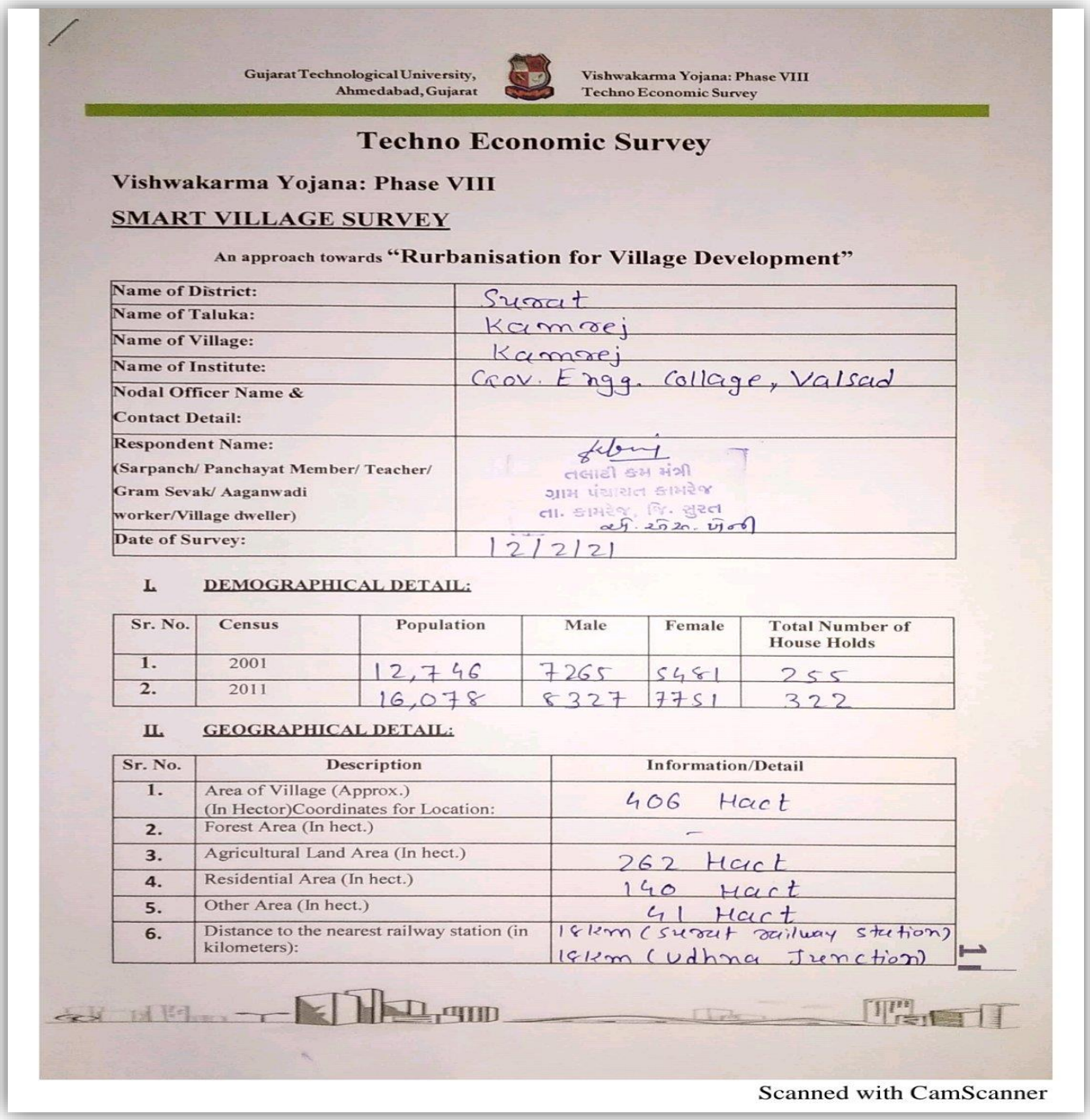
Sr. No.	Descriptions	Information/ Detail	Remarks
1.			

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

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



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



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Techno Economic Survey

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Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

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

Name of District:	Surat
Name of Taluka:	Kamrej
Name of Village:	Kamrej
Name of Institute:	Govt. Engg. Collage, Valsad
Nodal Officer Name & Contact Detail:	
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	તલાટી કમ મંત્રી ગ્રામ પંચાયત કામરેજ તા. કામરેજ, જિ. સુરત
Date of Survey:	12/2/21

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	12,746	7265	5481	255
2.	2011	16,078	8327	7751	322

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	406 Hact
2.	Forest Area (In hect.)	-
3.	Agricultural Land Area (In hect.)	262 Hact
4.	Residential Area (In hect.)	140 Hact
5.	Other Area (In hect.)	41 Hact
6.	Distance to the nearest railway station (in kilometers):	18km (Surat railway station) 18km (Udhna Junction)

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7.	Name of Nearest Town with Distance:	20 km (Surat)
8.	Distance to the nearest bus station (in kilometers):	0 km
9.	Whether village is connected to all road for the any facility or town or City?	Yes

III. OCCUPATIONAL DETAILS:

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

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

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
1.	**PIPED WATER**				Yes
	Piped Into Dwelling				
	Piped To Yard/Plot				
	Public Tap/Standpipe	✓			
	Tube Well Or Bore Well				
2.	**DUG WELL**				Yes
	Protected Well				(Protected)
	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**				Lake

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Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	5000	MLD	6 Nos
	Underground Sump	Capacity:			
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1 2 B. OPEN WITH OUTLET C. OPEN WITHOUT OUTLET	Yes	–	–	–
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Yes			Kutchha
	Main road	Yes			All weather
	Internal streets	Yes			WBM
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH (1.5 km)	SH (2.6 km)	MDR (300 m)	ODR (3.6 km)
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	YES			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	YES			
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	YES			Autol Private vehicles
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	YES			>6 hrs

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	Power supply for Domestic Use	Yes			> 6 Hrs
	Power supply for Agricultural Use	Yes			> 6 Hrs
	Power supply for Commercial Use	Yes			> 6 Hrs
	Road/ Street Lights	Yes			> 6 Hrs
	Electrification in Government Buildings/ Schools/ Hospitals	Yes			> 6 Hrs
	Renewable Energy Source Facilities (Y/ N)	NO	–	–	–
	LED Facilities				
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	4 Nos			
	Location Condition	good			
	Community Toilet (With bath/ without bath facilities)	4 Nos			
	Solid & liquid waste Disposal system available	NO			
	Any facility for Waste collection from road	3 Nos			
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL. OTHER (SPECIFY)	✓ ✓ ✓			
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	30/70			

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	NO. 1			✓
	Sub-Centre				—
	PHC				Yes [Sub Block PHC]
	BLOCK PHC	NO. 1			
	CHC/RH				—
	District/ Govt. Hospital				—
	Govt. Dispensary				—
	Private Clinic				✓
	Private Hospital/				✓
	Nursing Home				—
	AYUSH Health Facility				✓
	sonography /ultrasound facility				—
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group	NO. 9	—	—	Yes
	Primary School	NO. 3	—	—	Yes
	Secondary school	NO. 5	—	—	Yes
	Higher sec. School				
	ITI college/ vocational Training Center				
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	NO. 1	—	—	Sidd harath law collage.
	If any of the above Facility is not available in village than approx. distance from village: ..20..kms.				

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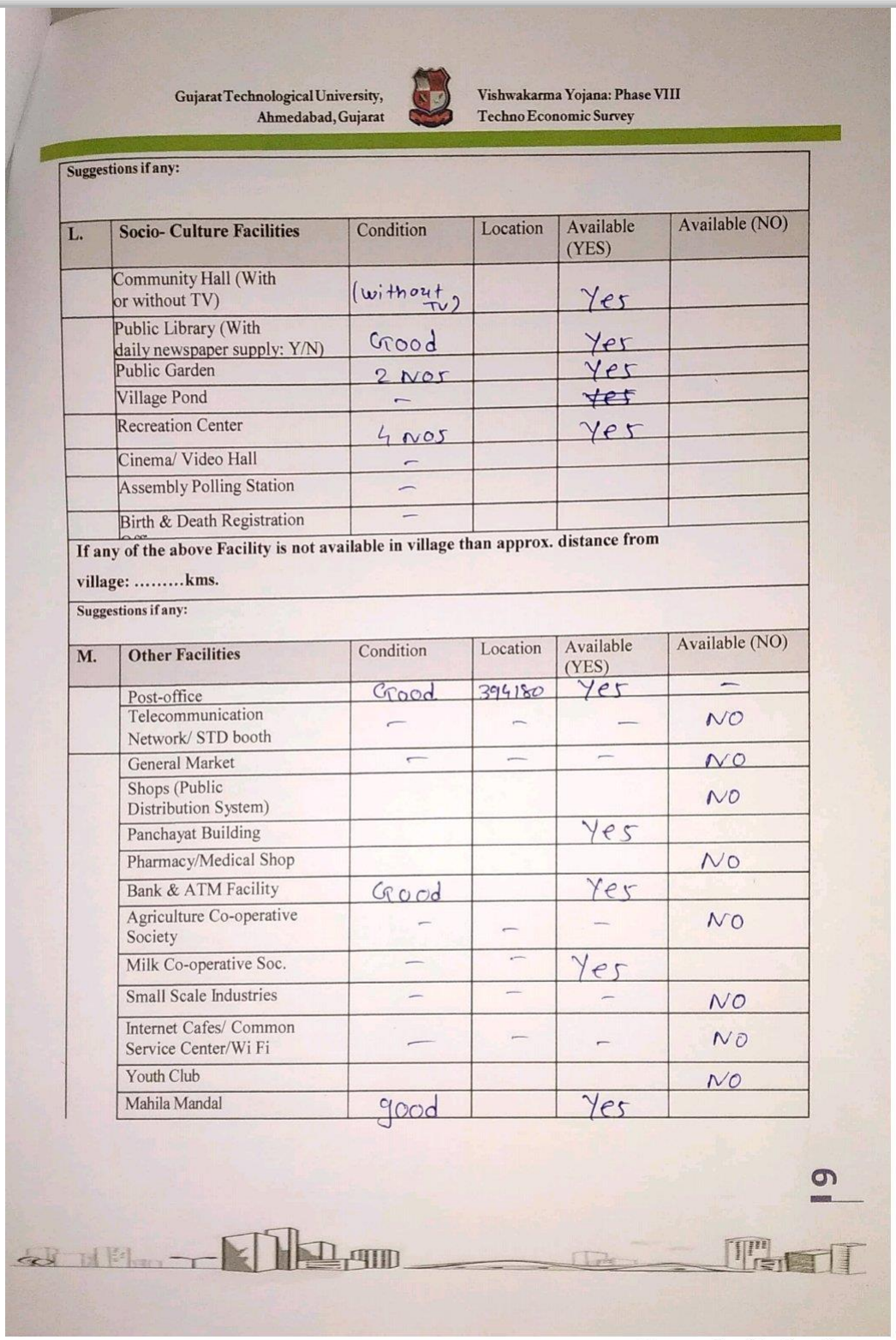

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Suggestions if any:

L.	Socio- Culture Facilities	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	(without TV)		Yes	
	Public Library (With daily newspaper supply: Y/N)	Good		Yes	
	Public Garden	2 Nos		Yes	
	Village Pond	–		~~Yes~~	
	Recreation Center	4 nos		Yes	
	Cinema/ Video Hall	–			
	Assembly Polling Station	–			
	Birth & Death Registration	–			

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

Suggestions if any:

M.	Other Facilities	Condition	Location	Available (YES)	Available (NO)
	Post-office	Good	394180	Yes	–
	Telecommunication Network/ STD booth	–	–	–	NO
	General Market	–	–	–	NO
	Shops (Public Distribution System)				NO
	Panchayat Building			Yes	
	Pharmacy/Medical Shop				NO
	Bank & ATM Facility	Good		Yes	
	Agriculture Co-operative Society	–	–	–	NO
	Milk Co-operative Soc.	–	–	Yes	
	Small Scale Industries	–	–	–	NO
	Internet Cafes/ Common Service Center/Wi Fi	–	–	–	NO
	Youth Club				NO
	Mahila Mandal	good		Yes	

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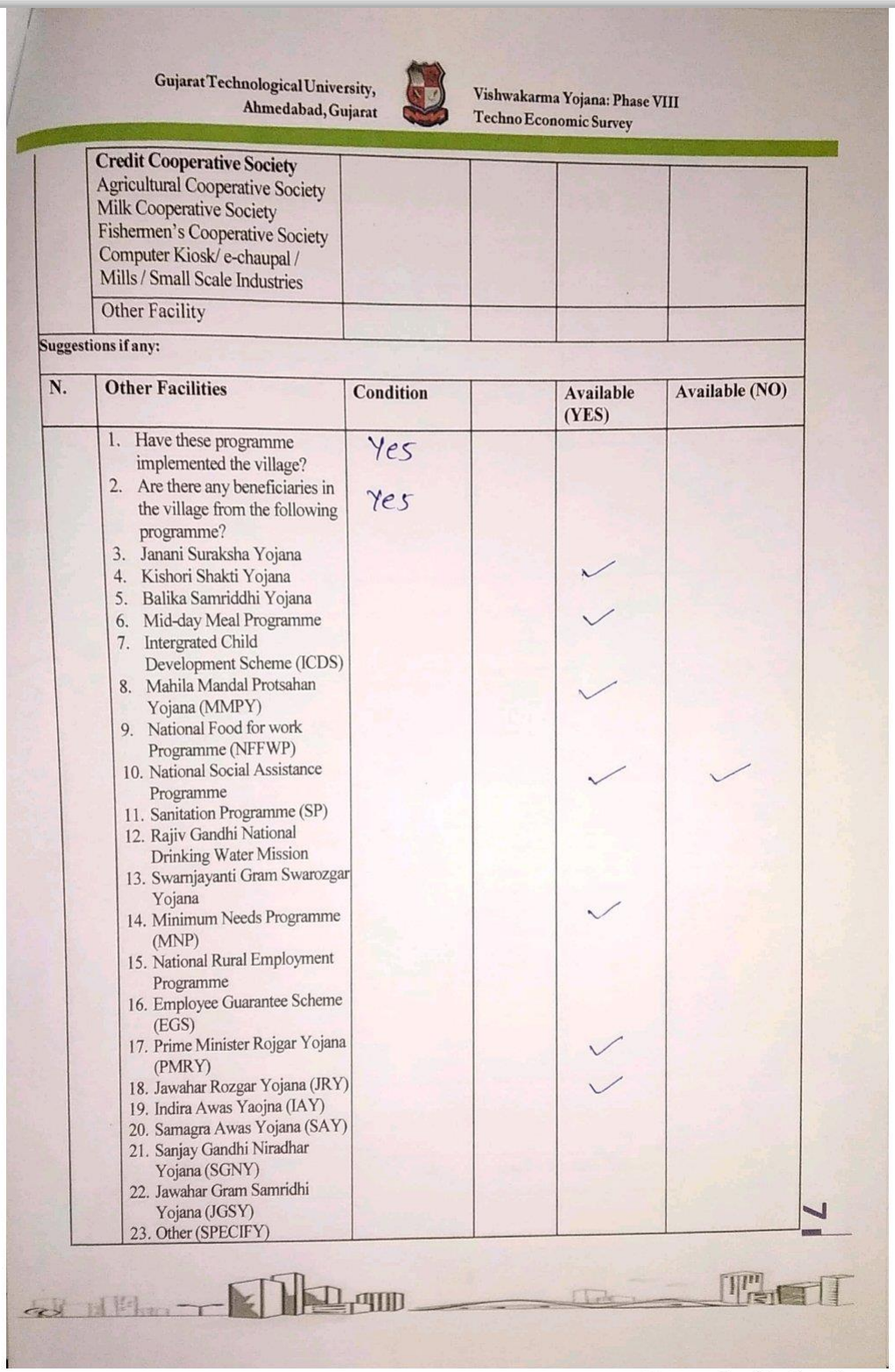

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	Credit Cooperative Society Agricultural Cooperative Society Milk Cooperative Society Fishermen's Cooperative Society Computer Kiosk/ e-chaupal / Mills / Small Scale Industries				
	Other Facility				

Suggestions if any:

N.	Other Facilities	Condition		Available (YES)	Available (NO)
	1. Have these programme implemented the village?	Yes			
	2. Are there any beneficiaries in the village from the following programme?	Yes			
	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)				

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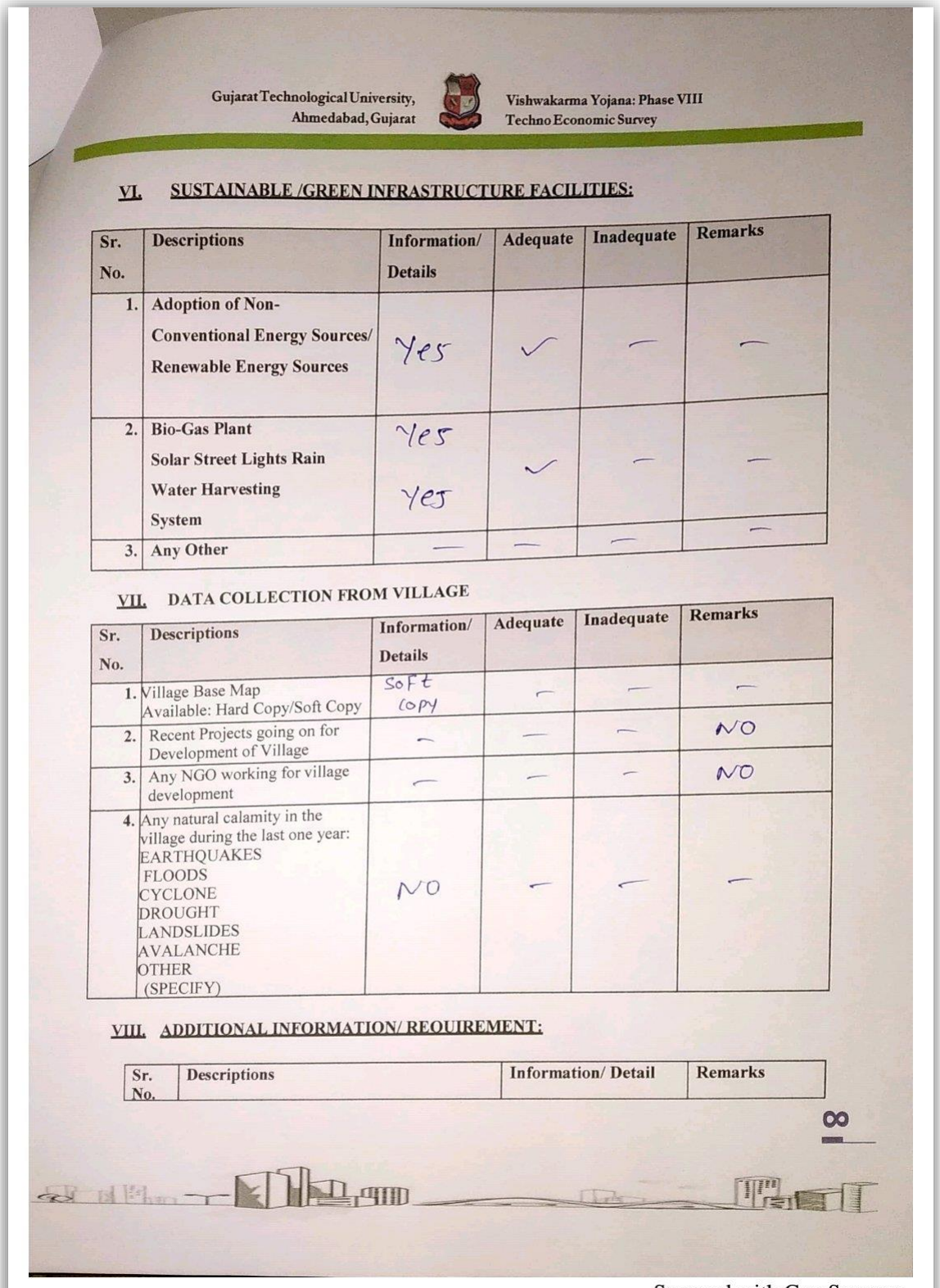

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VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

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

VII. DATA COLLECTION FROM VILLAGE

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

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

IX. Smart Village / Heritage Details

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

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

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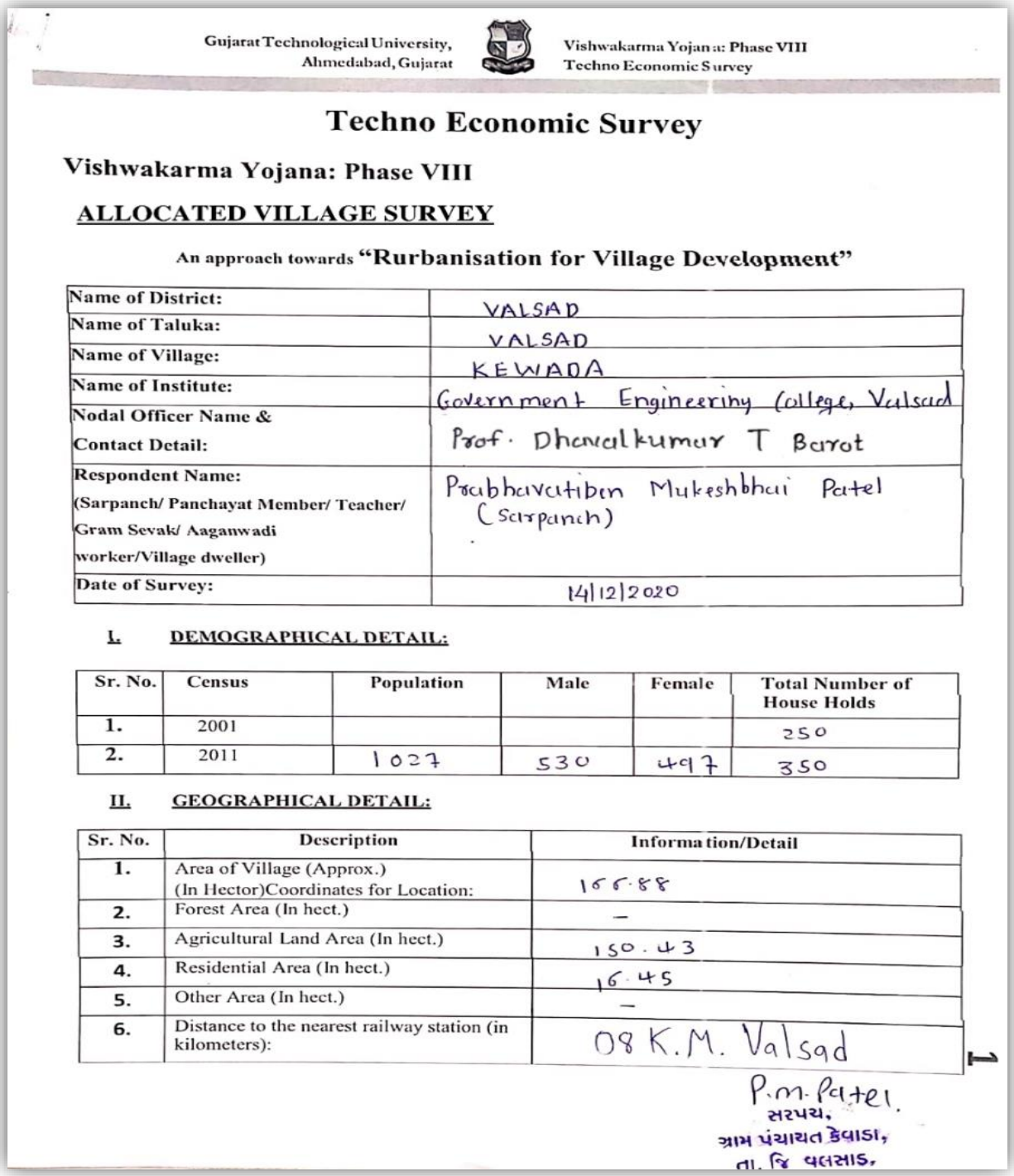
12.3 Survey form of Allocated Village Scanned copy attachment in the report for Part-I



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ALLOCATED VILLAGE SURVEY

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

Name of District:	VALSAD
Name of Taluka:	VALSAD
Name of Village:	KEWADA
Name of Institute:	Government Engineering College, Valsad
Nodal Officer Name & Contact Detail:	Prof. Dhavalkumar T Barot
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Prabhavatiben Mukeshbhai Patel (Sarpanch)
Date of Survey:	14/12/2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001				250
2.	2011	1027	530	497	350

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	156.88
2.	Forest Area (In hect.)	–
3.	Agricultural Land Area (In hect.)	150.43
4.	Residential Area (In hect.)	16.45
5.	Other Area (In hect.)	–
6.	Distance to the nearest railway station (in kilometers):	08 K.M. Valsad

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7.	Name of Nearest Town with Distance:	02 km Gundlav
8.	Distance to the nearest bus station (in kilometers):	02 K.M. Gundlav
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.	-
	2.	-
	3.	-

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

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	✓	✓		400
	Tube Well Or Bore Well	well	✓		
2.	**DUG WELL**				
	Protected Well	Uncovered		✓	1 R.O. plant about to short.
	Un Protected Well				
3.	**WATER FROM SPRING**				
	Protected Spring	—			25 (Hand Pump)
	Unprotected Spring				
	Rainwater	-			48- Private Tubwell
	Tanker Truck				
	Cart With Small Tank				
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/**				
	Irrigation Channel	-		✓	1 - canal
	Bottled Water	-		✓	2. Pond.
	Hand Pump				
	Other(Specify)**Lake/ Pond**				

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Suggestions if any:					1. 20,000 ltr (4 Nos)
B.	**Water Tank Facility**				2. 5000 ltr (3 Nos)
	Overhead Tank	Capacity:		✓	
	Underground Sump	Capacity:			
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1 2 B. OPEN WITH OUTLET C. OPEN WITHOUT OUTLET	No			
Suggestions if any:	Drainage facility required				
D.	**Road Network : All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road				
	Main road				
	Internal streets				
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH - 48			
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	N. Valsad.	-	-	
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	N. Valsad.			
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Auto.			
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Y.			24 hrs

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	Power supply for Domestic Use	Y			
	Power supply for Agricultural Use	Y			
	Power supply for Commercial Use				
	Road/ Street Lights	Yes			
	Electrification in Government Buildings/ Schools/ Hospitals	Yes			
	Renewable Energy Source Facilities (Y/ N)				
	LED Facilities	Yes			
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	NO			
	Location Condition				
	Community Toilet (With bath/ without bath facilities)	NO			
	Solid & liquid waste Disposal system available	NO			
	Any facility for Waste collection from road	NO			
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL OTHER (SPECIFY)				48 private Tube well 1 - Canal 2 - Pond 25 - Hand pump
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	10 Kuchha 390 Pucca 2.5 % ratio.			

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi) Sub-Centre PHC BLOCK PHC CHC/RH District/ Govt. Hospital Govt. Dispensary Private Clinic Private Hospital/ Nursing Home AYUSH Health Facility sonography /ultrasound facility	—	—		1. SHC 1. Community Hall
	If any of the above Facility is not available in village than approx. distance from village: 08 ...kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group ✓	YES		1	under construction
	Primary School ✓				
	Secondary school	No			
	Higher sec. School	No			
	ITI college/ vocational Training Center	No			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	No			
	If any of the above Facility is not available in village than approx. distance from village: 08 .....kms.				

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Suggestions if any:

L.	Socio- Culture Facilities	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	Yes without T.V		✓	
	Public Library (With daily newspaper supply: Y/N)				
	Public Garden				
	Village Pond (1).			✓	
	Recreation Center				
	Cinema/ Video Hall				
	Assembly Polling Station		Primary school	kewada	
	Birth & Death Registration		Panchayat	offic.	

If any of the above Facility is not available in village than approx. distance from village: 0 ....kms.

Suggestions if any:

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

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

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VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	–			
2.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	4 solar street light.			Non working.
3.	Any Other				

VII. DATA COLLECTION FROM VILLAGE

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

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks

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

IX. Smart Village / Heritage Details

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

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

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12.4 Gap Analysis of the Allocated Village

VILLAGE GAP Analysis					
Village Facilities	**Planning Commission/UDPFI Norms**	**Village Name:**	Bhadeli Jagalala		
		Population:1858			
		Existing	**Required as per Norms**	**Smart Village / Cities / Heritage Future Projection Design**	**Gap**
Social Infrastructure Facilities					
Education					
Anganwadi	Each or Per 2500 population	1	1	-	0
Primary School	Each Per 2500 population	1	1	-	0
Secondary School	Per 7,500 population	0	1	-	-1
Higher Secondary School	Per 15,000 Population	0	1	-	-1
College	Per 125,000 Population	0	0	-	0
Tech. Training Institute	Per 100000 Population	0	0	-	0
Agriculture Research Centre	Per 100000 Population	0	0	-	0
Skill Development Center	Per 100000 Population	0	0	-	0
Health Facility				-	
Govt/Panchayat Dispensary or Sub PHC or Health Centre	Each Village	1	1	-	0
Primary Health & Child Health Center	Per 20,000 population	0	0	-	0
Child Welfare and Maternity Home	Per 10,000 population	0	0	-	0
Multispecialty Hospital	Per 100000 Population	0	0	-	0
Public Latrines	1 for 50 families (if toilet is not there in home, especially for slum pockets & kutcha house)	0	1	-	-1
Physical Infrastructure Facilities					
Transportation		**Adequate**		-	-
Pucca Village Approach Road	Each village	**Adequate**	3 km approach road	-	-

Bus/Auto Stand provision	All Villages connected by PT (ST Bus or Auto)	**Inadequate**	Pickup stand at main highway of valsad	-	-

			village		
Drinking Water (Minimum 70 lpcd)		Adequate	-	-	-
Over Head Tank	1/3 of Total Demand	Adequate	2	1	+1
U/G Sump	2/3 of Total Demand	Adequate	0	1	-1
Drainage Network - Open		Adequate	0% open	-	-
Drainage Network - Cover		Adequate	100%covered	-	-
Waste Management System		Inadequate	-	-	-
Socio- Cultural infra-structure facilities					
Community Hall	Per 10000 Population	0	1	-	-1
Public Library	Per 15000 Population	0	1	-	-1
Cremation Ground	Per 20,000 population	0	1	-	-1
Post Office	Per 10,000 population	0	1	-	-1
Gram Panchayat Building	Each individual/group panchayat	1	1	-	0
APMC	Per 100000 Population	0	0	-	0
Fire Station	Per 100000 Population	0	0	-	0
Public Garden	Per village	0	1	-	-1
Police post	Per 40,000Population	0	1	-	-1
Shopping Mall **: Shops are available in village**					
Electrical Design					
Electricity Network		Adequate			
Any Smart Village Facility					
Technology		-----			

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

In this semester, we completed our Literature Review and our Ideal Village Visit. From there we got an Idea about how the smart village should be. Then we visited our allotted village Kewada of Valsad district. There we completed our Techno-Economic Survey and Smart Village Survey. After surveying we came To a conclusion and made many designs as per the need. It is as follows:

Sr. No.	Village Name	Discipline	Part-I	Part-II
1	Bhadeli jagalala	Civil	Anganwadi	Community hall
			Gram panchayat	Design of street light points near existing pond
			Primary health center	Crematorium
		Electrical	IR based hand sanitizer dispenser	Electrical wiring layout of primary health center
			Automatic Solar panel cleaning machine	Electrical wiring concept of anganwadi
			Live energy monitoring	Automatic water level controller
2	Kewada	Civil	Anganwadi	Panchayat office
			Bus stop	Public toilet
			Pond	Library
		Electrical	Single phase to three phase converter	Electrical wiring layout of anganwadi
			Smart irrigation system	Electrical wiring layout of bus stop
			Solar street lights	Electrical wiring layout of panchayat office
3	Shankar Talav	Civil	Aaganwadi	Post Office
			R.O. Water Plant	Library
			Bus-Stop	Community Hall
		Electrical	Automatic Street Light Bulb Holder	Electrical Layout Of Community Hall
			Live Energy Billing	Electrical Layout of Library
			Water Level Indicator with Alarm	Automatic Irrigation with Arduino
4	Bhagod	Civil	Bus Stop	Hospital
			Community Hall / Meeting Room	Village Gate
			Primary School Toilet	Medical Shop

		Electrical	**Smart Irrigation**	**Roof top Solar Panel**
			Smart Dustbin	**Electrical Layout of Hospital**
			Home Automation	**Electrical Layout of Medical Shop**
5	**Chichwada**	**Civil**	**Public Toilet**	**Primary School**
			Village Gate	**PHC Center**
			Community Hall	**BUS Stop**
		Electrical	**Automatic Water Level Controller**	**Solar panel Clearing**
			Motion Activated Street Light	**Off grid Solar System**
			Roof Top Solar Panel	**Primary School Wring**

12.6 Drawings

All the drawing and images are attached with their respected chapters along with listing and respective page numbers.

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

Fig. 12.1 Photos of allocated village


આંગણવાડી કેન્દ્ર

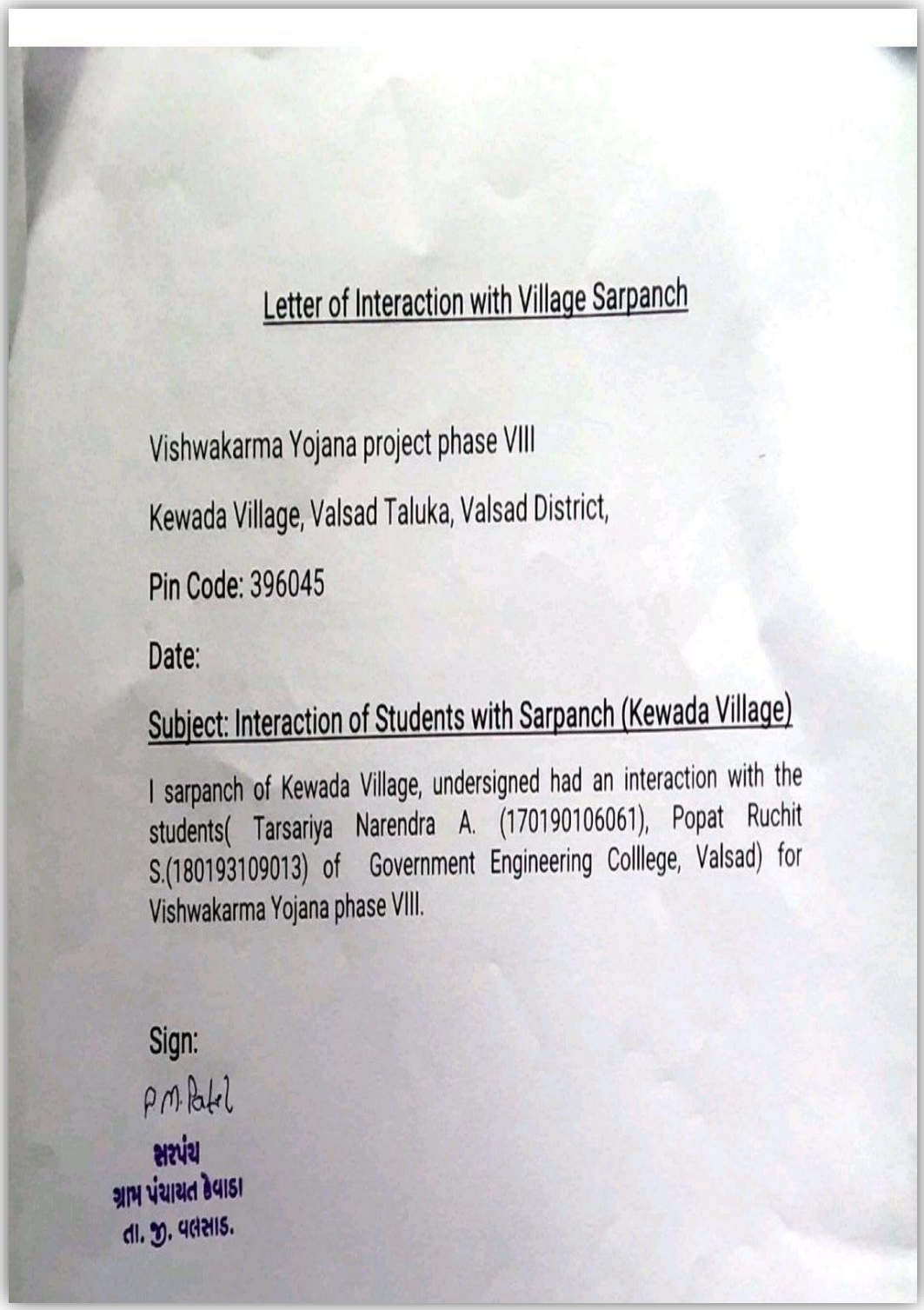

આયુષ્યમાન ભારત
પેટા આરોગ્ય કેન્દ્ર - કેવાડા


ગ્રામ પંચાયત
કેવાડા

Fig. 12.2 Photos of smart village

Fig. 12.3 Photos of ideal village

12.8 Village Interaction with sarpanch Report:



Letter of Interaction with Village Sarpanch

Vishwakarma Yojana project phase VIII

Kewada Village, Valsad Taluka, Valsad District,

Pin Code: 396045

Date:

Subject: Interaction of Students with Sarpanch (Kewada Village)

I sarpanch of Kewada Village, undersigned had an interaction with the students(Tarsariya Narendra A. (170190106061), Popat Ruchit S.(180193109013) of Government Engineering Colllege, Valsad) for Vishwakarma Yojana phase VIII.

Sign:

P M Patel

સરપંચ
ગ્રામ પંચાયત કેવાડા
તા. જી. વલસાડ.

12.9 Sarpanch Letter giving information about the village development

Approval Letter for Proposed Design

Vishwakarma Yojana project phase VIII

Kewada Village, Valsad Taluka, Valsad District,

Pin Code: 396045

Date:

Subject: Approval Letter for Proposed Design Kewada Village.

I Sarpanch of Kewada village, undersigned gives approval for the following deigned as proposed by the students (Tarsariya Narendra A.(170190106061), Popat Ruchit S.(180193109013) of Government Engineering Colllege, Valsad) for Vishwakarma Yojana phase VIII.

Approved Designs For Part 1:

Civil

1. Aaganwadi
2. Bus Stop
3. Pond

Electrical

4. Automatic intensity controlled solar street light
5. A.C. to A.C. converter - single phase to three phase
6. Touchscreen based automation system

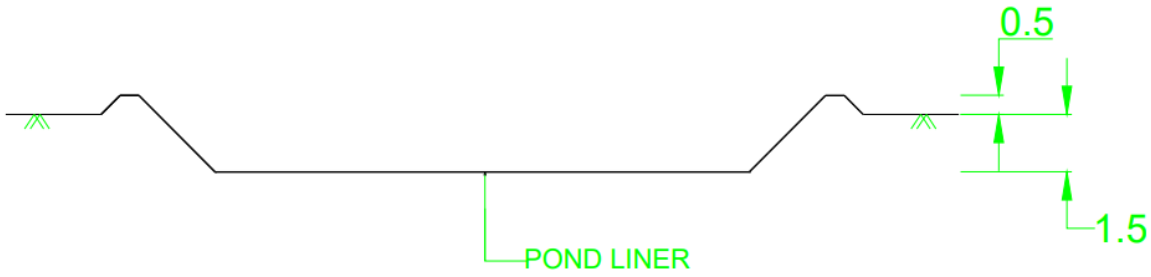
P.M.Patel

સરપંચ
ગ્રામ પંચાયત કેવાડા
તા. જી. વલસાડ.

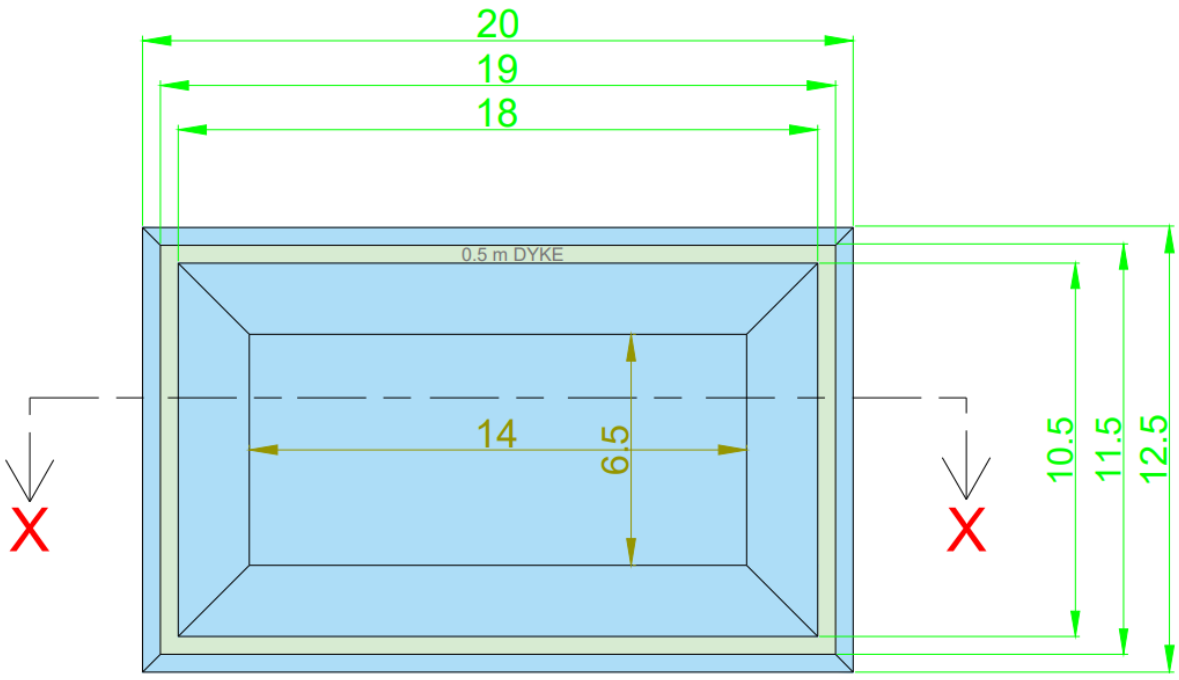
12.10 Comprehensive report preparation as per format

Civil Designs:

Design of pond



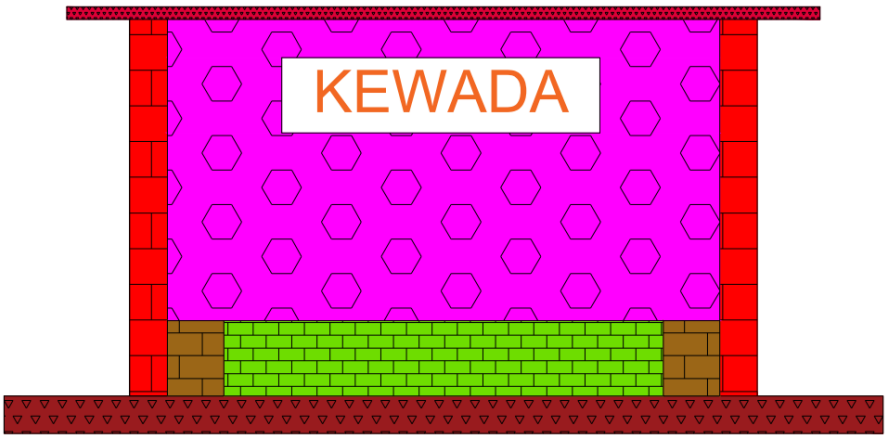
Section X-X



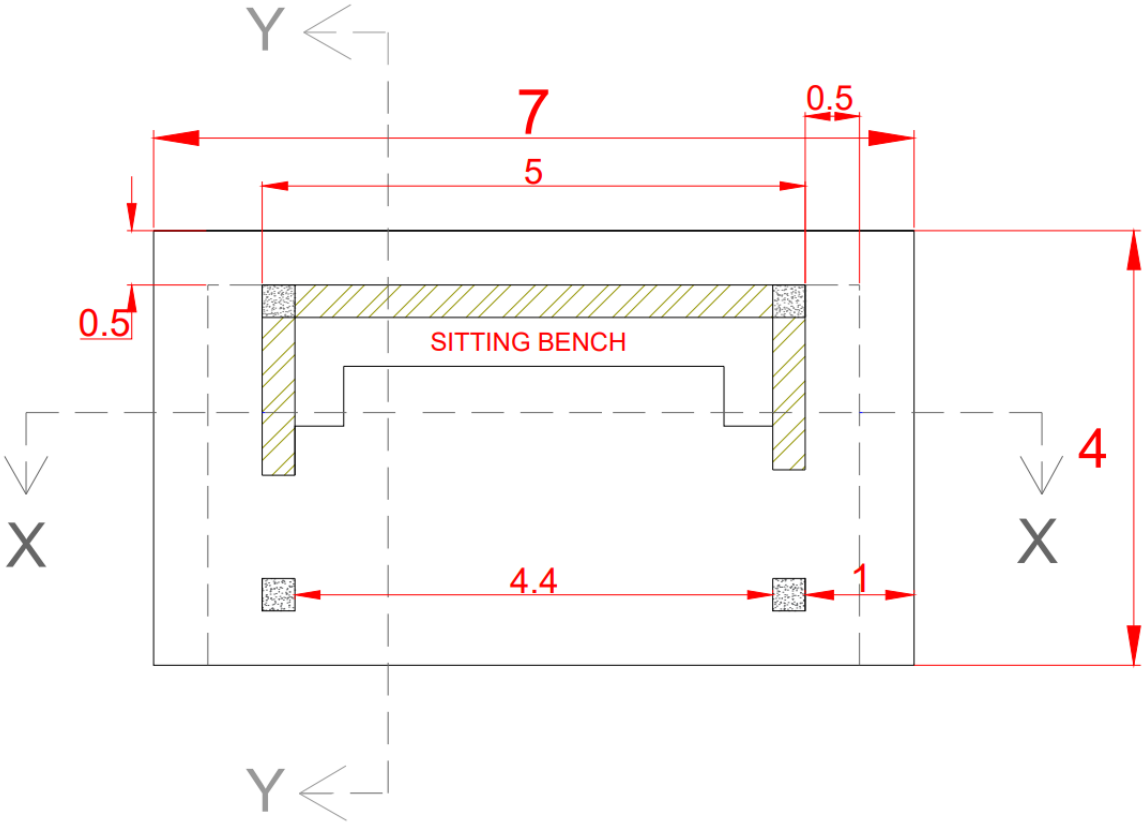
Plan

All dimensions are in meters

Designs of Bus stop

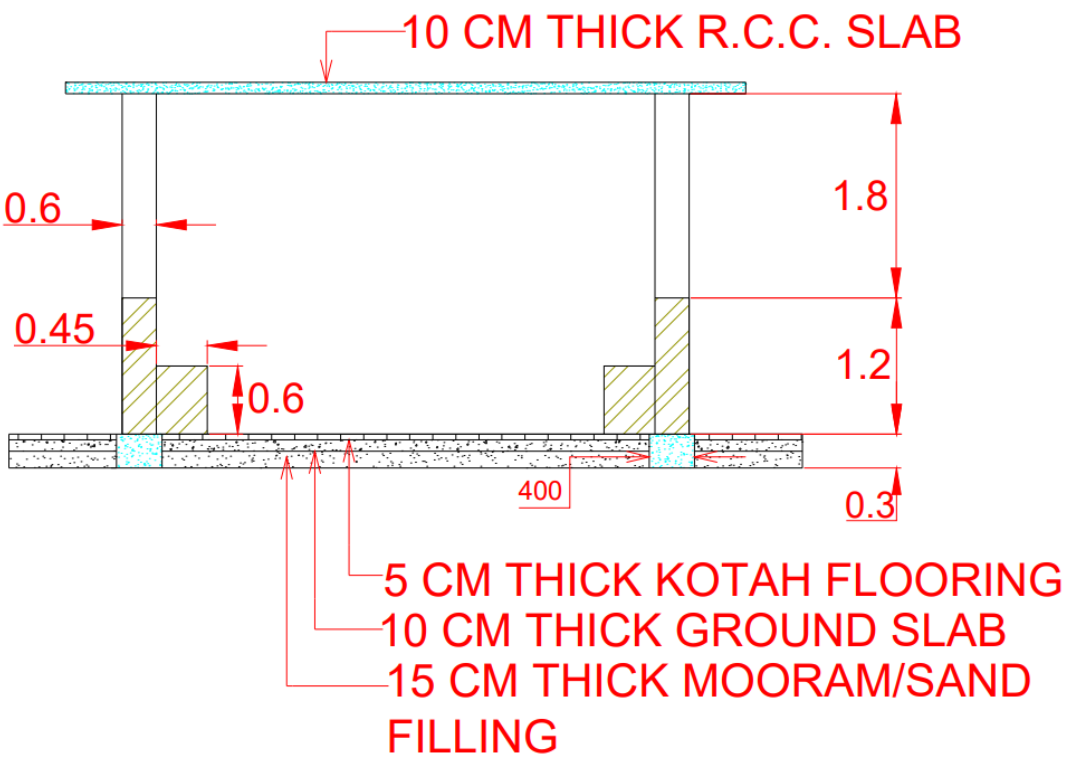


Front Side Elevation

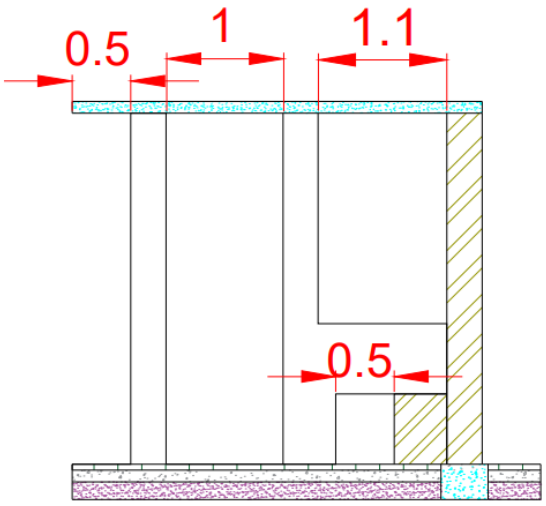


All dimensions are in meters

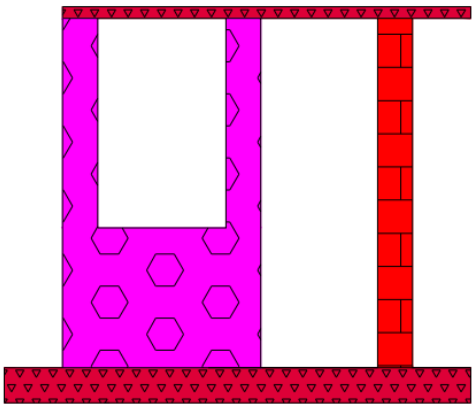
Plan



Section X-X



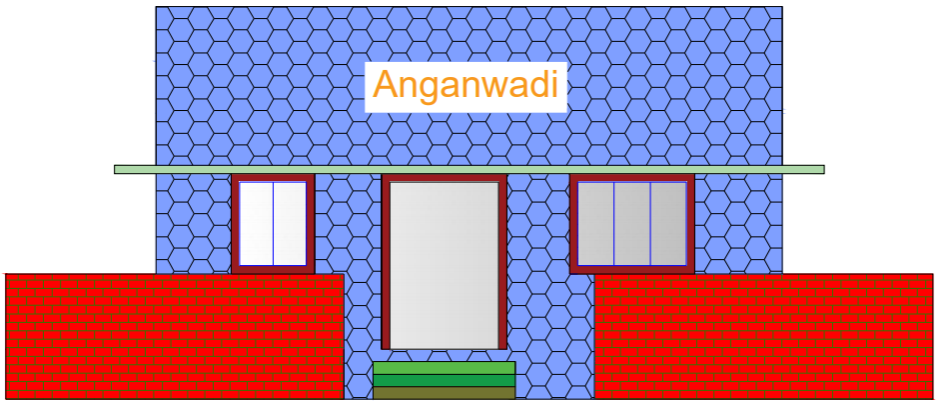
Section Y-Y



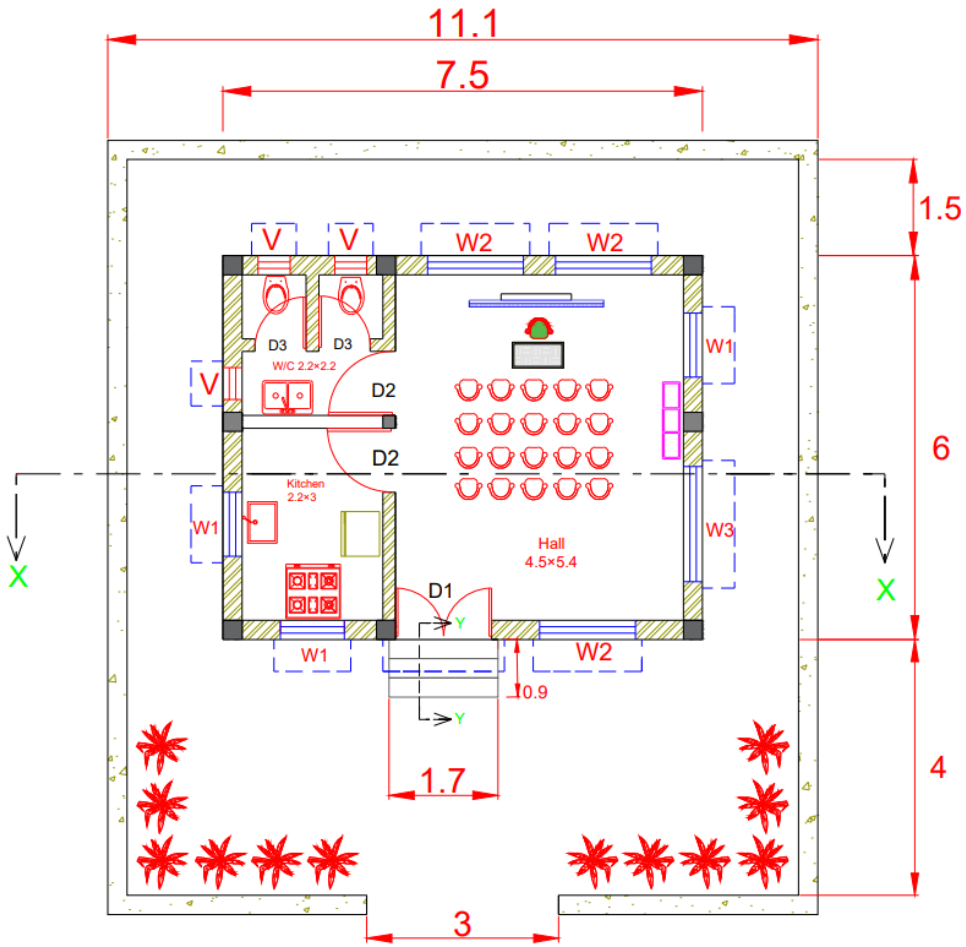
Left Side Elevation

All dimensions are in meters

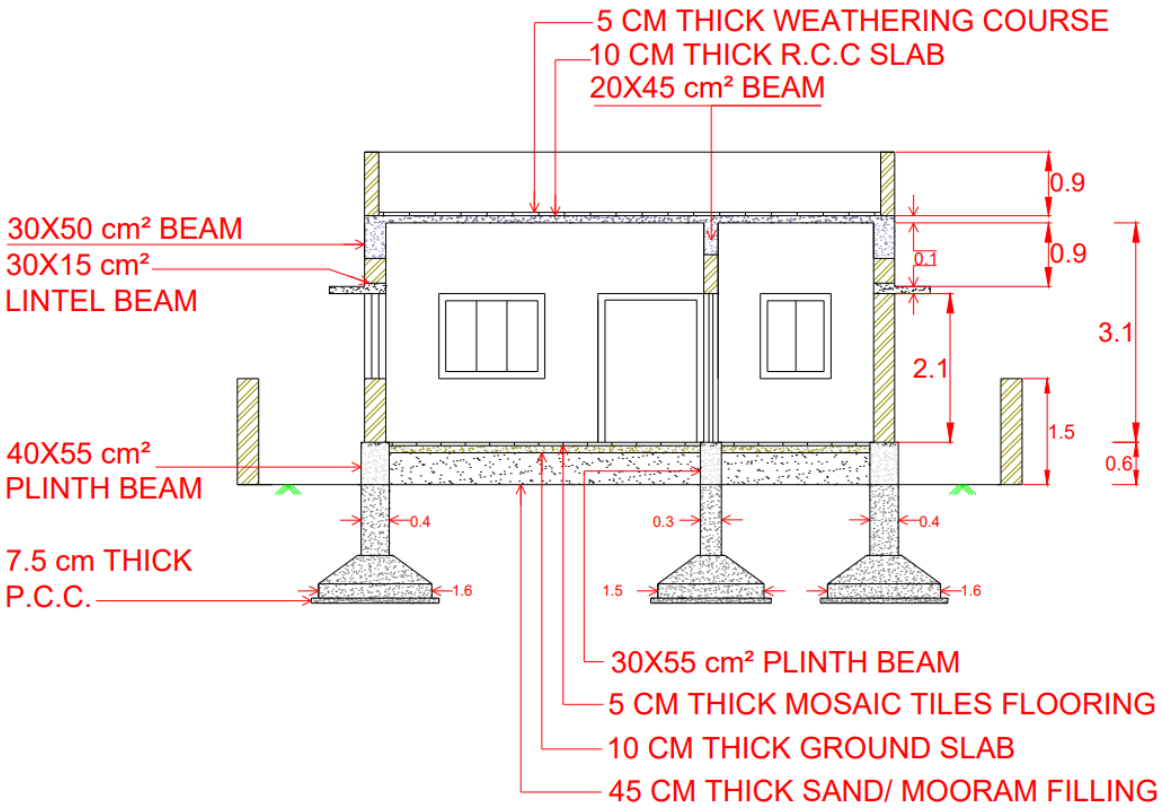
Designs of Anganwadi



Front Side Elevation



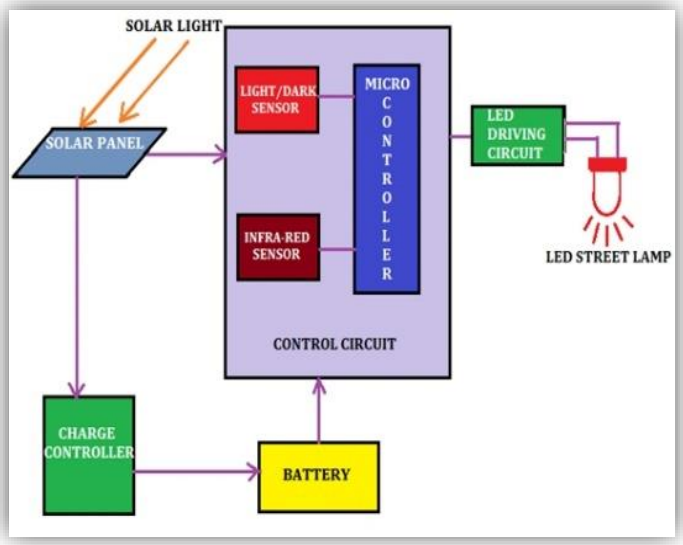
All dimensions are in meters Ground Floor Plan



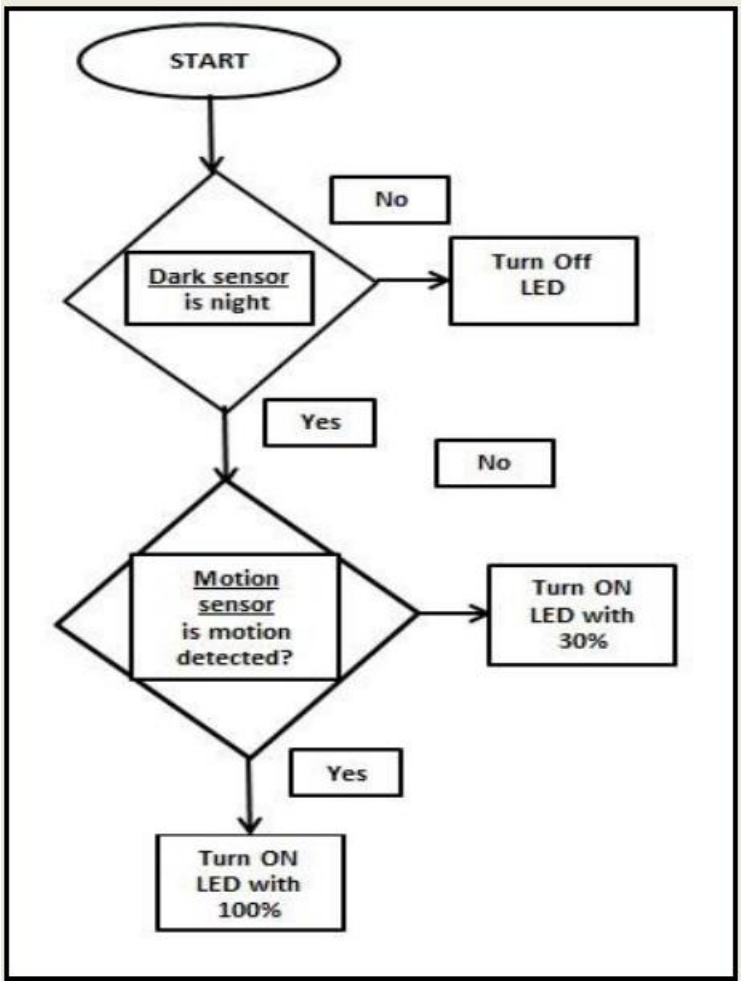
Section X-X

Electrical Designs:

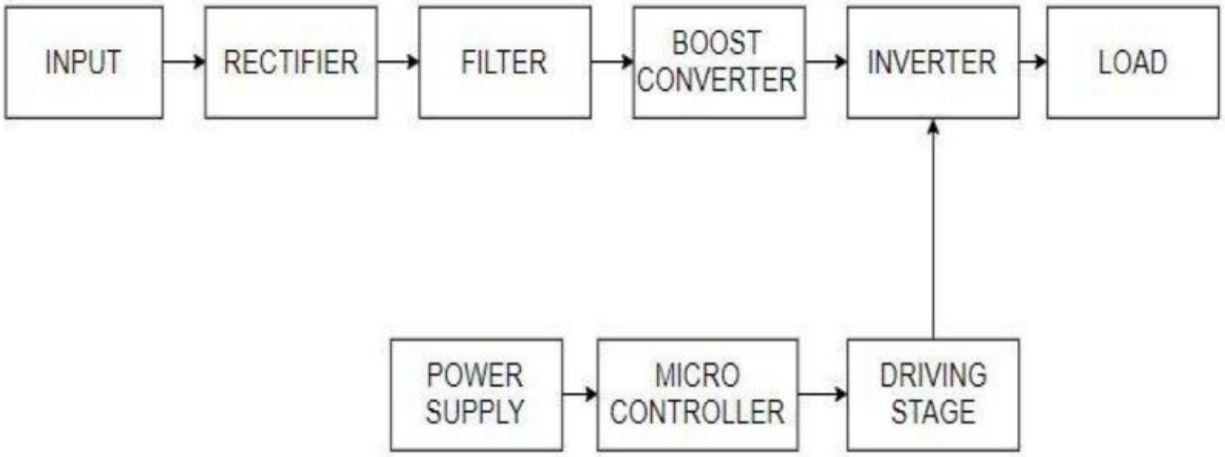
Electrical Design for Automatic Intensity Controlled Street Lights

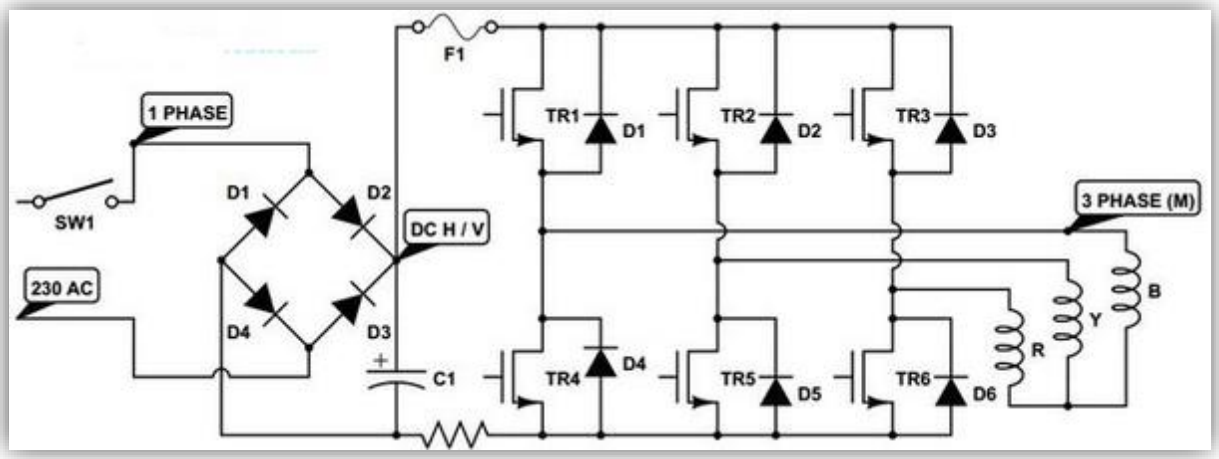


All dimensions are in meters

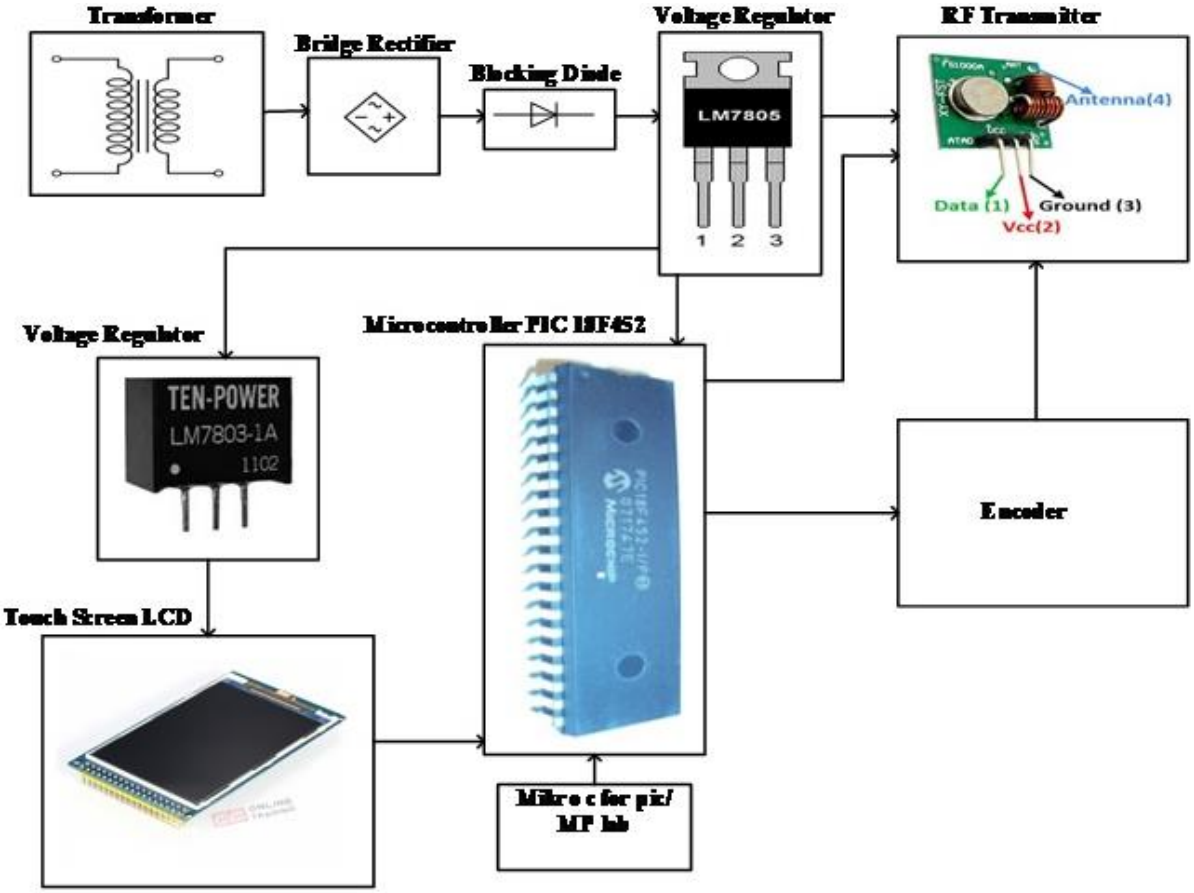


Electrical design for A.C. to A.C. Converter-single phase to three phase





Electrical design for Touchscreen based Automation System



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

13.1 Design Proposals

The design proposals are as per the need of the village. The designs are given below as per the Vishwakarma Yojna phase-8, part-2.

13.1.1 Civil Design 1 : PANCHAYAT OFFICE

The village already consists one panchayat office building but that is old and made as per old systems and requirements , So the new design is given based on new facilities provision to the villagers and this panchayat office building will provide better administration to the users also. This new panchayat office building will be able to handle more people then the old building and the facilities will be better also then old one.

Plot area statement:

Plot area: 113.1 m²
Built up area:

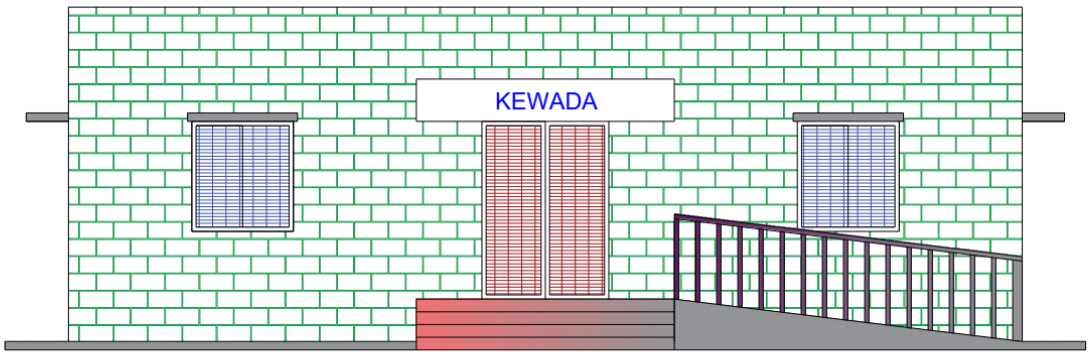


Fig. 13.1 Elevation (Panchayat Office)

All dimensions are in mm

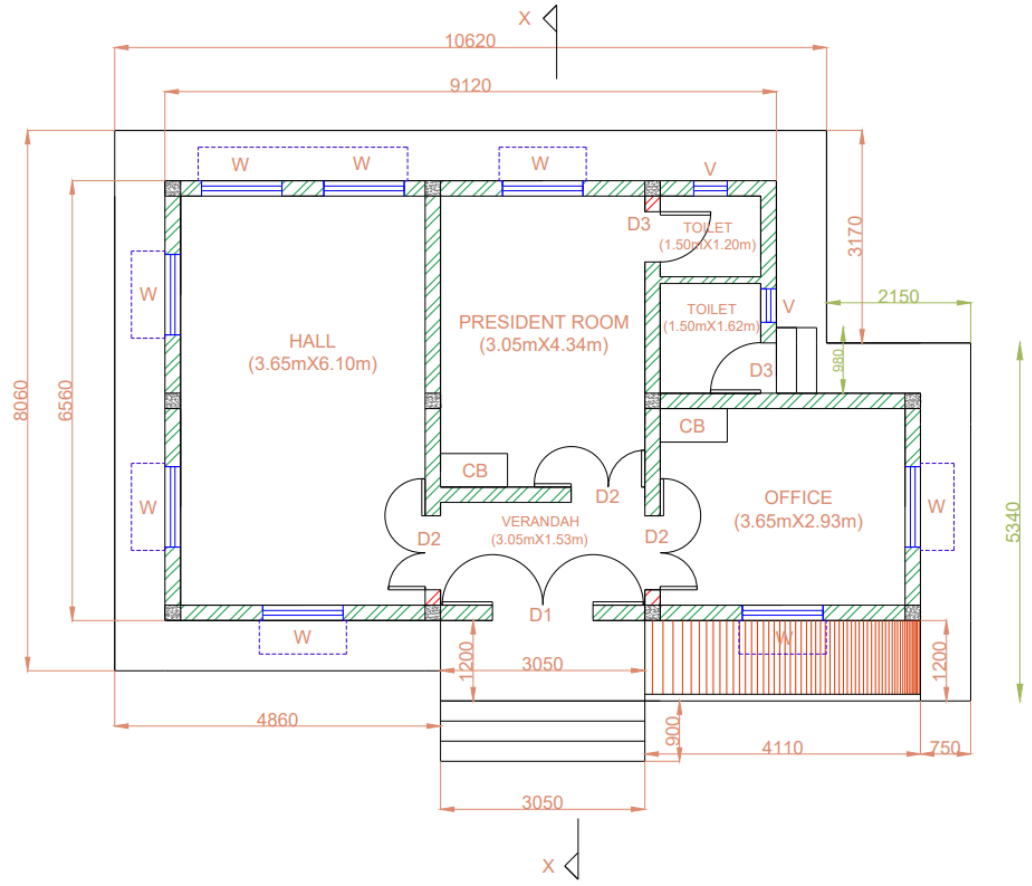


Fig. 13.2 Plan (Panchayat Office)

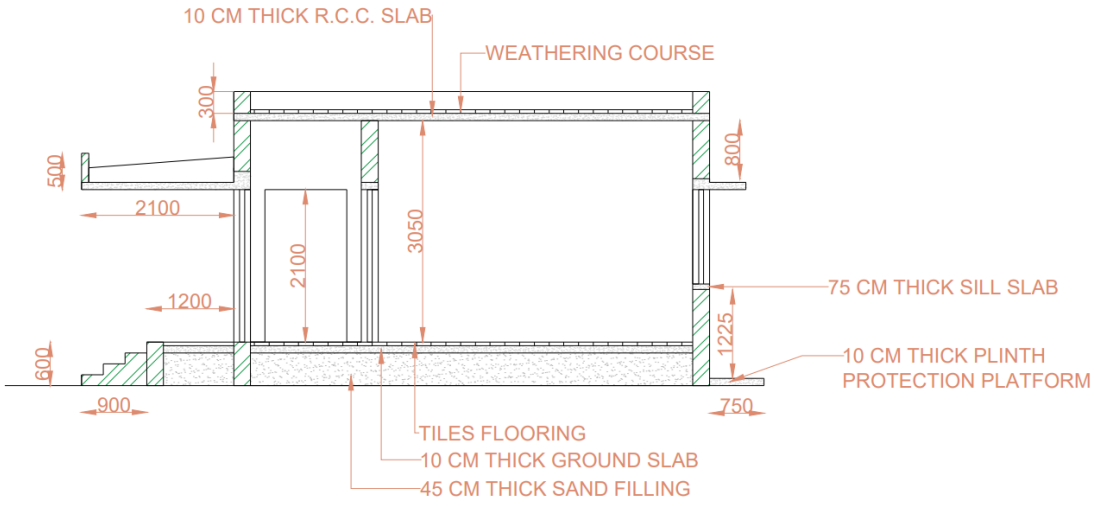


Fig. 13.3 Section X-X (Panchayat Office)

All dimensions are in mm

Fig. 13.4 Panchayat Office 3D Model

Table 13.1 Schedule of Openings (Panchayat Office)

No.	DETAILS	SYMBOL	SIZE	Nos.
1.	DOOR	D1	1500 X 2100	1
2.	DOOR	D2	1100 X 2100	3
3.	DOOR	D3	750 X 2100	2
4.	WINDOW	W	1200 X 1300	8
5.	VENTILATION	V	500 X 500	2

Table 13.2 Measurement Sheet (Panchayat Office)

Sr. No.	Item Description	No.	Length (m)	Width (m)	Height (m)	Quantity	Unit
1	Excavation	11	1.33	1.33	1.675	32.59	m^3
2	P.C.C.	11	1.33	1.33	0.075	1.459	m^3
3	Footing	11	1.13	1.13	0.2	2.81	m^3
		11	0.2345			2.579	m^3
		11	0.23	0.23	1	0.5819	m^3
						5.97	m^3
4	Earth filling					26.619	m^3
5	Plinth Beam	3	0.23	6.10	0.6	2.5254	m^3
		1	0.23	2.93	0.6	0.400	m^3
		2	0.23	3.65	0.6	1.0074	m^3

		3	0.23	3.05	0.6	1.2627	m³
		2	0.23	3.65	0.6	1.0074	m³
						6.2029	m³
6	Sand filling	1	3.65	6.10	0.45	10.019	m³
		1	3.05	6.10	0.45	8.3722	m³
		1	3.65	2.93	0.45	4.8125	m³
		1	1.5	2.90	0.45	1.9575	m³
						25.1612	m³
7	Ground Slab	1	9.12	6.56	0.10	5.9827	m³
		1	2.14	3.39	0.10	0.7254	m³
		1	3.05	1.20	0.10	0.366	m³
						7.0741	m³
8	Column	11	0.23	0.23	3.65	2.1239	m³
9	Roof Slab	1	9.12	6.56	0.10	5.9827	m³
		1	2.14	3.39	0.10	0.7254	m³
						6.7081	m³
10	Brickwork up to Roof Slab	3	3.65	0.23	3.05	7.6814	m³
		2	6.10	0.23	3.05	8.5583	m³
		3	3.05	0.23	3.05	6.4187	m³
		1	2.93	0.23	3.05	2.0553	m³
		2	3.65	0.23	3.05	5.1209	m³
		1	1.50	0.23	3.05	1.0522	m³
		1	3.15	0.23	3.05	2.2097	m³
		1	1.50	0.10	3.05	0.4575	m³
						33.554	m³
	Deductions	8	1.20	1.30	0.23	2.8704	m³
		2	0.50	0.50	0.23	0.1150	m³
		1	1.50	2.10	0.23	0.7245	m³
		3	1.10	2.10	0.23	1.5939	m³
		2	0.75	2.10	0.23	0.7245	m³
						6.0283	m³
	Total Brickwork up to Roof Slab					22.5257	m³
11	Brickwork in Parapet Wall	1	32.84	0.23	0.30	2.2659	m³
12	Brickwork in Steps	1	3.05	0.90	0.15	0.4117	m³

		1	3.05	0.60	0.15	0.2745	m^3
		1	3.05	0.30	0.15	0.1373	m^3
		1	0.98	0.60	0.15	0.0882	m^3
		1	0.98	0.30	0.15	0.0441	m^3
						0.9558	m^3
13	Lintel Beam	8	1.3	0.23	0.15	0.3588	m^3
		1	1.6	0.23	0.15	0.0552	m^3
		3	1.2	0.23	0.15	0.1242	m^3
		2	0.85	0.23	0.15	0.0586	m^3
						0.5968	m^3
14	Chajja	8	1.3	0.5	0.1	0.520	m^3
		1	3.05	2.1	0.1	0.6405	m^3
						1.1605	m^3
15	Tiles Flooring	1	3.65	6.10		22.265	m^2
		1	3.05	4.34		13.237	m^2
		1	1.50	1.20		1.800	m^2
		1	1.50	1.62		2.430	m^2
		1	3.65	2.93		10.695	m^2
		1	3.05	2.10		6.405	m^2
		1	4.11	1.20		4.932	m^2
						61.764	m^2
16	Inside Plastering	4	3.65		3.05	44.53	m^2
		2	6.10		3.05	37.21	m^2
		2	2.93		3.05	17.873	m^2
		4	3.05		3.05	37.21	m^2
		2	4.34		3.05	26.474	m^2
		2	1.53		3.05	9.333	m^2
		4	1.50		3.05	18.30	m^2
		2	1.20		3.05	7.320	m^2
		2	1.62		3.05	9.882	m^2
	Outside Plastering	2	6.56		4.05	53.136	m^2
		1	9.12		4.05	36.936	m^2
		1	11.27		4.05	45.643	m^2
						343.84	m^2
	Deductions	2	1.5	2.1		6.300	m^2
		6	1.1	2.1		13.860	m^2
		4	0.75	2.1		6.300	m^2
		16	1.2	1.3		24.96	m^2
		4	0.5	0.5		1	m^2

						52.42	m^2
	Total Plastering					291.42	m^2

Table 13.3 Abstract Sheet (Panchayat Office)

Sr. No.	Item Description	Quantity	Rate	Per	Amount
1	Excavation	32.59 m^3	90	m^3	2933
2	P.C.C.	1.459 m^3	3500	m^3	5106
3	Footing	5.97 m^3	4100	m^3	24477
4	Plinth Beam	6.2029 m^3	4100	m^3	25431
5	Ground Slab	7.0741 m^3	4100	m^3	29003
6	Column	2.1239 m^3	4100	m^3	8708
7	Roof Slab	6.7081 m^3	4100	m^3	27503
8	Lintel Beam	0.3588 m^3	4100	m^3	1471
9	Chajja	1.1605 m^3	4100	m^3	4758
10	Brick Work (CM - 1:6)	25.7474 m^2	3500	m^2	90115
11	Plastering	291.42 m^2	204	m^2	59449
12	Tiles Flooring	61.764 m^2	600	m^2	37058
13	Paint Work	291.42 m^2	204	m^2	59450
				Total Rs.	375462
		Add 1.5% water charge	5632		
		Add 10% contingencies charge	37546		
		Total estimated cost in Rs.	418640		

13.1.2 Civil Design 2 : PUBLIC TOILET

Kewada village do not have any public toilet facility. To control open defecation and reduce the spread of diseases through open defecation the public toilet design is provided.
This design will be helpful for all villagers and the design has best facility and for ladies and gents different blocks are also provided.

Plot area statement:
Built up Area : 52.128 m^2

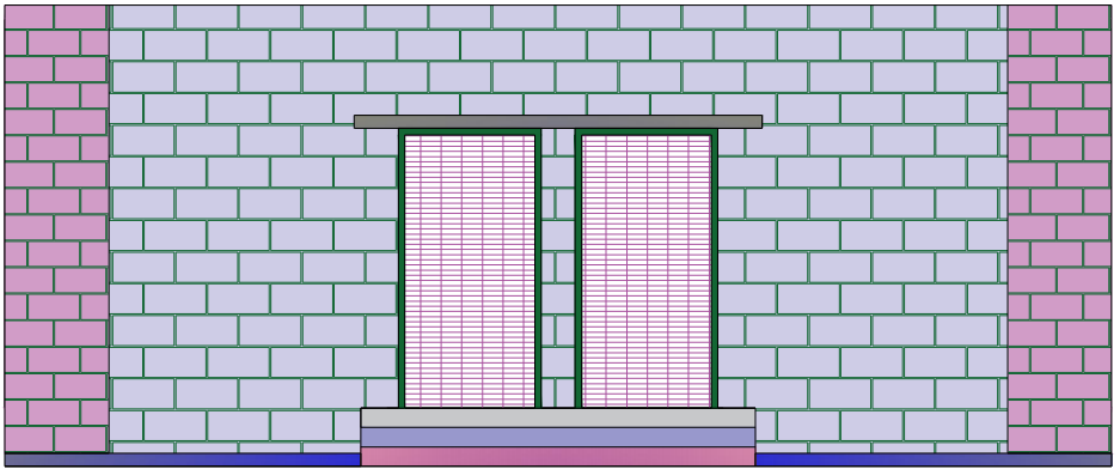


Fig. 13.5 Elevation (Public Toilet)

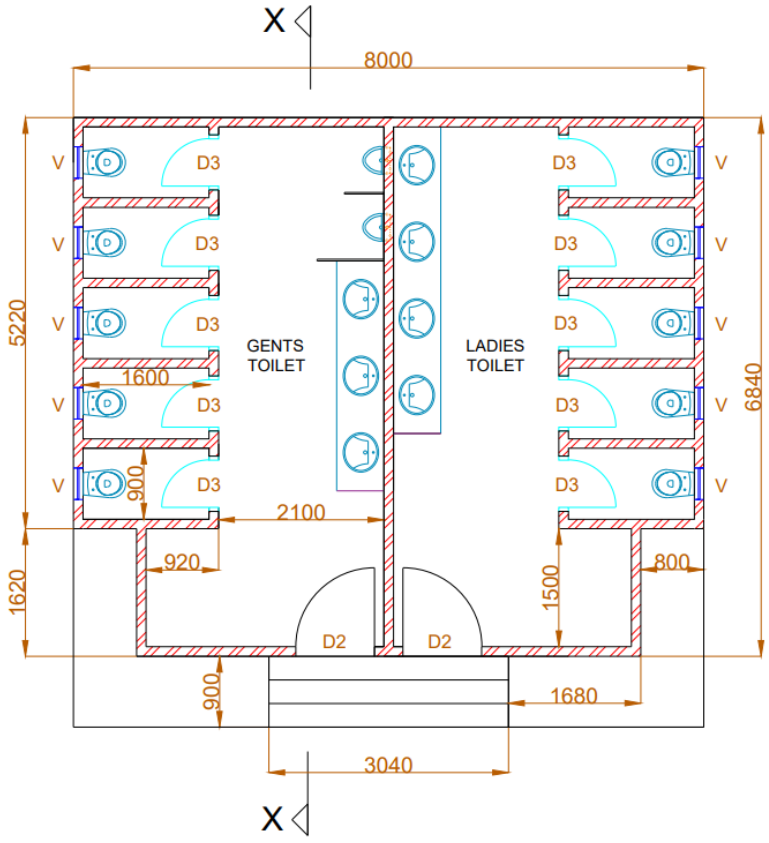


Fig. 13.6 Plan (Public Toilet)

All dimensions are in mm

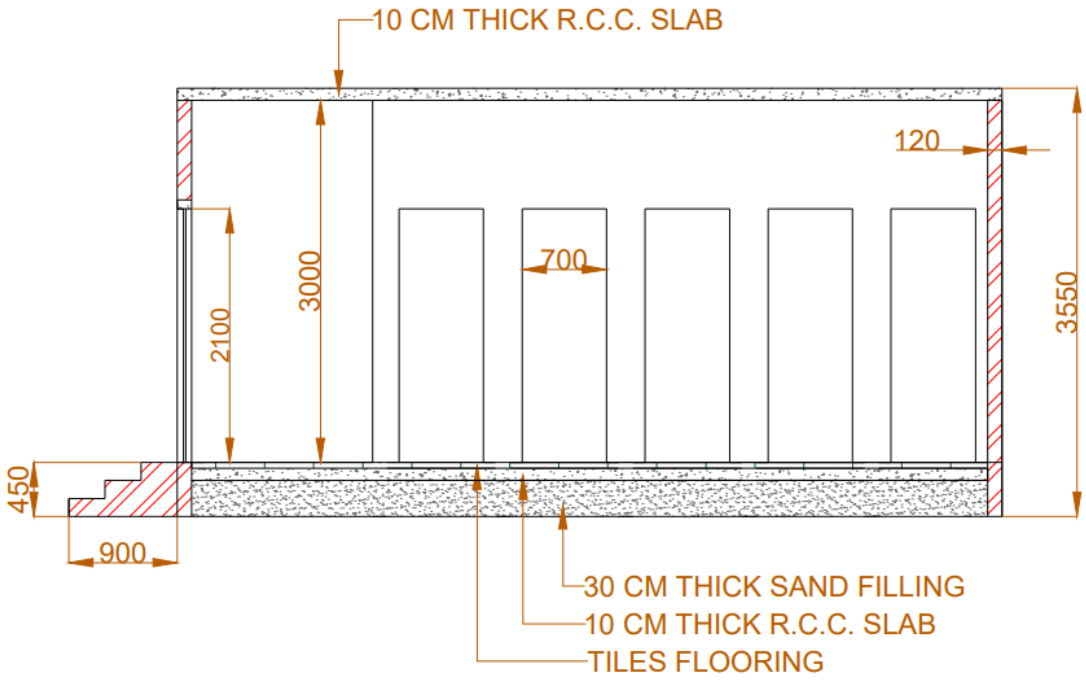


Fig. 13.7 Section X-X (Public Toilet)

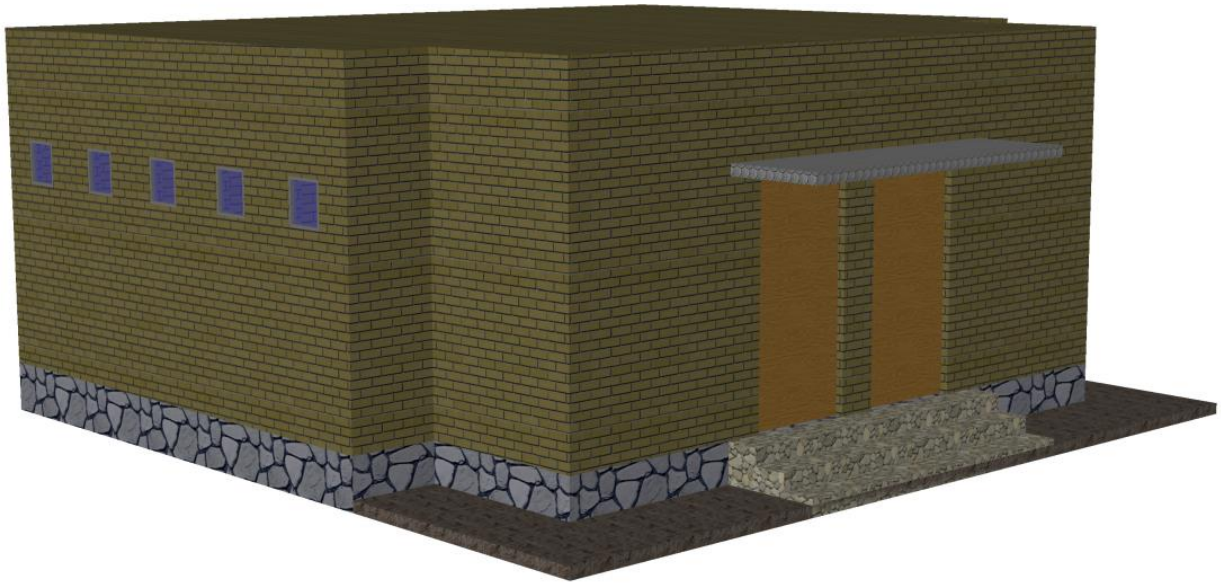


Fig. 13.8 Public Toilet 3D Model

All dimensions are in mm

Table 13.4 Schedule of Openings (Public Toilet)

No.	DETAILS	SIZE	SYMBOL
1	DOOR	1000 X 2100	D2
2	DOOR	700 X 2100	D3
3	VENTILATION	400 X 400	V

Table 13.5 Measurement Sheet (Public Toilet)

Sr. No.	Item Description	No.	Length (m)	Width (m)	Height (m)	Quantity	Unit
1	Earthwork	1	29.66	1.3	1.3	50.125	m^3
		1	24.76	1.3	1.3	41.844	m^3
						91.96	m^3
2	P.C.C.	1	29.66	1.3	0.3	11.567	m^3
		1	24.76	1.3	0.3	9.656	m^3
						21.22	m^3
3	Brickwork in Foundation	1	29.66	0.9	0.3	8.00	m^3
		1	24.76	0.9	0.3	6.68	m^3
		1	29.66	0.6	0.3	5.34	m^3
		1	24.76	0.6	0.3	4.45	m^3
		1	29.66	0.3	0.3	2.67	m^3
		1	24.76	0.3	0.3	2.23	m^3
						31.01	m^3
4	D.P.C.	1	29.66	0.3		8.898	m^2
			24.76	0.3		7.428	m^2
						16.326	m^2
5	Roof Slab	1	8	5.22	0.25	10.44	m^3
		2	1.62	3.2	0.25	2.835	m^3
						13.270	m^3
6	Brickwork up to Roof Slab	4	5.22	0.12	3.0	7.5168	m^3
		1	8.0	0.12	3.0	2.88	m^3
		10	1.6	0.12	3.0	5.76	m^3
		1	6.4	0.12	3.0	2.304	m^3
		2	1.5	0.12	3.0	1.08	m^3
		1	6.6	0.12	3.0	2.376	m^3
						21.92	m^3
	Steps	1	3.04	0.9	0.45	1.2312	m^3
		1	3.04	0.6	0.30	0.5472	m^3
		1	3.04	0.3	0.15	0.1368	m^3
	Total Brickwork					23.835	m^3

7	Inside Plastering	1	24.76		3	74.28	m^2
		1	29.66		3	88.98	m^2
						163.26	m^2
	Deductions	10	0.4	0.4		1.6	m^2
	Total	163.26 – 1.6		161.66	m^2		
8	Outside Plastering	1	29.68	3.55		105.364	m^2
	Deductions	2	1	2.1		4.2	m^2
		10	0.4	0.4		1.6	m^2
	Total	105.364 – 5.8		99.564	m^2		
	Total Plastering					261.22	m^2
9	Tiles Flooring					42.36	m^2
10	Paint Work					261.22	m^2

Table 13.6 Abstract Sheet (Public Toilet)

Sr. No.	Item Description	Quantity	Rate	Per	Amount (Rs.)
1	Earthwork	91.96 m^3	90	m^3	8277
2	P.C.C.	21.22 m^3	3500	m^3	74270
3	Brickwork in Foundation	31.01 m^3	3500	m^3	108535
4	Roof Slab	13.270 m^3	4100	m^3	54407
5	Brickwork up to Roof Slab	21.920 m^3	3500	m^3	76720
6	Plastering	261.22 m^2	204	m^2	53288
7	Tiles Flooring	42.36 m^2	600	m^2	2795
8	Paint Work	261.22 m^2	202	m^2	52766
				Total Rs.	431058
		Add 1.5% water charge	6465		
		Add 10% contingencies charge	43105		
		Total estimated cost in Rs.	480625		

13.1.3 Civil Design 3 : UNDERGROUND WATER TANK

In some season shortage of water is common problem for almost all villages mainly in summer season so the rain water harvesting plays an important role during this season or not only in summer season, sometimes in monsoon also less rainfall occurs so there the shortage of water crysis occurs in village.

Kewada Village do not have any rain water harvesting facility so based on that this underground water tank design is given which may apply below panchayat office or below public toilet so it may helpful for the villagers.

Area covered by tank : 29.16 m²

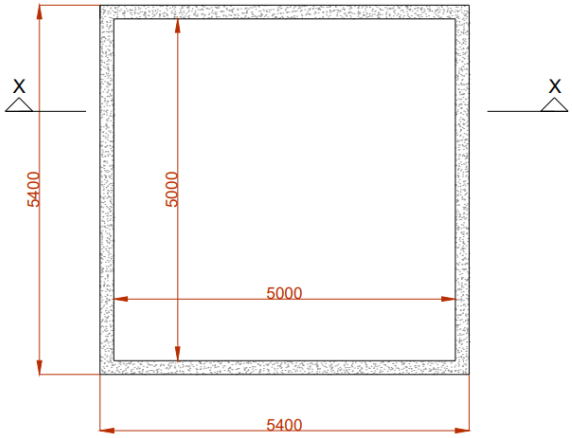


Fig. 13.9 Plan (Underground Water Tank)

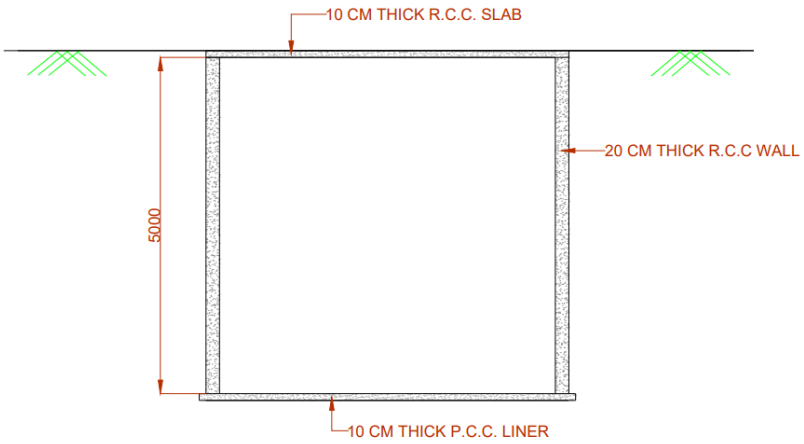


Fig. 13.10 Section X-X (Underground Water Tank)

All dimensions are in mm

Table 13.7 Measurement Sheet (Underground Water Tank)

Sr. No.	Item Description	No.	Length (m)	Width (m)	Height (m)	Quantity	Unit
1	Earth Work	1	5.4	5.4	5.0	145.8	m^3
2	P.C.C.	1	5.6	5.6	0.1	3.136	m^3
3	R.C.C. Wall	2	5.4	0.2	5.0	10.80	m^3
		2	5.0	0.2	5.0	10.00	m^3

Table 13.8 Abstract Sheet (Underground Water Tank)

Sr. No.	Item Description	Quantity	Rate	Per	Amount (Rs.)
1	Earth Work	145.8 m^3	90	m^3	13122
2	P.C.C.	3.136 m^3	3500	m^3	10976
3	R.C.C. Wall	20.80 m^3	4100	m^3	85280
4	R.C.C. Slab	2.916 m^3	4100	m^3	11955
				Total Rs.	121333
		Add 1.5% water charge	1820		
		Add 10% contingencies charge	12133		
		Total estimated cost in Rs.	135286		

13.1.4 Electrical Design 1 : Smart solar based irrigation system

Current condition through which Problem identified:
This problem was recognized through farmers of the village, that there is a big wastage of water, electricity as well as man power, in current irrigation system, because currently the whole process is manual and open loop (without feedback of water from soil or moisture through sensor).

Solution from electrical side to improve the existing condition of Smart irrigation system:
This solution is actually a précised automatic watering system for the plant which automatically water the crops without the engagement of farmer with the system. In this design we are using a soil moisture sensor that senses the moisture content in the soil and send this data to the Arduino that we are using. Soil moisture sensors can send data in both, in analog as well as in digital. So, we are using the analog data here to get the accuracy in the project. Moisture sensor is inserted in the soil and connected to the Arduino; the sensor sends the data to the Arduino about the moisture inside the soil. The Arduino will get the action on the data, according to the condition mentioned in the program which is to be uploaded in Arduino. If the soil moisture sensor detects no moisture or very little moisture then the pump will get started and water is supplied to the plants Automatically. Components required for this design are moisture sensor, nodemcu, relay module, and water pump or solenoid valve.

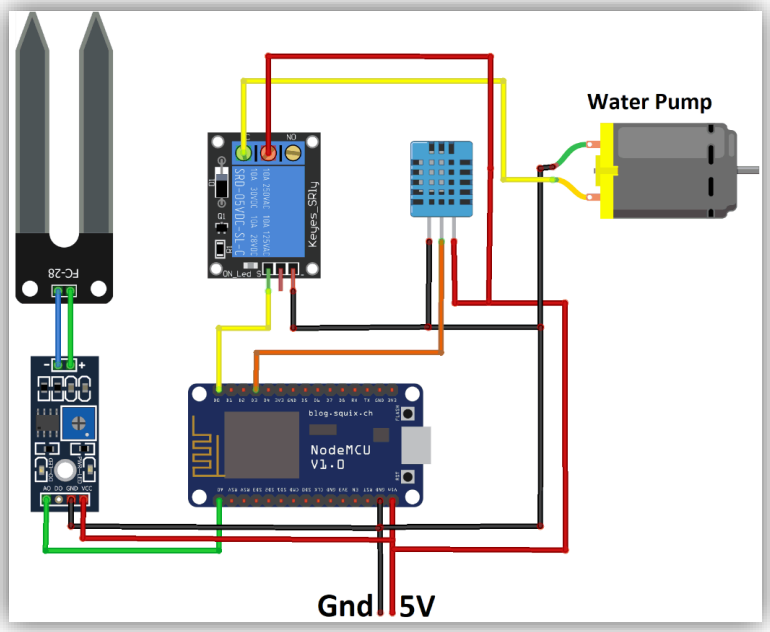


Fig. 13.11 Smart Irrigation System Circuit Diagram

Adding Solar as a source of energy in smart irrigation system for making smart solar irrigation
If in case the supply of electricity is not reached up to village. Solar energy is the most available source of energy in the world. Solar based irrigation system: A suitable alternative for farmers in the present state of energy crisis in village. Also it is an eco-friendly – green way for electrical energy production because it Requires only an initial investment. An automatic irrigation system using solar power, controller and moisture sensor is used to pump water from bore well to a tank, to control the flow rate of water from the tank to the irrigation field. Thus also optimizes the use of water. This system is very much highly efficient as it make the use of water as per the need only and the wastage of water is highly saved.

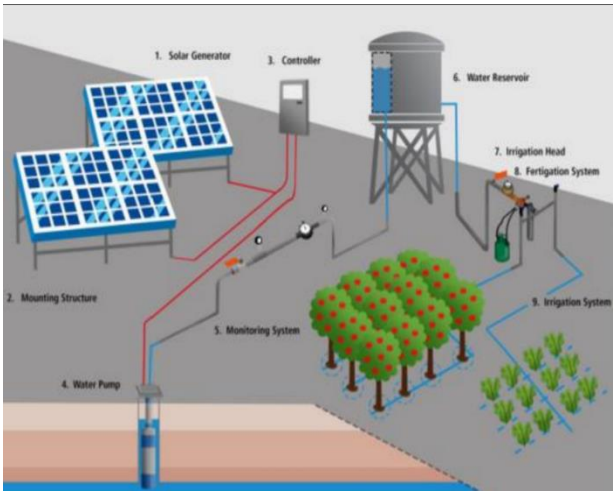


Fig. 13.12 Solar irrigation system

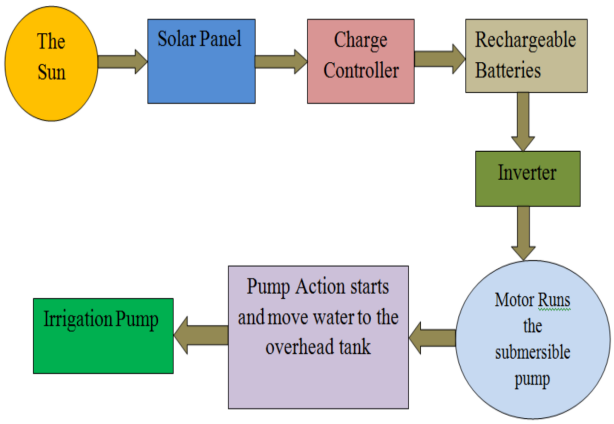


Fig. 13.13 solar irrigation layout

Prediction of requirement with approximate calculation with respect to survey and assumption

⇒ Suppose we have to run 2HP motor for irrigation. For that the energy required is:
2HP=1.5 Kw. 1.5Kw = 1500 watt, Power = volt*current, V=240 v. So, Current (I) =1500/240 = 6.25 A.

⇒ Requirement for rechargeable batteries of 120V: Power = volt*current 1500 = N*volt*current 1500=N*240*6.25 (N=number of require batteries) 1500=N*240*6.25, N=2, (2 batteries are required)

⇒ Requirement for solar panels: 1 solar panel of 72 cells generates 200watts, Required power is 1500 watts,1500/200=7.5 Nearly 8 solar panels are required

Components	Quantity required	Cost per unit	Total cost
Solar panels	8	6,250	50,000
Water pump	1	15,000	15,000
Battery	2	10,000	20,000
Converter circuit	1	1,000	1,000
Node-mcu micro-controller	1	300	300
Moisture sensor	1	100	100
Relay module	1	100	100
Miscellaneous			3,500
Net cost			90,000

Table 13.10 Overall Cost calculation

Subsidy from government by Pradhan Mantri KUSUM Yojna

Overall cost	90,000 Rs
30 % Cost Given By Central Government	27,000 Rs
30 % Cost Given By State Government	27,000 Rs
30 % Cost Given By Bank or any other institution	27,000 Rs
10% Invest By Farmer	**9,000 Rs**

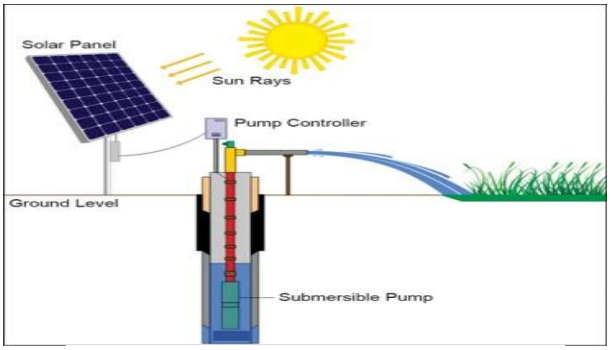


Fig. 13.14 typical solar irrigation system

Advantages of a typical solar irrigation system are:

1. It makes irrigation possible in remote areas
2. Is environment friendly
3. No grid connection required
4. No electricity bills to be paid
5. No fuel required
6. Is durable, requiring minimal maintenance

13.1.5 Electrical Design 2 : Piezoelectric Speed Breaker Electricity Generator Design

Energy is needed at every point in our daily lives. We obtain energy through various methods, out of which conventional methods is most commonly used one. Conventional sources of energy such as coal, petroleum and natural gas have been used extensively over the years and have depleted significantly. The conventional sources of energy are also the cause of global warming and pollution of the environment. Hence, it is necessary to come up with alternative energy sources. Non-conventional energy derived from windmills, solar, bio-gas etc. are renewable, Adopting to non-conventional energy sources is essential because it is sustainable, renewable, clean and is environment friendly. The most commonly used non-conventional energy is derived from solar and windmills.

Working of Piezo-electric speed breaker circuit:

Piezoelectricity is the appearance of an electrical potential across the sides of a crystal like quarts and tourmaline, when applied mechanical stress on both the sides of it. Many vehicles move over the roads frequently and each vehicle has enough kinetic energy that is lost when it crosses speed breakers. We can convert this kinetic energy to potential energy. The kinetic energy of the moving vehicle can be converted into electrical energy by embedding a piezoelectric generator in the speed breakers. In Kewada Village we can Construct Piezoelectric Speed Breakers at main entrance of Village where the migration of vehicles and people is maximum, By applying the Kinetic Energy on Piezoelectric Sensor. For Constructing a Piezoelectric Speed Breaker We Need some Small Peizo Electric Sensors which are connected in Series or Parallel as per required current-Voltage Rating. We also need a DC-DC Booster Battery, Inverter, Step-up Transformer. We can Construct a RCC Speed Breaker or also We Can install a Private Safety Speed Breaker Inserting The Piezoelectric sensor on it. Output of the Speed Breaker Can Be supplied to power grid or any utilizer load like street light.

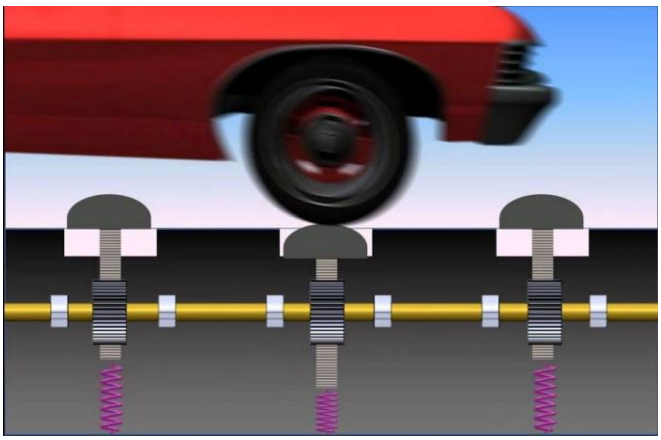


Fig. 13.15 Piezo-eletric speed breaker diagram

[1] Speed Bump with Piezoelectric Cantilever System as Electrical Energy Harvester, speed bump is designed with spring module, with piezo-electric module, & electrical energy converter circuit. It includes the modifications the size of the speed bump to comply with govt. regulation, spring characteristic, the cantilever knocking mechanism & the mechanical coupling system.

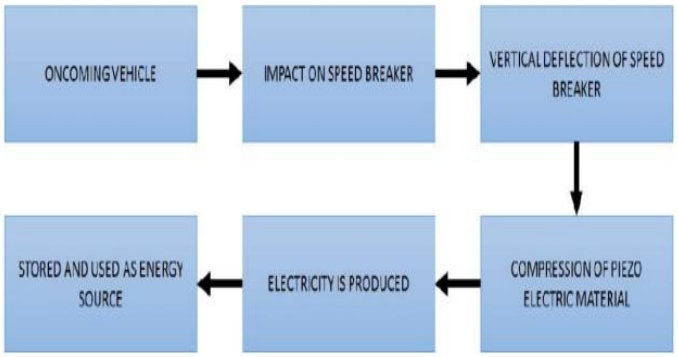


Fig. 13.16 Generation of electricity using Piezo-electric material

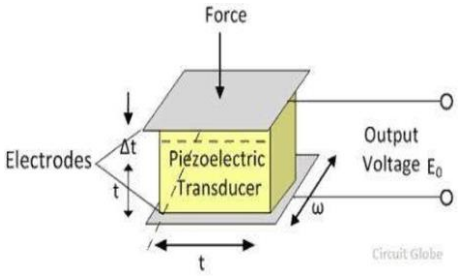


Fig. 13.17 Piezo-electric transducer

[2] Energy Harvesting for Back-up Power Supply Using Speed Humps An idea of rotational conversion using flywheel & gear mechanism is used underneath the road surface at the point of road where a speed-breaker is raised. The linear motion of a rack is converted in to rotational motion applied by the oncoming vehicular load. Pulley structure is geared such that it's ultimately making generator to rotate for producing output voltage. Thus kinetic energy of vehicle is harvested & used instead of wasting.

[3] Electrical Power Generation through Speed Breaker A system is designed to tap into the energy generated by moving vehicles and produce power by using the speed breaker as power generating unit. and this mechanical energy is again converted to electrical energy using generator which is used for lighting the street lights. Vehicle pressure on the speed breaker is converted into rotary energy through rack and pinion using hydraulic press. Consequently, the rotary energy rotates generator that generates electrical power which is stored through battery using a charging circuit.

[4] Power Generation using Piezoelectric Crystal, Hydraulic Press & electromagnetic induction A new mechanism is designed to generate power from speed bumps. A combination of hydraulic mechanism, piezoelectric crystal mechanism & electromagnetic induction is used. When a vehicle passes over the speed bump which is made of cylinder and piston arrangement, then the electric energy is generated.

Whenever an oncoming vehicle passes over a speed breaker, the speed breaker is made is such a way that it deflects vertically. This deflection is released as thermal energy. Using a synthetic speed breaker with embedded piezoelectric generators, part of this energy the vehicle expands on speed breakers deformation is transformed into electric energy through direct piezoelectric effect instead of being wasted as thermal energy. The mechanical energy is derived from the compression stress created during the vehicles' movement

Sr No.	Name of device	Quantity required	Cost per unit	Total cost
1	Piezoelectric Sensors	5	60	300
2	DC-DC Booster	1	300	300
3	Inverter	1	300	300
4	Battery	1	500	500
5	Transformer	1	300	300
6	Speed breaker	1	1000	1000
Miscellaneous				300
Net Cost				3,000

Table. 13.11 Cost estimation of piezo electric speed breaker

on speed breaker. The vertical deflection of speed breaker is proportional to the vehicle weight. Energy is harvested in this part of speed breaker vertical deformation, which is a percentage from the total energy of the vehicle. It is known that the vertical load of the vehicle's wheels yields compression stress, which diminishes with depth. The piezoelectric generators are embedded in such a way that the compressive stress is maximal and hence the piezoelectric effect can be maximized. The speed breaker is divided into three parts, the upper part, part with piezoelectric material and lower part. The upper part can be detached from the lower part, and the lower part is fixed to the road. In India, there is a lack of speed breakers in critical zones of roads and accident prone areas, hence by implementing the synthetic speed breakers at the critical zones of roads, the streets and roads are more secure and the number of accidents caused can be minimized. By doing this, the amount of energy generated is also more.

13.1.6 Electrical Design 3 : Intelligent water level indicator with controller

Water tank overflow is a common problem which leads to the wastage of water. Though there are many solutions to it like ball valves which automatically stop the water flow once the tank gets full. But being an electronics enthusiastic we would like an electronic solution for it! So here is a simple design of water level indicator project which will detect water level & will raise an alarm upon getting water tank full or a preset level. This simple transistor based water level indicator circuit is very useful to indicate water levels in a tank. Whenever tank gets filled, we get alerts on particular levels. Here we have created 4 levels (low, medium, high & full), we can create alarms for more levels. We have added 3 leds to indicate initial three levels (A, B, C), and one Buzzer to indicate FULL level (D). When tanks gets filled completely we get beep sound from Buzzer. So, user comes to know that the water tank is full.

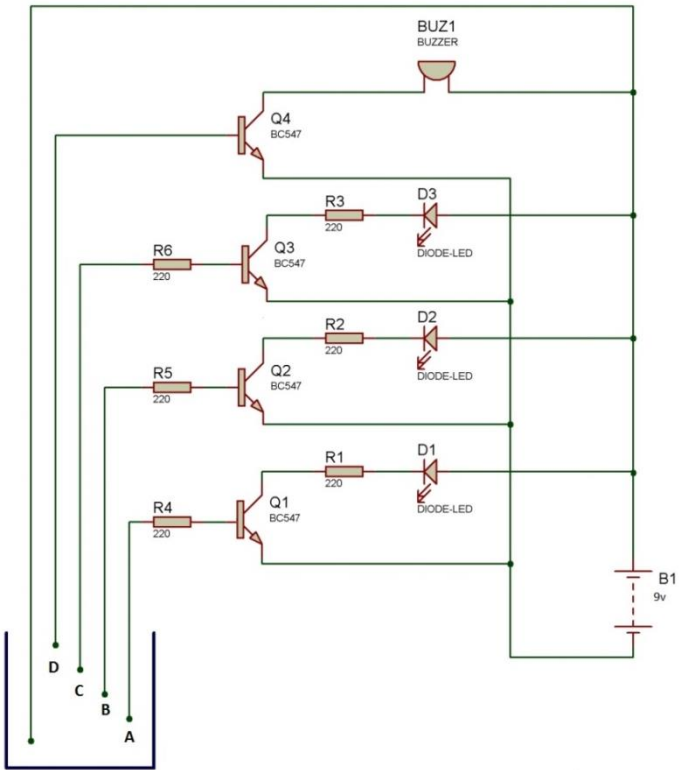


Fig. 13.18 Circuit diagram of automatic water level indicator

The complete circuit diagram for the water overflow alarm project design is shown. As we can see the circuit is simple as it only has few basic components like transistors, resistors, leds and a buzzer when a particular level (A,B,C,D) of water have been reached. When water level reaches to point A, circuit with RED LED & transistor Q1 gets completed and RED LED glows. Similarly when water level reaches to point B, circuit with YELLOW LED and transistor Q2 gets completed and Yellow LED glows, same goes with point C. And finally when tank gets full (Point D), circuit with buzzer gets completed and buzzer starts beeping.

Adding water level controller to the circuit of water level indicator:

The simple water level controller circuit for controlling tank overflow can be built using a single IC 4049. The circuit provided below performs a dual function, it includes an overhead water level control features and also indicates the different levels of water while the water fills the tank. As soon as the water reaches the uppermost level of the tank, the last sensor positioned at the relevant point triggers a relay which in turn switches the pump motor for initiating the required water evacuating action. Use of just one IC makes the entire configuration very easy to build, install and maintain. The fact that impure water which happens to be the tap water that we receive in our homes offers a relatively low resistance to electricity has been effectively exploited for implementing the intended purpose. Here a single CMOS IC 4049 has been employed for executing the control function. It is the high input resistance and sensitivity of the CMOS gates which actually makes the functioning completely straightforward and hassle free. As shown in the below figure, we see that the six NOT gates inside the IC 4049 are arranged in line with their inputs directly introduced inside the tank for the required sensing of the water levels. The ground or the negative terminal of the power supply is introduced right at the bottom of the tank, so that it becomes the first terminal to come in contact with water inside the tank. It also means that the preceding sensors placed inside the tank, or rather the inputs of the NOT gates sequentially come in contact or bridges themselves with the negative potential as the water gradually rises inside the tank. Here it means as the negative potential from the water bottom comes in contact with the inputs of the NOT gates through the resistance offered by the water, the output of those relevant NOT gates sequentially start producing opposite response, that is their outputs start becoming logic high or become at the positive potential. This action immediately lights up the LEDs at the outputs of the relevant gates, indicating the proportionate levels of the water inside the tank.

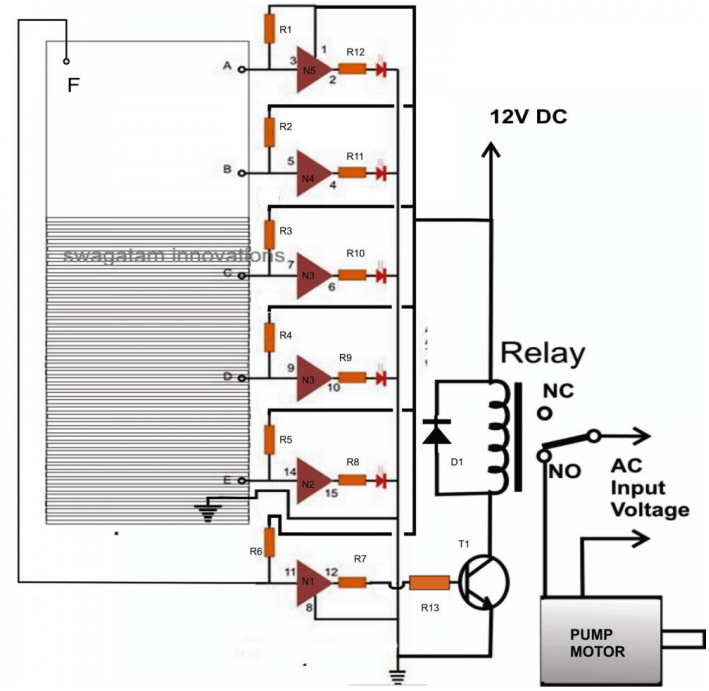


Fig. 13.19 Intelligent water level indicator with controller

Sr No.	Name of device	Quantity required	Cost per unit	Total cost
1	12V D.C. adapter	1	100	100
2	L.E.D. lights	10	20	20
3	Cmos I.C. 4049	1	100	100
4	Transistor	2	50	100
5	Relay	1	50	50
6	Buzzer	1	50	50
7	Resistors	10	2	20
Miscellaneous				360
Net Cost				800

Table. 13.12 Cost estimation of Water level indecator

CHAPTER 14 : Technical Options with Case Studies

14.1 Civil Engineering

14.1.1 Advanced Earthquake Resistant Techniques

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

These range from appropriately sizing the structure to be strong and ductile enough to survive the shaking with an acceptable damage. The conventional approach to earthquake resistant design of buildings depends upon providing the building with strength, stiffness and inelastic deformation capacity which are great enough to withstand a given level of earthquake-generated force. This is generally accomplished through the selection of an appropriate structural configuration and the careful detailing of structural members, such as beams and columns, and the connections between them. But more advanced techniques for earthquake resistance is not to strengthen the building, but to reduce the earthquake-generated forces acting upon it.

Among the most important advanced techniques of earthquake resistant design and construction are:
1. Energy Dissipation Devices
2. Base Isolation

Base Isolation Method of Earthquake Resistant Design

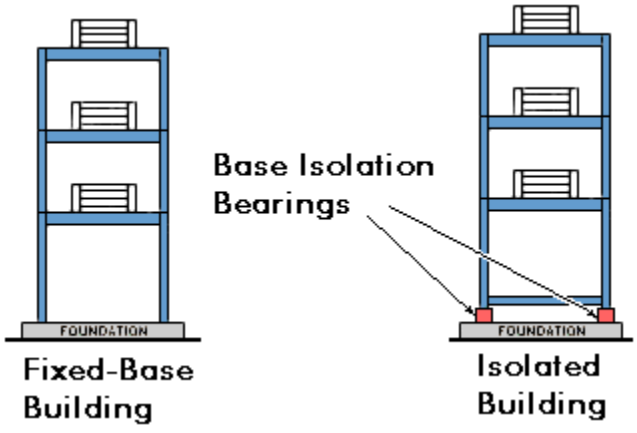


Fig. 14.1 Building Isolation System

A base isolated structure is supported by a series of bearing pads which are placed between the building and the building's foundation. 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.

To get a basic idea of how base isolation works, examine Figure 14. 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, 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. By contrast, even though it too 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.

Energy Dissipation Devices

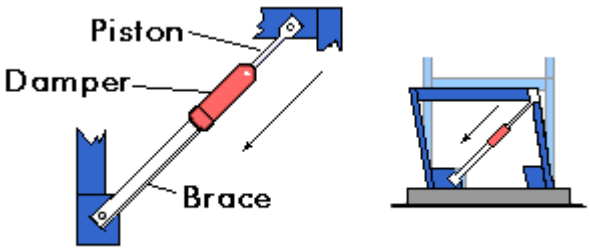


Fig. 14.2 Damper

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

dissipation devices have been developed and are now being installed in real buildings. Energy dissipation devices are also often called damping devices. The large number of damping devices that have been developed can be grouped into three broad categories: Friction Dampers: these utilize frictional forces to dissipate energy Metallic Dampers: utilize the deformation of metal elements within the damper Viscoelastic Dampers: utilize the controlled shearing of solids Viscous Dampers: utilized the forced movement (orificing) of fluids within the damper.

14.1.2 Seismic Retrofitting of Buildings

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.

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

Need for Seismic Retrofitting:

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

Problems faced by Structural Engineers are:

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

Basic Concept of Retrofitting:

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

- Increase in strength and ductility

Various Retrofitting Techniques:

1. Adding New Shear Walls

Fig. 14.3 Addition of shear Wall

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 .

2. Adding Steel Bracings

Fig. 14.4 Addition of 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.

3. Mass Reduction Technique of Retrofitting

This may be achieved, for instance, by removal of one or more storeys. 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.

4. 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.

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

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

3D Printing

Sometimes known as ‘additive manufacturing’, 3D printing uses a printer to build objects layer by layer. 3D printers are being designed to work with increasingly complex materials; the latest models are capable of combining different materials together in a single object. This development has opened up entirely new possibilities for the construction industry. 3D printing can be used to construct either a small component or even an entire building.

3D printing is latest method of construction and in which the construction work may finish in less amount of time with better quality then labour work.

Material Physics

Metamaterials are materials which have been custom designed in order to have specific properties as a result of their molecular make up. The versatility of materials that civil engineers have at their disposal is allowing them to design and execute more innovative and adventurous projects than ever before. The most well known of these new materials is graphene, a material which can be made to have a number of different properties under different conditions. This gives it an almost limitless range of uses in the field of construction.

Modular Construction

Modular buildings, sometimes known as 'prefabricated buildings' are buildings which are constructed from different components, each of which is produced on an assembly line to ensure that they are all produced exactly the same. This makes this type of building much easier and cheaper to construct.

14.1.4 Engineering Aspects Of Soil mechanics - Environmental Impact Assessment

Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

Environmental assessment (EA) is the assessment of the environmental consequences (positive and negative) of a plan, policy, program, or actual projects prior to the decision to move forward with the proposed action.

Environmental Impact Assessment (EIA) is the process of examining the anticipated environmental effects of a proposed project - from consideration of environmental aspects at design stage, through consultation and preparation of an Environmental Impact Assessment Report (EIAR), evaluation of the EIAR by a competent authority, the subsequent decision as to whether the project should be permitted to proceed, encompassing public response to that decision.

Environmental Impacts of Dams

Impacts on Fish:

- Changing the current has an immediate impact on the ecosystem in the river.
- The dam changes the water qualities to which organisms are used to
- Many animal's life cycles are synced with the annual floods that occur in an area; therefore, those cycles are interrupted when the floods stop because of the dam.
- Dams are created in order to change the currents of a River.
- The dam basically acts as a barrier stopping fish from going upstream or downstream; thus, lifecycles of migratory fish are deeply damaged, as they cannot go and spawn or interact with others.

Soil Erosion Before the Dam:

- The sediment that the water carries is blocked by the dam; as time passes, it slowly builds up, adding additional pressure to the dam wall

- In this way, serious accidents can occur: the dams are only built to withstand a certain amount of water pressure; with the pressure from the sediment in some time the wall either explodes or water is caused to go above the dam, creating a waterfall; in both cases, a lot of organisms, including humans are in great danger.

Soil Erosion after the Dam:

- As sediment coming from the upper parts is blocked, the water after the dam is essentially "cleared" of all particles
- Once again, that interrupts the ecosystem present
- The nutrients are blocked along with the sediment
- The organisms that used the mud to hide themselves now have no protection from predators.

Disease Spread:

- The water that is blocked by the dam stays in one place, and, consequently, can get very dirty
- It attracts mosquitoes and other disease-carrying insects, which contaminate it

People Displacement:

- When dams are built, the settlements and habitats that stand in their way are generally demolished
- This way, a lot of people are left without a home and a job, which is a big economical problem.
- The water is a breeding place for snails carrying the parasite bilharzia, which is the second worst disease after malaria in Egypt.

Other Environmental Effects:

- The physical environment is altered
- Cycles and variation of flow downstream are affected
- Standing water (reservoir) habitats replace flowing water habitats
- Nutrients are unable to move downstream
- Reduction of biodiversity occurs
- Ocean fish migrations are blocked, most notably the salmon and steelhead

Environmental Impact of Ordinary Portland Cement

There are lots of environmental impacts of Cement on our ecology. One of the major problems is emission of CO_2 from the Cement industry. It is found that world yearly 1.6 billion tons production of cement covers 7% of carbon dioxide's yearly production. As CO_2 is harmful for human health and also for the wild life. It causes many respiratory problems like asthma, bronchitis, and nasal infections.

The cement manufacturing industry is labour intensive and uses large scale and potentially hazardous manufacturing processes. The industry experiences accident rates that are high compared with some other manufacturing industries. There are a number of hazards inherent to the cement production process. Some examples for health hazards are:

1. Exposure to dust and high temperatures;
2. Contact with allergic substances; and
3. Noise exposure

And some examples for safety hazards:

1. Falling / impact with objects
2. Hot surface burns

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

Water Supply Sustainable Development Techniques:

For sustainable development, it is important to effectively manage fresh water due to its declining availability and ever increasing demand. India has to take steps and make effective policies and adopt effective measures for its conservation due to high cost of desalination making sea water usage to a minimum. Attempts to prevent pollution ought to be made besides using water saving techniques. There is a need to adopt practices such as rain-water harvesting, water recycling & reuse for sustained supply in the long run.

1. Prevention of Water Pollution

There is a rapid deterioration of water quality alongside its quantity getting reduced. While rivers contain better quality at upper stretches of hilly areas, when in plains river water is deteriorated owing to the solid/liquid wastes, fertilizers, insecticides and industrial effluents getting into it through drains. The pollutants are more enriched in summer due to the low momentum of water. Water quality of 507 national aquatic resources is being monitored by central and state pollution control boards. Some of the most polluted ones being The Yamuna between Delhi and Etawah, severely polluted rivers Sabarmati at Ahmedabad, the Gomti at Lucknow, the Vaigai at Madurai and the Musi of Hyderabad and the Ganga at Kanpur and Varanasi etc. Ground water also got polluted over the time due to high concentrations of heavy/toxic metals, fluoride and nitrates. While The Water (Prevention and Control of Pollution) Act 1974, and Environment Protection Act 1986 need to be adhered to, awareness for low usage of pollutants in agricultural and industrial sectors and also towards low waste generation need to be created in general populous.

2. Sustainable Water Use

Sustainable water use refers to the use of water that supports the ability of human society to endure and flourish into the indefinite future without undermining the integrity of the hydrological cycle. The utilization of reclaimed waste- water is an smart option for fulfilling the demand of industries. Similarly, in urban areas water from household drains can be used for gardening. Water used for washing vehicle can also be used for gardening. This would conserve better quality of water for drinking purposes. Currently, recycling of water is practiced on a limited scale. However, we need to encourage the replenishment of water through recycling. United Nations Environment Programme has launched an Integrated Water Resources Management (IWRM) to promote coordination in management and development water, land and related resources. It will help to improve economic and social welfare in a justifiable manner without compromising the sustainability of vital resources.

3. Watershed Management

Watershed management implies the conservation and efficient management surface and groundwater resources especially watershed areas. It comprises storage and prevention of runoff for groundwater recharge through various methods like recharge well, tanks and check dams etc. The main objective of watershed management is maintaining the balance between utilization of natural resources and their demand in society. The accomplishment of watershed development chiefly depends upon participation of local community. The States and Central Governments have started many watershed management programmes in India such as Haryali, Arvary Pani Sansad (Rajasthan), Neeru-Meeru (Andhra Pradesh) etc. It is essential to generate awareness about welfares of watershed development and its management among local communities and this approach will ensured the sustainable availability of water.

4. Rainwater Harvesting

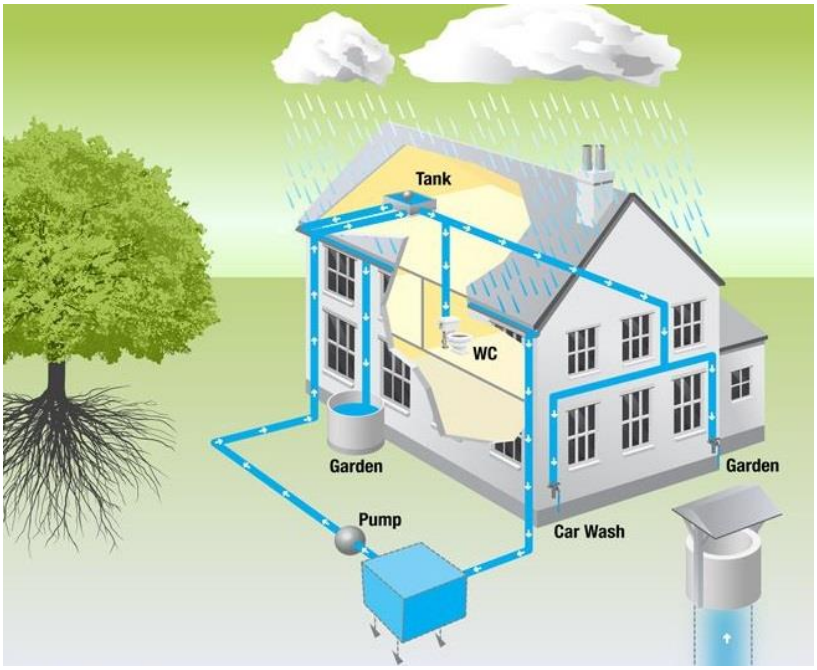


Fig. 14.5 Rain Water Harvesting

Rain water harvesting is used to capture and store rainwater. It is also helpful to recharge groundwater. It is an eco-friendly and cheap technique for preserving precipitated rain water by guiding it to storage tank or bore well or pits or wells. It increases water availability, sustains ground water table, improves groundwater quality through dilution of contaminants like arsenic, fluoride, phosphates, nitrates etc. It also prevents flooding, soil erosion, and arrests salt water imposition in coastal areas. Now a day, Government is also encouraging the practice of Rainwater harvesting in residential, institutional and commercial areas. In our country, rainwater harvesting was a common traditional practice and is done by various methods in form of storage bodies like Kund or Tanka, ponds, lakes, etc.

5. Dam and Its Role in Water Conservation

Storage of water by construction of dams is regarded as an efficient component of water management for irrigation. In India, the high-level demand of water for irrigation can be achieved by building dams of various heights. It has already been done under several river valley projects like Sardar Sarovar Dam project (in Narmada river valley), Nagarjun Sagar Dam Project (in Krishna River valley), Tehri Dam project (in Bhagirathi River valley) etc. The benefits of dam projects include;

1. Generation of hydroelectricity.
2. Irrigation and flood control.
3. Industrial and municipal water supply.

The canal system from dam can transfer a large amount of water to great distances. The most famous example is the Indira Gandhi canal that brought greenery to the desert areas of Rajasthan. However, mismanagement of water from water reservoir of dams can cause many problems such as;

- Unequitable distribution of water in downstream areas
- People living close to the water sources grow crops which require heavy irrigation
- The sudden or accidental release of water from dam results into flood like situations.
- Disturbance of the ecosystem

Since independence more than 700 dam have been constructed. if the government programmes go ahead as scheduled, there will be hardly any free-flowing river left in the country. That is why, environmentalist such as Sundar Lal Bahuguna, Medha Patkar, Chandi Prasad Bhatt and others have opposed the implementation of several river valley projects like Tehri Dam project (Uttarakhand), Sardar Sarovar Dam (Gujrat), Narmada Sagar Dam project (Madhya Pradesh) etc. The reasons for this opposition are due to the social, economic and environmental problems.

Sustainable drainage system:

Sustainable drainage systems (also known as SuDS or sustainable urban drainage systems) are a collection of water management practices that aim to align modern drainage systems with natural water processes. SuDS efforts make urban drainage systems more compatible with components of the natural water cycle such as storm surge overflows, soil percolation, and bio-filtration. These efforts hope to mitigate the effect human development has had or may have on the natural water cycle, particularly surface runoff and water pollution trends. SuDS have become popular in recent decades as our understanding of how urban development affects natural environments, as well as concern for climate change and sustainability, have increased. SuDS often use built components that mimic natural features in order to integrate urban drainage systems into the natural drainage systems or a site as efficiently and quickly as possible.

Because SuDS describe a collection of systems with similar components or goals, there is a large crossover between SuDS and other terminologies dealing with sustainable urban development. The following are examples generally accepted as components in a SuDS system:

Bioswales

A bioswale is a shallow depression in a piece of land meant to gather and filter stormwater runoff by directing polluted rainwater through soil and vegetation. Besides the environmental benefits bioswales provide, they are commonly used in public spaces due to their aesthetic qualities and generally low difficulty of installation and maintenance. Bioswales are designed linearly and slightly sloped in order to drain water throughout its components and into the soil as opposed to simply collecting it in a standing location. Although bioswales provide passive means

Fig. 14.6 Bioswales

to filter runoff indefinitely, they are limited by their momentary capacity for runoff volume. As such, they can be easily flooded over if rainfall events, adjacent surfaces, and soil characteristics are not adequately considered.

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Bioswales are found in various settings across the globe, particularly in densely built urban areas with paved streets. In Nashville, Tennessee, a renovation of historic Deaderick Street near the city center included bioswales meant to filter runoff from the street surfaces. Its developers claim that the intervention has reduced the amount of runoff entering Nashville's sewer system by over 1.2 million gallons annually.

Permeable pavement

Permeable pavement systems aim to provide a manner for water that falls on hardscaping to seep through to the soil below. This is accomplished by either dividing traditional pavement materials into sections, or using a porous pavement material.

In China, paved urban areas have grown rapidly since the 2000s, with dozens of cities supporting populations over one million. In response, the Chinese government has commissioned the design of several "sponge cities" which employ SuDS at urban scales throughout the country. One such example is Nanhui, a Shanghai suburb designed to combat rising sea levels on China's eastern coast. Nanhui, previously known as Lingang, uses permeable pavement for roads and public right-of-ways to reduce the effects large urban infrastructure has on the natural water cycle. It is the organic combination of modern green new technology and society, environment, human culture for social progress.

Wetlands

Artificial wetlands can be constructed in areas that see large volumes of storm water surges or runoff. Built to replicate shallow marshes, wetlands as BMPs gather and filter water at scales larger than bioswales or rain gardens. Unlike bioswales, artificial wetlands are designed to replicate natural wetlands processes as opposed to having an engineered mechanism within the artificial wetland. Because of this, the ecology of the wetland (soil components, water, vegetation, microbes, sunlight processes, etc.) becomes the primary system to remove pollutants. Water in an artificial wetland tends to be filtered slowly in comparison to systems with mechanized or explicitly engineered components.

Wetlands can be used to concentrate large volumes of runoff from urban areas and neighbourhoods. In 2012, the South Los Angeles Wetlands Park was constructed in a densely populated inner-city district as a renovation for a former LA Metro bus yard. The park is designed

to capture runoff from surrounding surfaces as well as storm water overflow from the city's current drainage system.[1]

Detention basins

Fig. 14.7 Detention Basin

Detention basins (or retention basins) are storm water detention areas meant to offset excess water that could overrun the capacity of the current filtration or drainage systems. Detention basins reduce peak discharge into drainage systems by methods including slowing runoff velocity, holding excess volume, and trapping sediment that could disrupt drainage systems downstream. Basins can be either wet or dry, depending on whether the default state of the basin is filled with water or only anticipates it during storm surges.

Xang Thoi Pond in Vietnam, is an example of urban retrofitting to reduce flooding through detention basins. Can Tho, a large city on the Mekong Delta, is susceptible to seasonal floods and intense rainfall. In response, the local government included urban flooding solutions as part of a wider national infrastructural initiative.

Green roof

Green roofs are landscaped or vegetated areas on the roofs of buildings, usually built to mimic natural landscaping or ground-level parks. Green roofs help drainage systems by offsetting peak discharge from otherwise hardscape surfaces, and filtering rainwater directly as it falls. They also have the added advantage of reducing energy consumption for buildings that would otherwise be receiving direct sunlight onto their roofs throughout the day.

As part of the 2015 United Nations Climate Change Conference, Argentina agreed to reduce greenhouse gas emissions as part of a global effort to combat climate change. Consequentially, many of Argentina's cities have passed resolutions requiring or encouraging new developments to implement green roofs. In Buenos Aires, the city government provides tax reductions to developments that incorporate green roofs along with other LEED criteria.

14.1.6 Case Study: Retrofitting of an Existing Residential Building by Using Shear Wall

Abstract :

In India, there exists a number of old and existing buildings that are either constructed without taking into account the effects of earthquake forces or that are previously damaged or are likely to be damaged in the near future during the shaking of the ground. There are various ways of

retrofitting these buildings so as to mitigate the effect of future earthquake. The technique of infilling/adding new shear walls is often regarded as the best and simple solution for improving seismic performance. In this paper, an effort has been made to retrofit an existing residential G+III storied building using exterior shear wall. Shear wall are installed in parallel to the building's exterior sides. This paper deals with the step by step retrofitting of the building by using shear walls with the aid of STAAD ProV8i. This paper incorporates the equivalent static as well as the dynamic method provided in the Indian Standard codes for evaluating the buildings strength and its performance. Applying shear wall to the building has not only strengthened the building but also improved its seismic capacity and stiffness.

1. INTRODUCTION :

In Jammu, most of the residential buildings have been designed only for dead and live loads. Since Jammu (J&K) lies in zone IV, the buildings located in this state needs to be seismic resistant. In this paper, an existing building is considered for the purpose of retrofitting. It is a framed structure with total three stories above ground level. The ground level is an open storey which is utilized as parking. It can be a soft storey. On the roof, there is a water tank too. This building is designed for the dead and the live loads only. Thus, two main problems are identified in this building with respect to the seismicity of the building. First, the Earthquake load was not considered for the design. Secondly, no provisions have been made up for the existing soft storey. So, ground storey needs to be given special attention.

2. CASE STUDY :

In this paper, an effort has been made to retrofit a G+III storey existing residential building located in Jammu. It is an Ordinary moment resisting Frame structure with masonry infill walls. It has an open ground storey referred to as soft storey. The roof consists of an overhead water tank with a capacity of 2700 LTS. The details of the building are as follows:
The total area of the land = 150.037 m2
The ground coverage = 73.458 m2
Total covered area = 293.832 m2
Parking are =1 NO
Stair head room area= 13.44 m2
Height of the building= 12.3 m

Main infill walls surrounding the building are 9" thick. These include the external walls and the parapet walls. However, the internal walls are 4.5" thick. Other details are as follows:
Grade of concrete = M20
Grade of steel = Fe415
Height of the Water tank = 1.2 m

2.1 Building Plan : The floor beam, slab, column layout plan has been shown in Fig. 1. The sections at A-A and B-B of the building are shown in Fig. 2 and Fig. 3. Reinforcement detailing of columns has been indicated in table.

Column no	Foundation to 1st level		1st to 3rd floor level		Above 3rd floor level	
	Size	Reinforcement	Size	Reinforcement	Size	Reinforcement
C1,C4 ,C9	250X300	4-16ø + 4-12ø 8ø @150 c/c	250X300	4-16ø + 4-12ø 8ø @150 c/c	250X300	4-16ø + 4-12ø 8ø @150 c/c
C2,C3,C5,C8 ,C10 ,C11, C12	250X350	8-16ø 8ø@ 150 c/c	250X300	8-16ø 8ø@ 150 c/c	250X300	8-16ø 8ø@ 150 c/c
C6,C7	250X400	8-16ø 8ø@ 150 c/c	250X300	8-16ø8ø@ 150 c/c	250X300	8-16ø 8ø@ 150 c/c

Table 14.1 Cross Section and Reinforcement Detailing of Columns

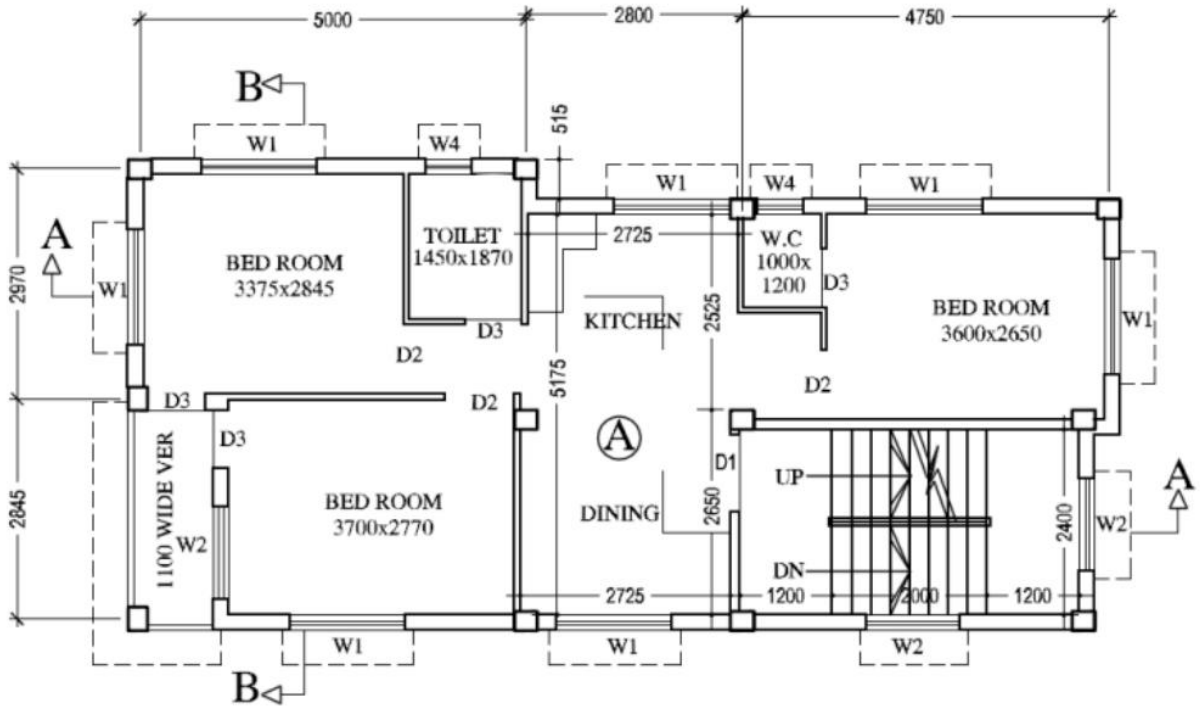


Fig. 14.8 Floor Beam, Slab, Column Layout Plan

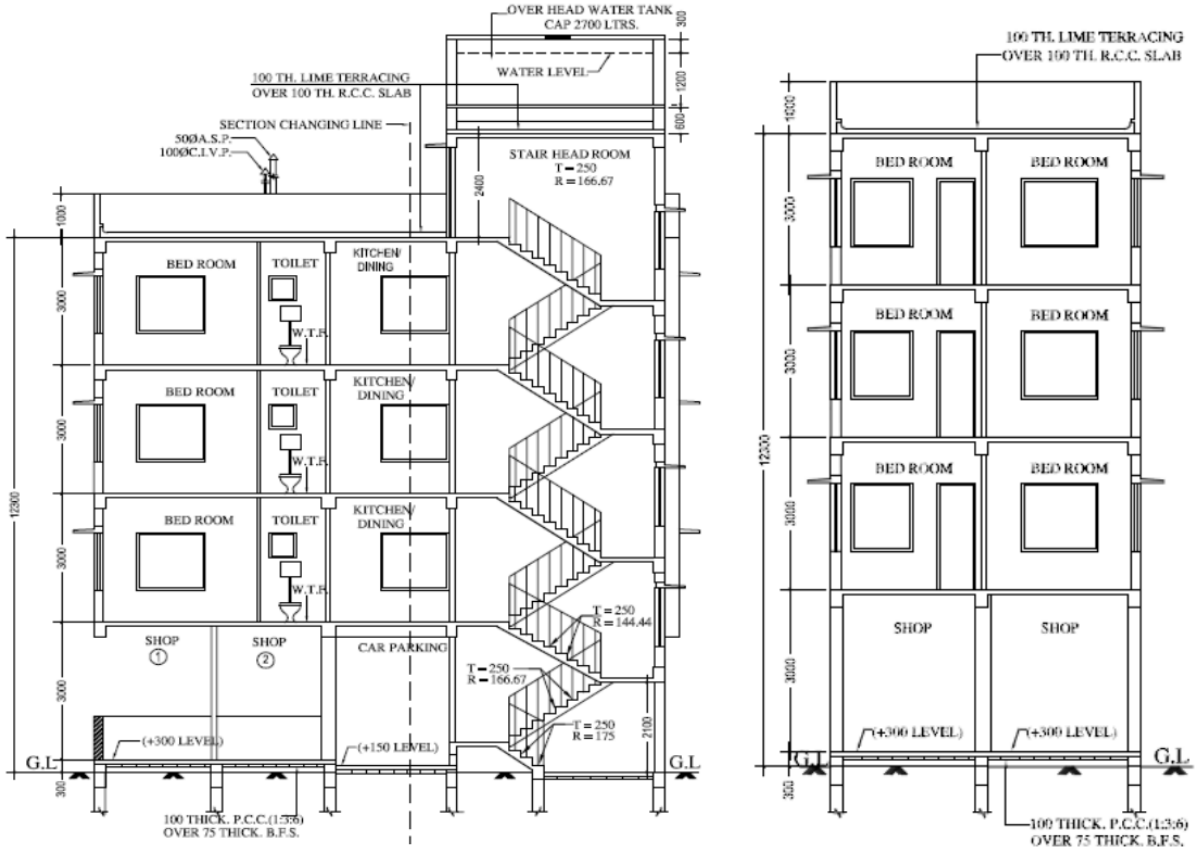


Fig. 14.9 Section A-A and B-B of the Building

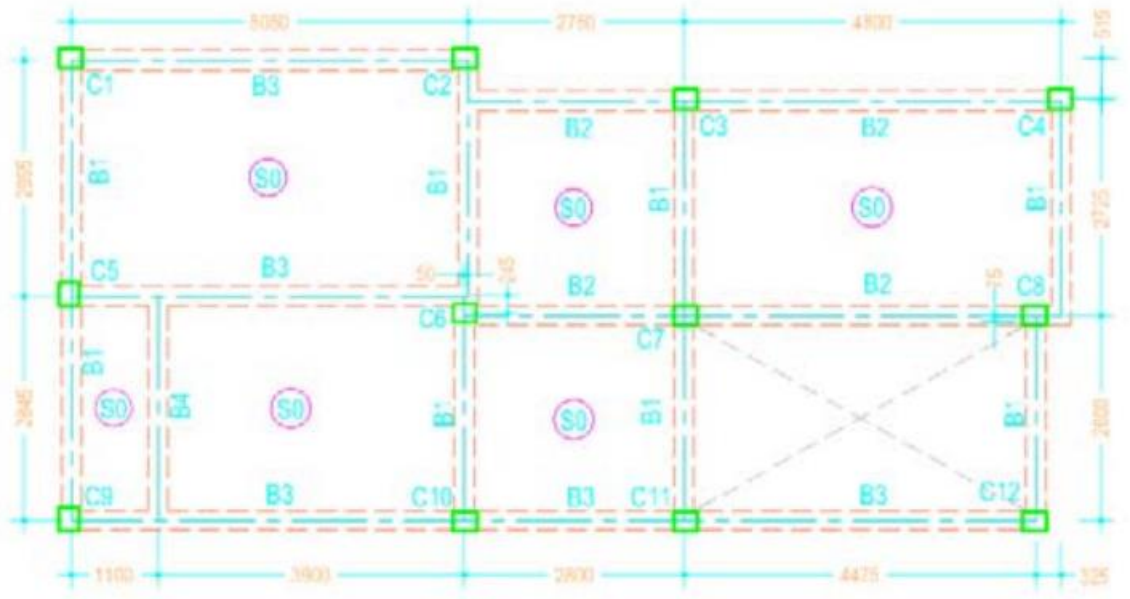


Fig. 14.10 Floor Beam, Slab, Column Layout Plan indicating column number

3. STRUCTURAL MODELLING AND DESIGN :

In this paper, the building is analyzed using STAAD PRO V8i software. Both the static and the dynamic analysis have been done for the existing building. Firstly, Dead and the live loads are found out separately. The unit weights of the material are taken from IS 875: Part 1. The live loads of residential building, accessible and inaccessible roof is taken from IS 875 Part 2. Then, the wind loads are calculated taking the wind speed of Jammu as 39 meter per second and the constants of wind proportionality as unity. Also, the seismic loads are taken out using IS 1893:2002. Analysis and the design of the concrete building are then carried out. The building has been designed for the following load combinations:

Type	L/C	Name
Primary	1	Seismic load in X DIR
Primary	2	Seismic load in Z DIR
Primary	3	
Primary	4	
Primary	5	
Primary	6	
Primary	7	DL
Primary	8	LL
Primary	9	DL + LL
Primary	10	DL + LL + EQL + VE X-DIR
Primary	11	DL + LL + EQL - VE X-DIR
Primary	12	DL + LL + EQL + VE Z-DIR
Primary	13	DL + LL + EQL + VE X-DIR
Primary	14	DL + LL + WL IN + X-DIR
Primary	15	DL + LL + WL IN - X-DIR
Primary	16	DL + LL + WL IN + Z-DIR
Primary	17	DL + LL + WL IN - Z-DIR
Primary	18	DL + LL
Primary	19	DL + LL + EQL + VE X-DIR
Primary	20	DL + LL + EQL - VE X-DIR
Primary	21	DL + LL + EQL + VE Z-DIR
Primary	22	DL + LL + EQL - VE Z-DIR
Primary	23	DL + WL IN + VE X-DIR
Primary	24	DL + WL IN + VE X-DIR
Primary	25	DL + WL IN + VE Z-DIR
Primary	26	DL + WL IN - VE Z-DIR
Primary	27	DL + LL + EQL + VE X-DIR
Primary	28	DL + LL + EQL - VE X-DIR
Primary	29	DL + LL + EQL + VE Z-DIR
Primary	30	DL + LL + EQL - VE Z-DIR
Primary	31	DL + WL IN + VE X-DIR
Primary	32	DL + WL IN + VE X-DIR
Primary	33	DL + WL IN + VE Z-DIR

Primary	34	DL + WL IN - VE Z-DIR

Table 14.2 Load Combinations

3.1 Problems identified after the analysis :

The provided and the required reinforcements are compared for each of the structural member. That is for the columns, beams, slab, and the foundation.

3.1.1 Column : Many columns were identified in which the required reinforcement was more than the provided reinforcement. For example: column number 2001(Fig. 5) in the 1st floor level, the required reinforcement came out to be 1308.27 mm2. However, the provided was 1256 mm2. So there was a shortfall of reinforcement in this column. Likewise if we talk about column number 2007, the required reinforcement was 2326.61mm2 and the provided one was 1608mm2 . A comparison of required and provided reinforcements is tabulated for each storey level columns. Table 2 shows the shortfall of reinforcements of columns from foundation to ground level. Table 3 shows the difference of required and provided area of steel from Ground to first level.

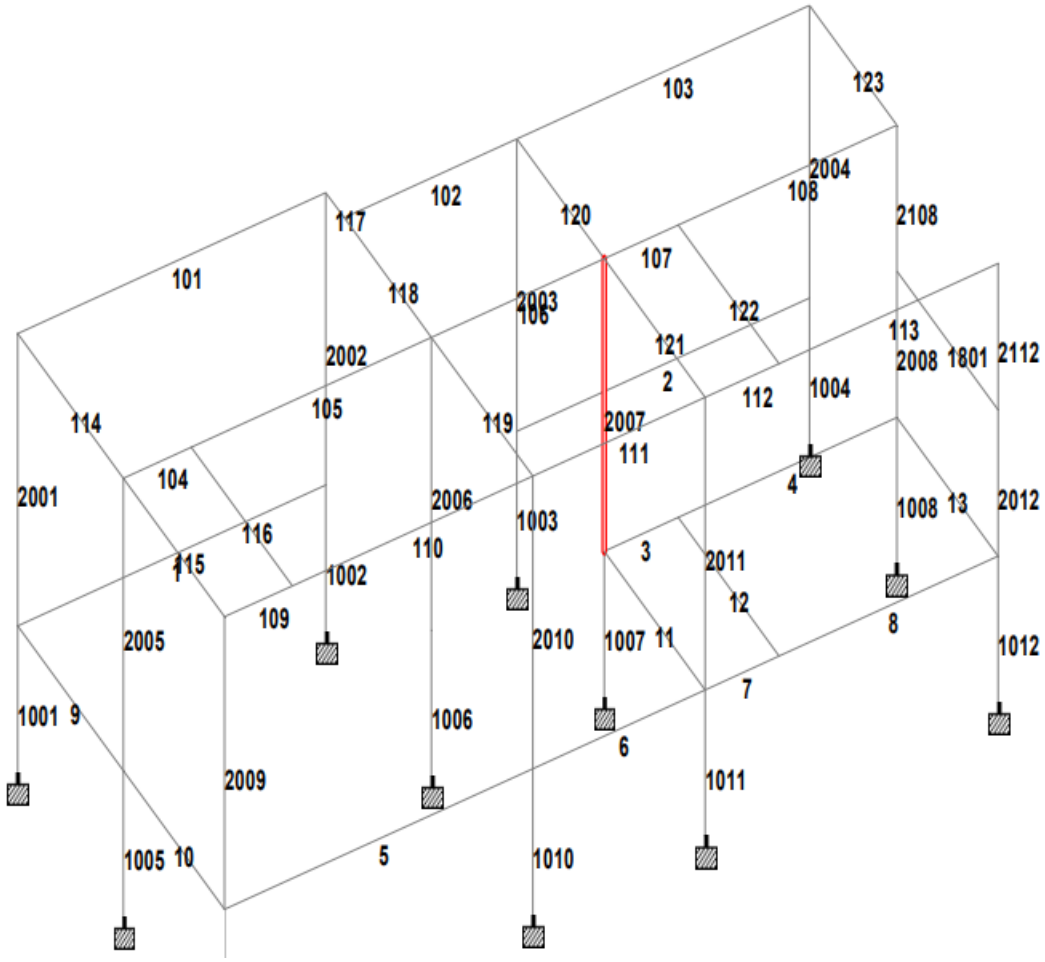


Fig. 14.11 First floor column no 2007 (shortage of reinforcement)

4. Retrofitting using shear wall:

Seismic Retrofitting can be done by adding shear wall, adding infill wall, base isolation etc. The technique of adding new shear walls is often taken as the best and simple solution for improving seismic performance. Therefore, it is frequently used for retrofitting of non-ductile reinforced concrete frame buildings. The added elements can be either cast-in-place or pre-cast concrete elements. New elements preferably are placed at the exterior of the building; however it may cause alteration in the appearance and window layouts. Placing of shear walls in the interior of the structure is not preferred.

4.1 Best location of adding shear wall :

Using STAAD Pro v8i, shear walls were added in the different bays of the building. For example, it was added in the 2.8m bay on both the sides of the building. However, it did not improve Earthquake resistance of the building. Then the shear wall was added in the 5m and 4.75m bay simultaneously in order to maintain symmetry and for uniform distribution of forces. Fig. 6 and 7 shows the location of shear wall in the building. The blue lines highlighted in Fig. 6 shows the location of shear wall.

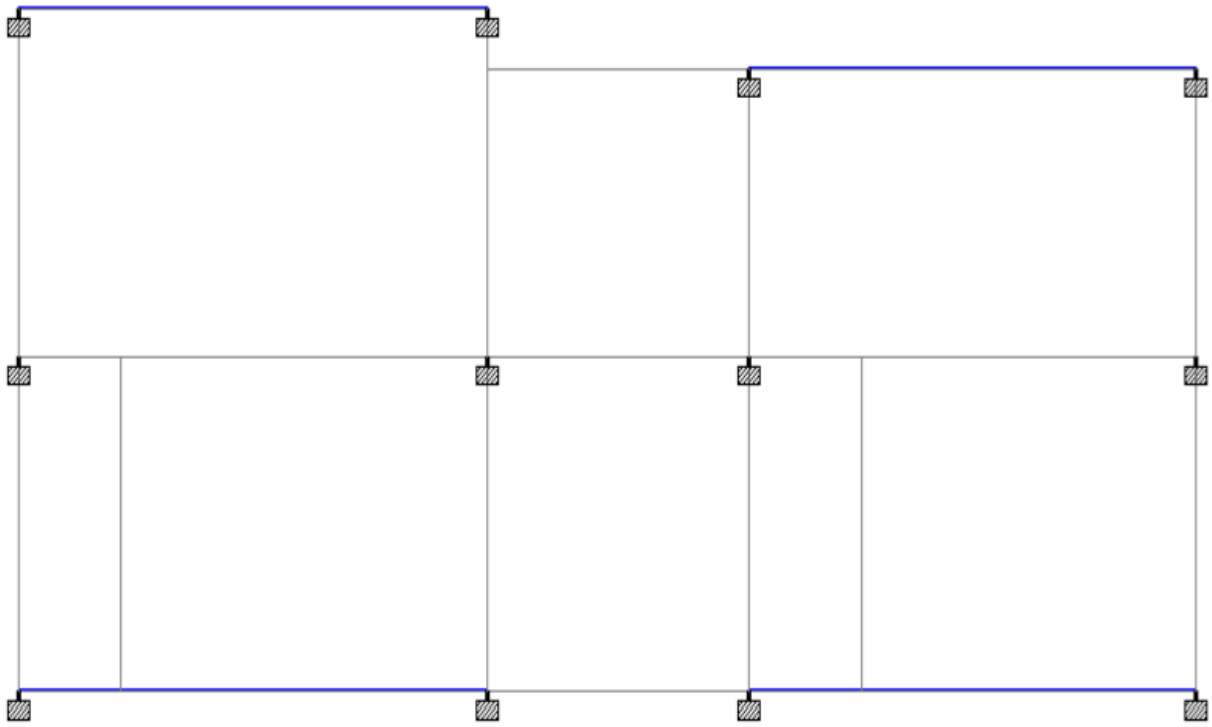


Fig. 14.12 Plan of the building showing location of shear wall

4.2 Shear Wall Design :

Shear wall is added to the building as a surface plate. It is added on all the four sides of the building. The provided reinforcements of the existing columns came out to be more than the required reinforcements. Hence, now the design is safe for all the columns and beams of the building. Table

4 shows the required and provided reinforcements of the building columns from foundation to ground level. Table 5 shows the required and provided reinforcements of the building from Ground to first level. Thus, all the beams and columns were checked after applying shear wall. The building was now found to be safe. The shear wall is designed with the help of Indian Standard Codes, IS 1893(Part 1): 2002 Indian Standard Criteria For Earthquake Resistant Design Of Structures, IS 13920:1993 Indian Standard Ductile Detailing Of Reinforced Concrete Structures Subjected To Seismic Forces, IS 15988:2013, Seismic Evaluation And Strengthening Of Existing Reinforced Concrete Buildings –Guidelines.

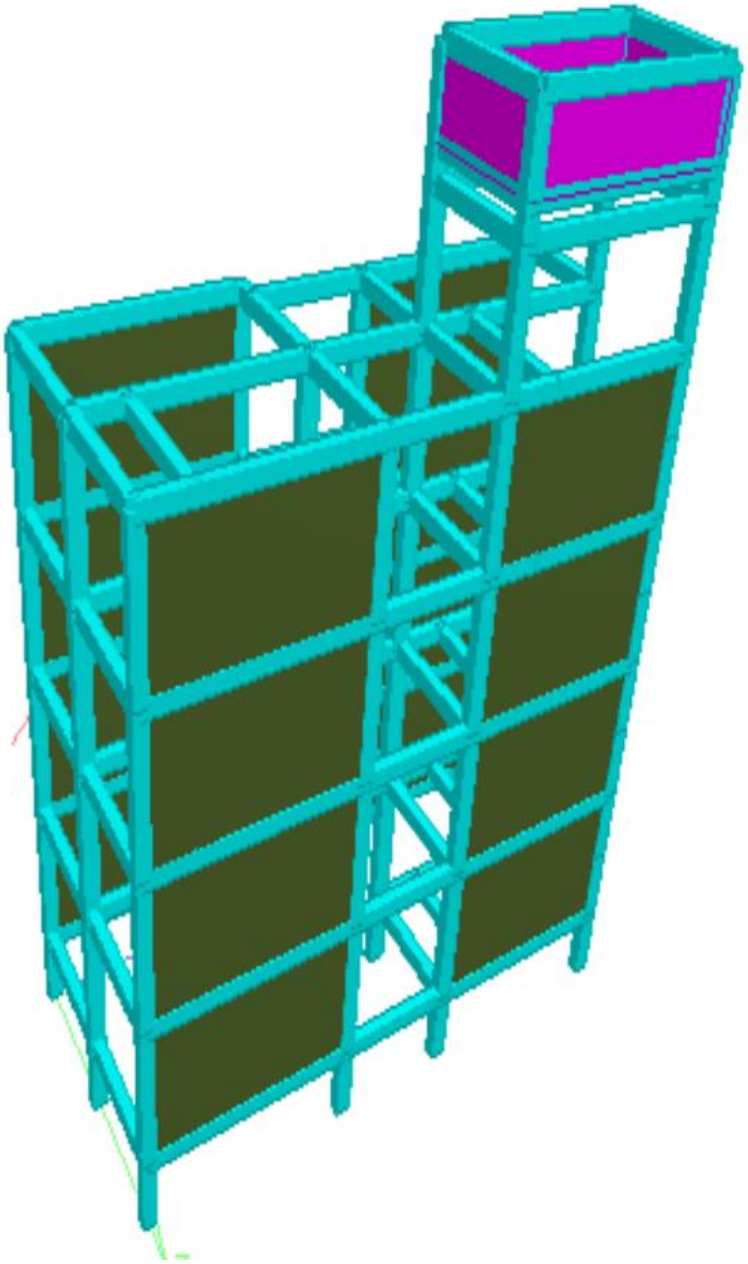


Fig. 14.13 Location of Shear Wall in the Building

5. CONCLUSIONS :

Adding shear wall significantly increases the lateral load carrying capacity of the building as well as the ductility. The building before adding shear wall was not designed as earthquake resistant. But after adding shear wall, significant improvement is seen in seismic performance of the building. The columns which were failing before addition of shear wall became safe after addition of shear wall. Also, the problem of soft present was solved. As addition of shear wall imposes very less disturbance to the existing structure so it is still very viable option in improving the earthquake resistance of the existing buildings. Foundations for newly added shear wall need significant attention of structural engineers.

14.2 Electrical Engineering

14.2.1 Design of Power Electronics converter

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

Power electronic converters can be found wherever there is a need to modify the electrical energy form with classical electronics in which electrical currents and voltage are used to carry information, whereas with power electronics, they carry power. Some examples of uses for power electronic systems are DC/DC converters used in many mobile devices, such as cell phones or PDAs, and AC/DC converters in computers and televisions. Large scale power electronics are used to control hundreds of megawatt of power flow across our nation. Some of those converters are discussed below.

Dual Converter

Dual converter is a combination of a rectifier and inverter in which the conversion of A.C to D.C happens and followed by D.C to A.C where load lies in between. A dual converter can be of a single phase or a three phase. A dual converter consists of two bridges consisting of thyristors in which one for rectifying purpose where alternating current is converted to direct current which can be given to load. Other bridge of thyristors is used for converting D.C to A.C.

Single Phase Dual Converter

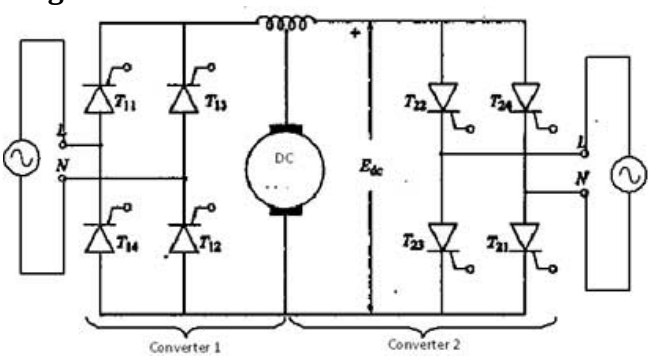


Fig. 14.14 Single Phase Dual Converter

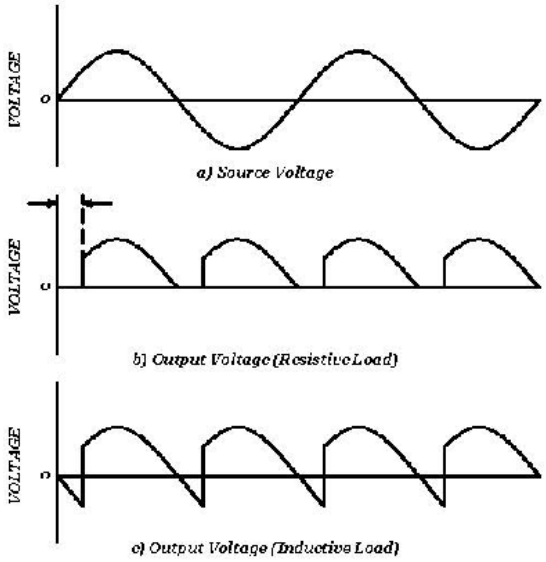
Single phase dual converter uses a single phase as source which is given to converter 1 of dual converter for rectification followed to load.

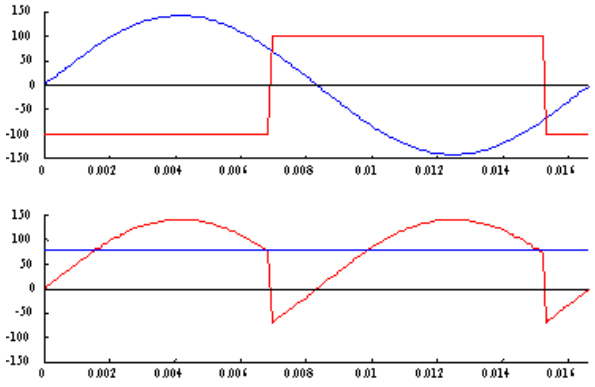
This dual converter can operate in any four quadrants so it can work as an inverter also and can work as a rectifier also. So if there is motor in the load than the direction of rotation can be changed very easily. By changing the firing angle of the thyristor the speed control of the motor can also be achieved very smoothly.

Principle of Operation:

A.C input given to converter 1 for rectification in this process positive cycle of input is given to first set of forward biased thyristors which gives a rectified D.C on positive cycle, as well negative cycle is given to set of reverse biased thyristors which gives a D.C on negative cycle completing full wave rectified output can be given to load. During this process converter 2 is blocked using an inductor. As thyristor only start conducting when current pulse is given to gate

and continuous conducting until supply of current is stopped. Output of Thyristor Bridge can be as follows when it is given to different loads.





As a dual converter also consists conversion of D.C to A.C to make it work converter two is blocked, D.C inputs become load to dc power source conversion.

Firing of Thyristors:

To make thyristors conduct, a trigger pulse must be given to its gate simultaneously along with line voltage. A separate gate drive circuit must be added to a dual converter thyristor bridges Gate drive circuit must be equally synchronized with source voltage, any delay causes zero cross jitter and zero frequency fluctuates. To prevent these circuits must be included with phase lock loops and comparators.

Applications of single phase dual converter

- Speed control and direction control in dc motors.

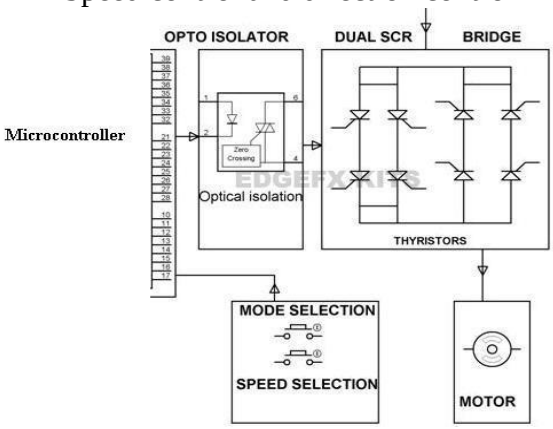


Fig. 14.15 Single Phase Dual Converter

Speed control and polarity control of dc motor using single phase dual converter

A single phase dual converter can be used in controlling speed and direction of rotation interfacing with microcontroller, combination of four SCR‘s is placed either side of motor and motor is load. These thyristors can be triggered through an optocoupler which is connected to a port of microcontroller.

Rotation of motor can be initialized using optocoupler by setting a set of thyristor to trigger which is placed at one side and change in direction of motor can be achieved by triggering another set

of thyristor Variation in speed of motor can be achieved by delayed firing angle of SCR.
Mode selection and speed selection are microcontroller interfaced switches using these switches speed and rotation can be selected.

Single Phase – Three Leg AC/AC Converter

Power electronics is the application of electronics for power conversion. A subcategory of power conversion is the AC to AC conversion. An AC to AC voltage controller is a converter which controls the voltage, current and average power delivered to an AC load from an AC source. There are two types of AC voltage controllers, single and three phase AC controller.

A single phase AC/AC converter is a converter which converts from a fixed AC input voltage into variable AC output voltage with a desired frequency. They are used in practical circuits like light dimmer circuits, speed controls of induction motors and traction motor control etc. There are many existing technologies in single phase AC/AC converters; they are single phase – two legs, three legs and four legs. The single phase – two and four legs converters have some demerits like – they need large number of power devices, large control circuitry, more switching and losses are reduced only half to control the 50% of the output. So, to overcome these demerits present in the conventionally used converters, a better approach is use of single phase-three AC/AC converter.

A single phase – three legs consists of 3 legs and 6 switches. A leg is common for both grid side and load side. A leg performs the rectifier operation and a grid performs the inverter operation. And in this, we use Pulse Width Modulation (PWM) techniques for controlling the converter output. A single phase-three leg converter is shown figure below:

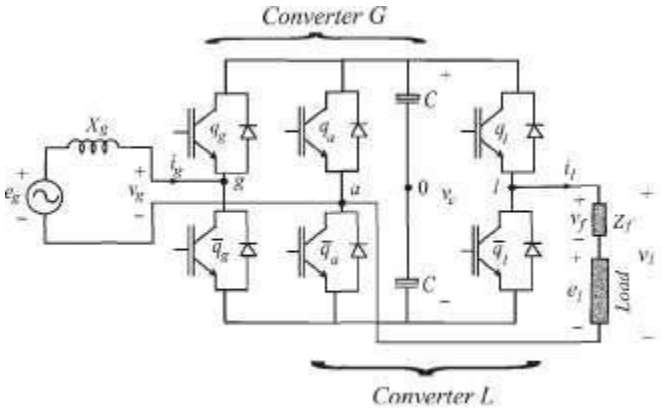


Fig. 14.16 Three Leg AC/AC Converter

During the positive half cycle of the supply voltage switches Qg and Qa in rectifier conducts and we get rectified output across the capacitor and for inverter operation in addition to the switches Qg and Qa', switch Ql in load side leg also triggered and we get ac output across the load. During negative half cycle switches Qa and Qg' in grid side conducts implying rectified output and for inversion operation in addition to the switches Qa and Qg', switch Ql' also triggered and we get ac output across the load. By using PWM method a fixed dc input voltage is supplied to the inverter and a controlled ac output voltage is obtained by adjusting the on and off periods of the inverter devices. The switches in the converter circuit for getting proper operation and also for reducing the harmonics. By varying the value of modulation index we can change the pulse width according to our convenience.

Advantages and Applications of 3 – Leg Converter

- The DC output voltage across the capacitor is almost doubled compared to the four leg converter.
- The power rating and voltage of the circuit can be improved.
- Same output can be obtained with reduced losses & switches. Hence the efficiency and the power factor can be improved.
- This converter is used in uninterruptable power supply circuits (UPS) and in power electronic for getting four quadrant operations of the drives.

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

A soft starter is any device that controls the acceleration of an electric motor using controlling the applied voltage.
Now let us have a brief recall of the need for having a starter for any motor.
An Induction motor can self start owing to the interaction between the rotating magnetic field flux and the rotor winding flux, causing a high rotor current as torque is increased. As a result, the stator draws high current and by the time the motor reaches to full speed, a large amount of current (greater than the rated current) is drawn and this can cause heating up of the motor, eventually damaging it. To prevent this, motor starters are needed.

Motor starting can be in 3 ways

- Applying full load voltage at intervals of time: Direct On Line Starting
- Applying reduced voltage gradually: Star Delta Starter and Soft starter
- Applying part winding starting: Autotransformer starter

Defining Soft Starting
Now let us shift our particular attention to soft starting.
In technical terms, a soft starter is any device that reduces the torque applied to the electric motor. It generally consists of solid-state devices like thyristors to control the application of supply voltage to the motor. The starter works on the fact that the torque is proportional to the square of the starting current, which in turn is proportional to the applied voltage. Thus the torque and the current can be adjusted by reducing the voltage at the time of starting the motor.

There can be two types of control using soft starter:

Open Control: A start voltage is applied with time, irrespective of the current drawn or the speed of the motor. For each phase, two SCRs are connected back to back and the SCRs are conducted initially at a delay of 180 degrees during the respective half-wave cycles (for which each SCR conducts). This delay is reduced gradually with time until the applied voltage ramps up to the full supply voltage. This is also known as Time Voltage Ramp System. This method is not relevant as it doesn't control the motor acceleration.

Closed-Loop Control: Any of the motor output characteristics like the current drawn or the speed is monitored and the starting voltage is modified accordingly to get the required response. The

current in each phase is monitored and if it exceeds a certain set point, the time voltage ramp is halted.

Thus the basic principle of the soft starter is by controlling the conduction angle of the SCRs the application of supply voltage can be controlled.

2 Components of a basic soft starter:

- **Power switches** like SCRs which need to be phase controlled such that they are applied for each part of the cycle. For a 3 phase motor, two SCRs are connected back to back for each phase. The switching devices need to be rated at least three times more than the line voltage.
- **Control Logic** using PID controllers or Microcontrollers or any other logic to control the application of gate voltage to the SCR, i.e. to control the firing angle of SCRs to make the SCR conduct at the required part of the supply voltage cycle.

Working Example of Electronic Soft Start System for 3 phase induction motor

The system consists of the following components.

Two back to back SCRs for each phase, i.e. 6 SCRs in total.

Control Logic circuitry in the form of two comparators- LM324 and LM339 to produce the level and the ramp voltage and an opt isolator to control the application of gate voltage to each SCR in each phase.

A power supply circuitry to provide the required dc supply voltage.

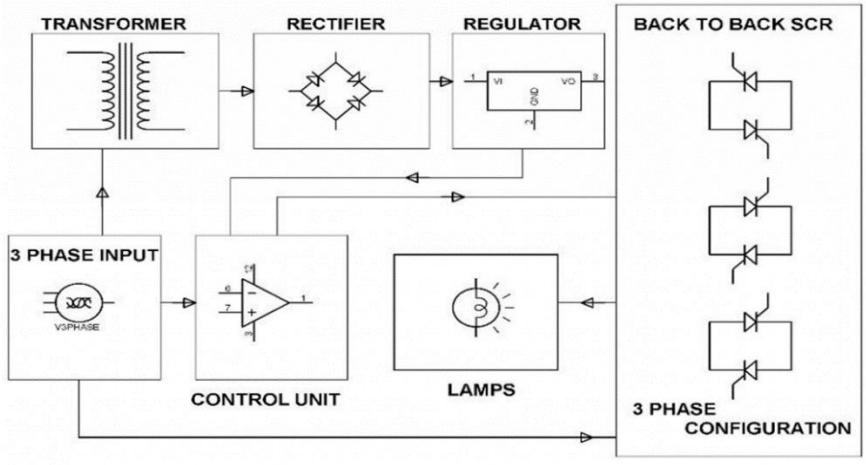


Fig. 14.17 Electronic Soft Starter System

The level voltage is generated using the comparator LM324 whose inverting terminal is fed using a fixed voltage source and the noninverting terminal is fed through a capacitor connected to the collector of an NPN transistor. The charging and discharging of the capacitor cause the output of the comparator to change accordingly and the voltage level to change from high to low. This output level voltage is applied to the noninverting terminal of another comparator LM339 whose inverting terminal is fed using a ramp voltage. This ramp voltage is produced using another comparator LM339 which compares the pulsating DC voltage applied at its inverting terminal to the pure DC

voltage at its noninverting terminal and generates a zero voltage reference signal which is converted to a ramp signal by the charging and discharging of an electrolyte capacitor.

The 3rd comparator LM339 produces a High pulse width signal for every high-level voltage, which decreases gradually as the level voltage reduces. This signal is inverted and applied to the Optoisolator, which provides gate pulses to the SCRs. As voltage level falls, the pulse width of the Optoisolator increases and more the pulse width, lesser is the delay and gradually the SCR is triggered without any delay. Thus by controlling the duration between the pulses or delay between applications of pulses, the firing angle of SCR is controlled and the application of supply current is controlled, thus controlling the motor output torque.

The whole process is an open-loop control system where the time of application of gate triggering pulses to each SCR is controlled based on how earlier the ramp voltage decreases from the level voltage.

Advantages of Soft Start
Now that we have learned about how an electronic soft start system works, let us recollect a few reasons why it is preferred over other methods.

- **Improved Efficiency**: The efficiency of the soft starter system using solid-state switches is more owing to the low on-state voltage.
- **Controlled startup**: The starting current can be controlled smoothly by easily altering the starting voltage and this ensures smooth starting of the motor without any jerks.
- **Controlled acceleration**: Motor acceleration is controlled smoothly.
- **Low Cost and size**: This is ensured with the use of solid-state switches.

14.2.3 Advanced Wireless Power Transfer System

The project is a device to transfer power wirelessly instead of using conventional copper cables and current carrying wires. The concept of wireless power transfer was introduced by Nikolas Tesla. This power is made to be transferred within a small range only for example charging rechargeable batteries etc. For demonstration purposes we have used a fan instead of battery that operates by using wireless power. This requires an electronic circuit for conversion of AC 230V 50Hz to AC 12V, high frequency and this is then fed to a primary coil of an air core transformer. The secondary coil of the transformer develops 12V high frequency. Therefore by this way the power gets transferred through primary coil to secondary coil that are separated by certain distance around 3cm. Here the primary coil acts as transmitter and secondary coil receives the power to run a load. This project can be used to charge batteries of a pace maker and similar applications.

Hardware Specifications

- HF Transformer
- 2 Inductor Coils
- Resistors
- Capacitors
- Transistors
- Cables and Connectors

- Diodes
- PCB and Breadboards
- LED
- Transformer/Adapter
- Push Buttons
- Switch

Block Diagram

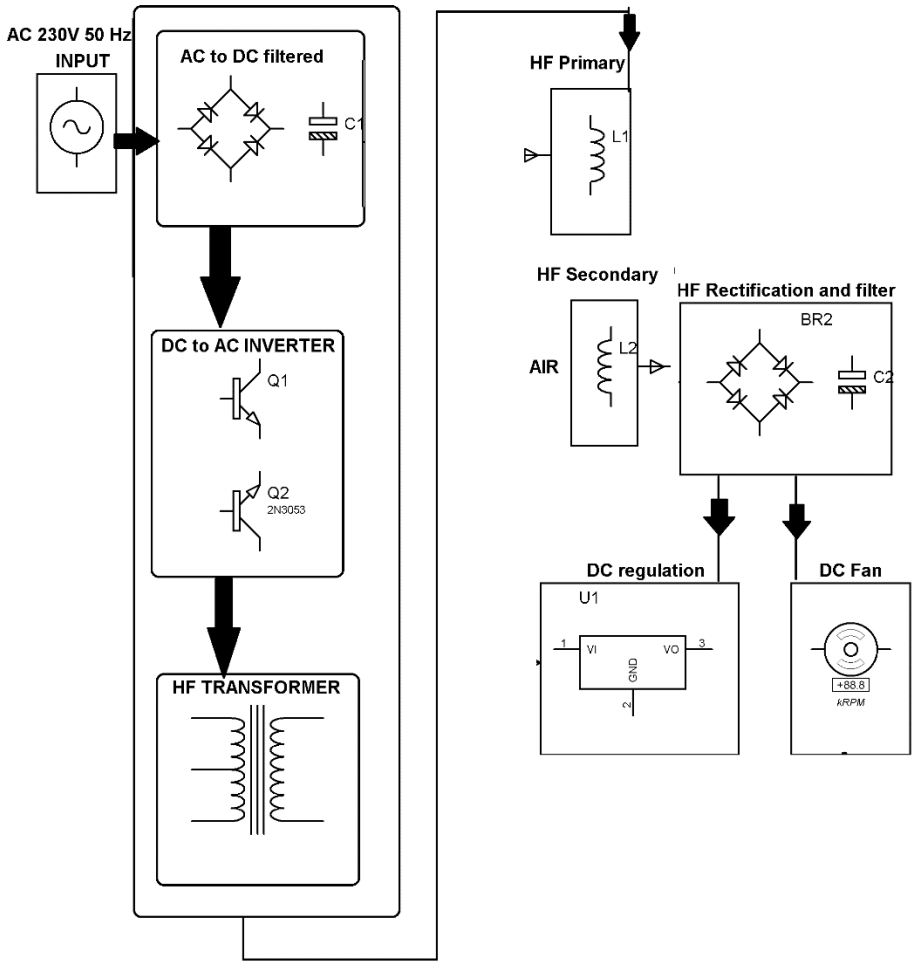


Fig. 14.18 Block Diagram

14.2.4 Industrial Temperature Controller

Temperature is the most often measured environmental quantity and many biological, chemical, physical, mechanical and electronic systems are affected by temperature. Some processes work

well only within a narrow range of temperatures. So proper care must be taken to monitor and protect the system.
When temperature limits are exceeded, electronic components and circuits may be damaged by exposure to high temperatures. Temperature sensing helps to enhance circuit stability. By sensing the temperature inside the equipment, high temperature levels can be detected and actions can be taken to reduce system temperature, or even shut the system down to avert disasters.
Some of the temperature control applications are Practical Temperature Controller and Wireless over Temperature Alarm Circuit Diagrams are discussed below.

Practical Temperature Controller

This type of controllers is used in industrial applications for controlling the temperature of devices. It also displays the temperature on 1 LCD displays in the range of –55°C to +125°C. At the heart of the circuit is the microcontroller from 8051 family which controls all its functions. IC DS1621 is used as temperature sensor.

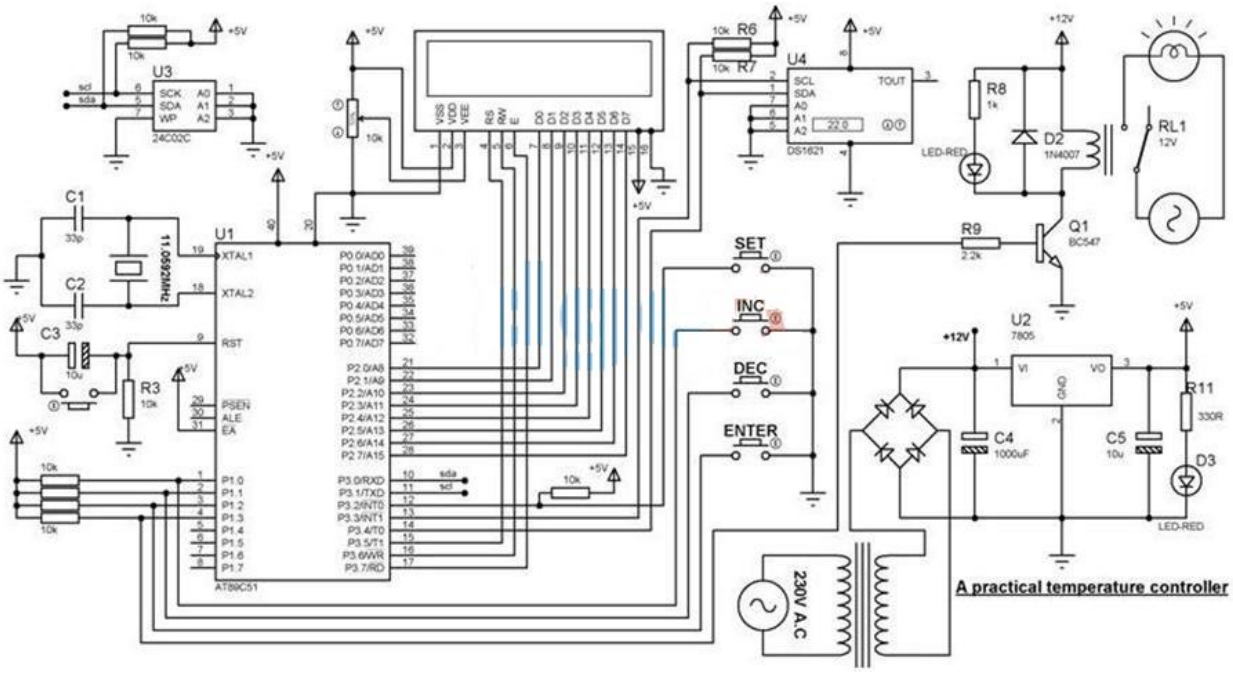


Fig. 14.19 Temperature Controller

The DS1621 is gives the 9-bits of readings to show the temperature. User-defined temperature settings are stored in a non volatile memory EEPROM through 8051 series microcontroller .Maximum and minimum temperature settings are entered to the MC through a set of switches which are stored in the EEPROM -24C02.Maximum and minimum setting are meant for allowing any hysteresis necessary. Set button is used first and then the temperature setting by INC and then the enter button. Similarly for the DEC button. A relay is driven from the MC through a transistor driver. The contact of the relay is used for the load, shown as a lamp in the circuit. For high power heater load a contactor may be used, the coil of which is operated by the relay contacts in place of the lamp as shown.

Standard power supply of 12 volt DC and 5 volt through a regulator are made from a step down transformer along with a bridge rectifier and filter capacitor.

Features of IC DS1621 are:

- Temperature measurements require no external components
- Measures temperatures from -55°C to +125°C in 0.5°C increments. Fahrenheit equivalent is -67°F to 257°F in 0.9°F increments
- Temperature is read as a 9-bit value (2-byte transfer)
- Wide power supply range (2.7V to 5.5V)
- Converts temperature to digital word in less than 1 second
- Thermostatic settings are user definable and nonvolatile
- Data is read from/written via a 2-wire serial interface (open drain I/O lines)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermal sensitive system
- 8-pin DIP or SO package (150mil and 208mil)

Wireless over Temperature Alarm

The circuit uses an analog temperature sensor LM35 duly interfaced to a comparator LM 324 whose output is fed to a 4 bit input encoder IC HT 12E .The limit is selected with the help of a 10K preset which is calibrated around its 270 degree rotation. The encoder IC converts this to parallel data to serial one which is given to a transmitter module for transmission.

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK).

Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources.

The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps – 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.

This wireless over temparature alarm system have many applications amd in fact this transmitter amd receiver circuit is used in the telivisions in each and every house. Transmission is done through infrared rays and it is very much energy efficient.

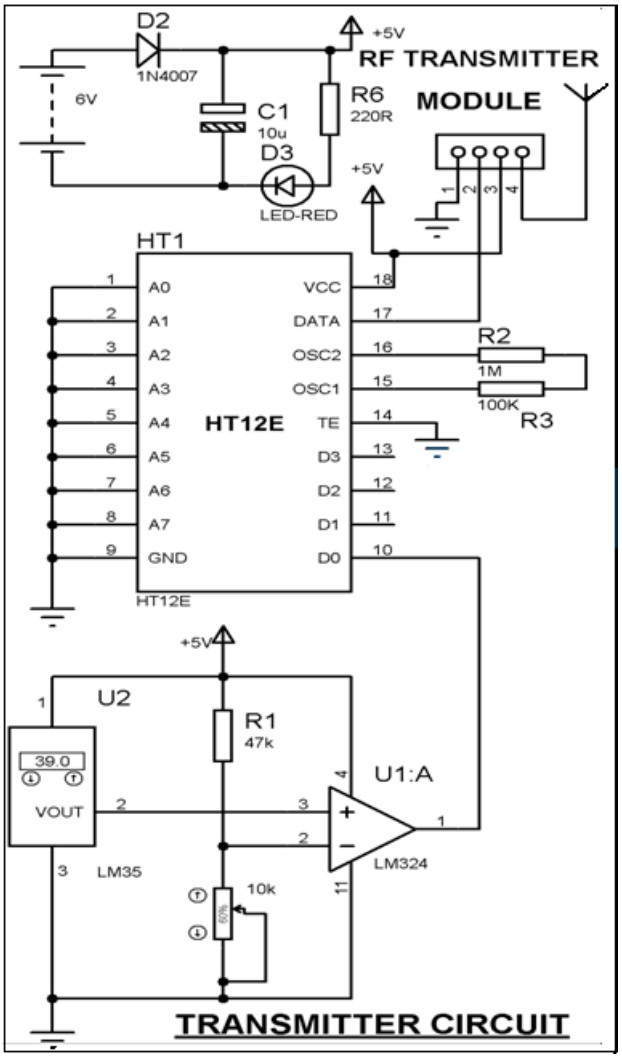


Fig. 14.20 Transmitter Circuit

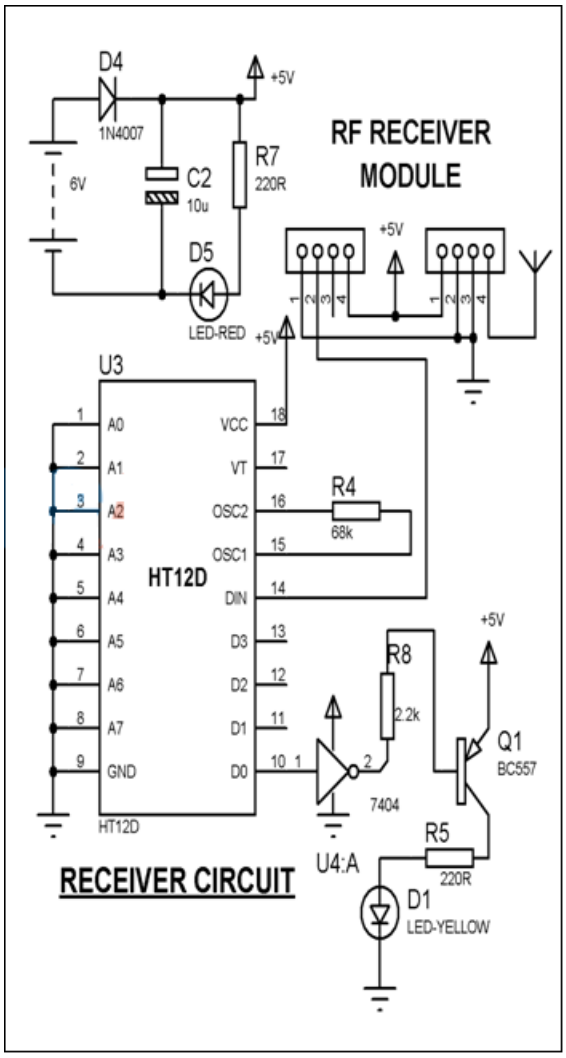


Fig. 14.21 Receiver Circuit

The receiver end receives this serial data and then feeds to a decoder IC HT12D to generate 4bit parallel data which is given to an inverter CD7404 to drive a transistor Q1 to actuate any load for warning purposes. Both the transmitter and the receiver are powered from batteries with reverse protection diodes and also to get around 5 volts out of 6 volt battery used.

HT12D is a 2^{12} series decoder IC (Integrated Circuit) for remote control applications manufactured by Holtek. It is commonly used for radio frequency (RF) wireless applications. By using the paired HT12E encoder and HT12D decoder we can transmit 12 bits of parallel data serially. HT12D simply converts serial data to its input (may be received through RF receiver) to 12 bit parallel data. These 12 bit parallel data is divided in to 8 address bits and 4 data bits. Using 8 address bits we can provide 8 bit security code for 4 bit data and can be used to address multiple receivers by using the same transmitter.

HT12D is a CMOS LSI IC and is capable of operating in a wide voltage range from 2.4V to 12V. Its power consumption is low and has high immunity against noise. The received data is checked 3 times for more accuracy. It has built in oscillator, we need to connect only a small external resistor. HT12D decoder will be in standby mode initially i.e., oscillator is disabled and a HIGH on DIN pin activates the oscillator. Thus the oscillator will be active when the decoder receives data transmitted by an encoder. The device starts decoding the input address and data. The decoder matches the received address three times continuously with the local address given to pin A0 – A7. If all matches, data bits are decoded and output pins D8 – D11 are activated. This valid data is indicated by making the pin VT (Valid Transmission) HIGH. This will continue till the address code becomes incorrect or no signal is received.

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

The main aim of the project Accident Detection and Messaging System is to inform the Ambulance and Police of the accident site and arrange for necessary steps to control the situation. This system is not only efficient but also worthy to be implemented. . The Accident Detection and Messaging System can be fitted in the vehicle (Ambulance or the Police) and they are informed about any such untoward incident at the go.

Accident Detection and Messaging System execution is simple as the system makes use of GSM and GPS technologies. GPS is used with arduino for taking the coordinates of the site of the accident while GSM is used with arduino for sending the coordinates to cell phones. To make this process all the controls are made using Arduino whereas a LCD is used to display the coordinates. It is assumed that the reader has gone through the project how to get started with the arduino and 16×2 LCD with arduino.

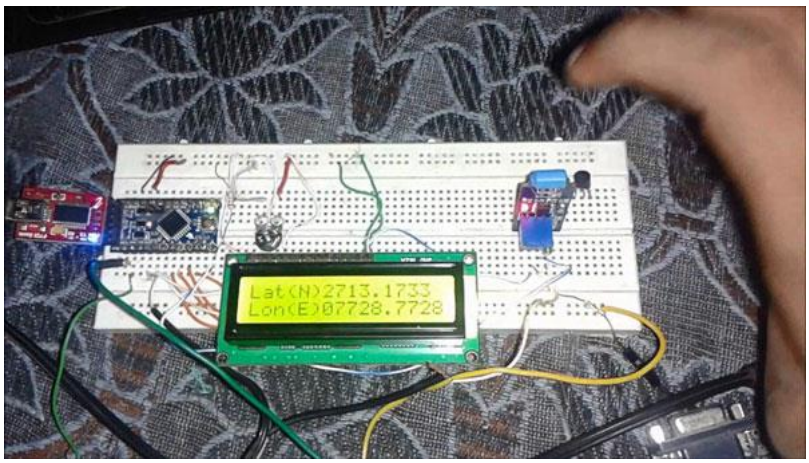


Fig. 14.22 Prototype of Arduino based Car Accident SMS Alert System

How It Works

Accident Detection and Messaging System is easy and the components used are Vibration Sensor, which detects the accident and in turn sends the signals to Arduino. At this point the Arduino takes control and starts collecting the coordinates received from the GPS which are later sent to the Central Emergency Monitoring Station by using the GSM Module.

Circuit Diagram Explanation

The circuitry of Accident Detection and Messaging System is similar to vehicle tracking system. The Tx pin of Arduino is directly connected with Rx pin of GSM module and the Rx pin of Arduino is directly connected with the Tx pin of GPS receiver. The output pin of Vibration sensor is connected with pin number 9 of Arduino. The 16×2 LCD's data pins are connected with the arduino's pin number 4,5,6,7 and command pin rs and en of LCD are connected with arduino's pin number 2 and 3. The rw pin of LCD is directly connected with ground. Vibration sensor module sends active low signal when the accident occurs.

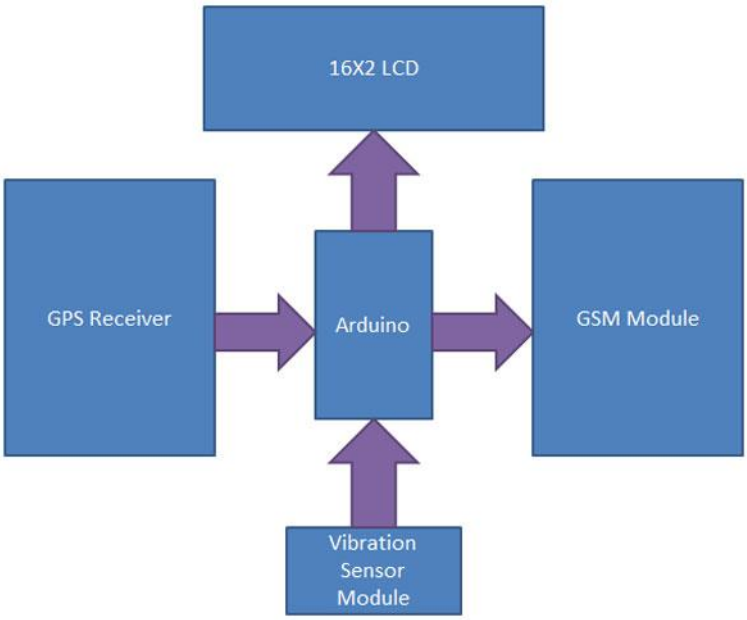


Fig. 14.23 Block Diagram of Arduino based Car Accident SMS Alert System

Another important aspect of the project is the Power Supply. The Vibration Sensor requires about 9 Volt of DC supply, if we opt for a 5 Volt DC power supply then this circuit will not work properly.

Programming

The Programming of this project is also similar to that of vehicle tracking system but here an "if" statement is used for sending coordinates when vibration sensor sends low signal to the Arduino. Before you embark upon building Accident Detection and Messaging System you have to select the same baud rate of GSM and GPS device, but if you are using different baud rate module or device you will face some problem related with the baud rate.

In this system we have used two different baud rates:
4800 bps baud rate for GPS Module and 9600 bps baud rate for GSM Module. When we takes Coordinates from GPS then we have use 4800 bps baud rate and when we have to send Coordinates to control room then we used 9600 bps baud rate.

Component Required

1. Arduino
2. GSM Module
3. GPS Module
4. Vibration Sensor module
5. 16×2 LCD
6. Power Supply
7. Connecting Wires

14.2.6 Case Study on Solar Thermal Collector

A solar thermal collector collects heat by absorbing sunlight. The term "solar collector" commonly refers to a device for solar hot water heating, but may refer to large power generating installations such as solar parabolic troughs and solar towers or non water heating devices such as solar air heaters.

Solar thermal collectors are either non-concentrating or concentrating. In nonconcentrating collectors, the aperture area (i.e., the area that receives the solar radiation) is roughly the same as the absorber area (i.e., the area absorbing the radiation). This type has no extra parts except the collector itself. Concentrating collectors have a much bigger aperture than absorber area (additional mirrors focus sunlight on the absorber) and only harvest the direct component of sunlight.

Non-concentrating collectors are typically used in residential and commercial buildings for space heating, while concentrating collectors in concentrated solar power plants generate electricity by heating a heat-transfer fluid to drive a turbine connected to an electrical generator. Visiongain research indicates that the global solar thermal collector market will be valued at $21 billion by the year 2029.

Solar thermal collectors generating electricity Parabolic troughs, dishes and towers described in this section are used almost exclusively in solar power generating stations or for research purposes. Parabolic troughs have been used for some commercial solar air conditioning systems. Although simple, these solar concentrators are quite far from the theoretical maximum concentration. For example, the parabolic trough concentration is about 1/3 of the theoretical maximum for the same acceptance angle, that is, for the same overall tolerances for the system. Approaching the theoretical maximum may be achieved by using more elaborate concentrators based on non-imaging optics. Solar thermal collectors may also be used in conjunction with photovoltaic collectors to obtain combined heat and power.

Parabolic trough

This type of collector is generally used in solar power plants. A trough-shaped parabolic reflector is used to concentrate sunlight on an insulated tube (Dewar tube) or heat pipe, placed at the focal point, containing coolant which transfers heat from the collectors to the boilers in the power station.

Parabolic dish

Solar parabolic dish

With a parabolic dish collector, one or more parabolic dishes concentrate solar energy at a single focal point, similar to the way a reflecting telescope focuses starlight, or a dish antenna focuses radio waves. This geometry may be used in solar furnaces and solar power plants. The shape of a parabola means that incoming light rays which are parallel to the dish's axis will be reflected toward the focus, no matter where on the dish they arrive. Light from the sun arrives at the Earth's surface almost completely parallel, and the dish is aligned with its axis pointing at the sun, allowing

almost all incoming radiation to be reflected towards the focal point of the dish. Most losses in such collectors are due to imperfections in the parabolic shape and imperfect reflection.

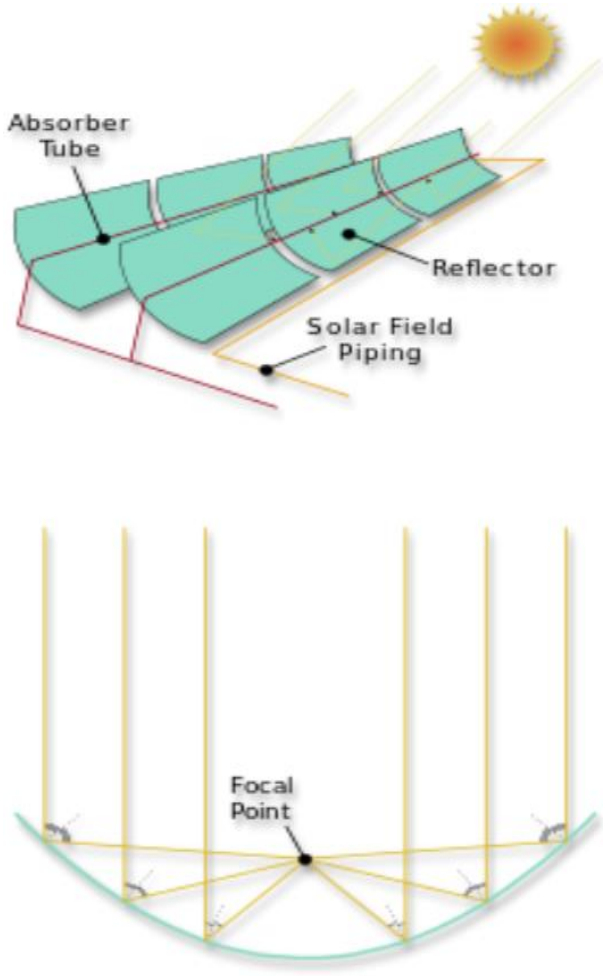


Fig.14.24 Parabolic Trough

Losses due to atmospheric scattering are generally minimal. However, on a hazy or foggy day, light is diffused in all directions through the atmosphere, which significantly reduces the efficiency of a parabolic dish. In dish stirling power plant designs, a stirling engine coupled to a dynamo, is placed at the focus of the dish. This absorbs the energy focused onto it and converts it into electricity.

Power tower

A power tower is a large tower surrounded by tracking mirrors called heliostats. These mirrors align themselves and focus sunlight on the receiver at the top of tower, collected heat is transferred to a power station below. This design reaches very high temperatures. High temperatures are suitable for electricity generation using conventional methods like steam turbine or a direct high temperature chemical reaction such as liquid salt.By concentrating sunlight, current systems can get better efficiency than simple solar cells. A larger area can be covered by using relatively inexpensive mirrors rather than using expensive solar cells. Concentrated light can be redirected to a suitable location via optical fiber cable for such uses as illuminating buildings. Heat storage for power production during cloudy and overnight conditions can be accomplished, often by underground tank storage of heated fluids. Molten salts have been used to good effect. Other working fluids, such as liquid metals, have also been proposed due to their superior thermal properties.

However, concentrating systems require sun tracking to maintain sunlight focus at the collector. They are unable to provide significant power in diffused light conditions. Solar cells are able to provide some output even if the sky becomes cloudy, but power output from concentrating systems drops drastically in cloudy conditions as diffused light cannot be concentrated.

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) Initial and Instant

The direct or immediate impact of designs on village will depend on design given. Like if anganwadi design is given to the village and after it's implement the children will directly be able to access his study and that anganwadi may used as a assembly hall or a meeting hall in there rest of time.
As per bus stop point of view villagers will be able to access the bus stop directly after completion.
But in case of pond it will work in only rainy season to store water and after pond fulfilled with water it will be used for irrigation purpose.
Panchayat office also will be directly accessible.
In case of public toilet the awareness will play an important role because generally rural people do not aware from this toilet. So after awaring people from this they only will access toilet.
In case of underground water tank the same scenario will occur. In rainy season it will be fulfilled and be used as a rainwater harvesting.

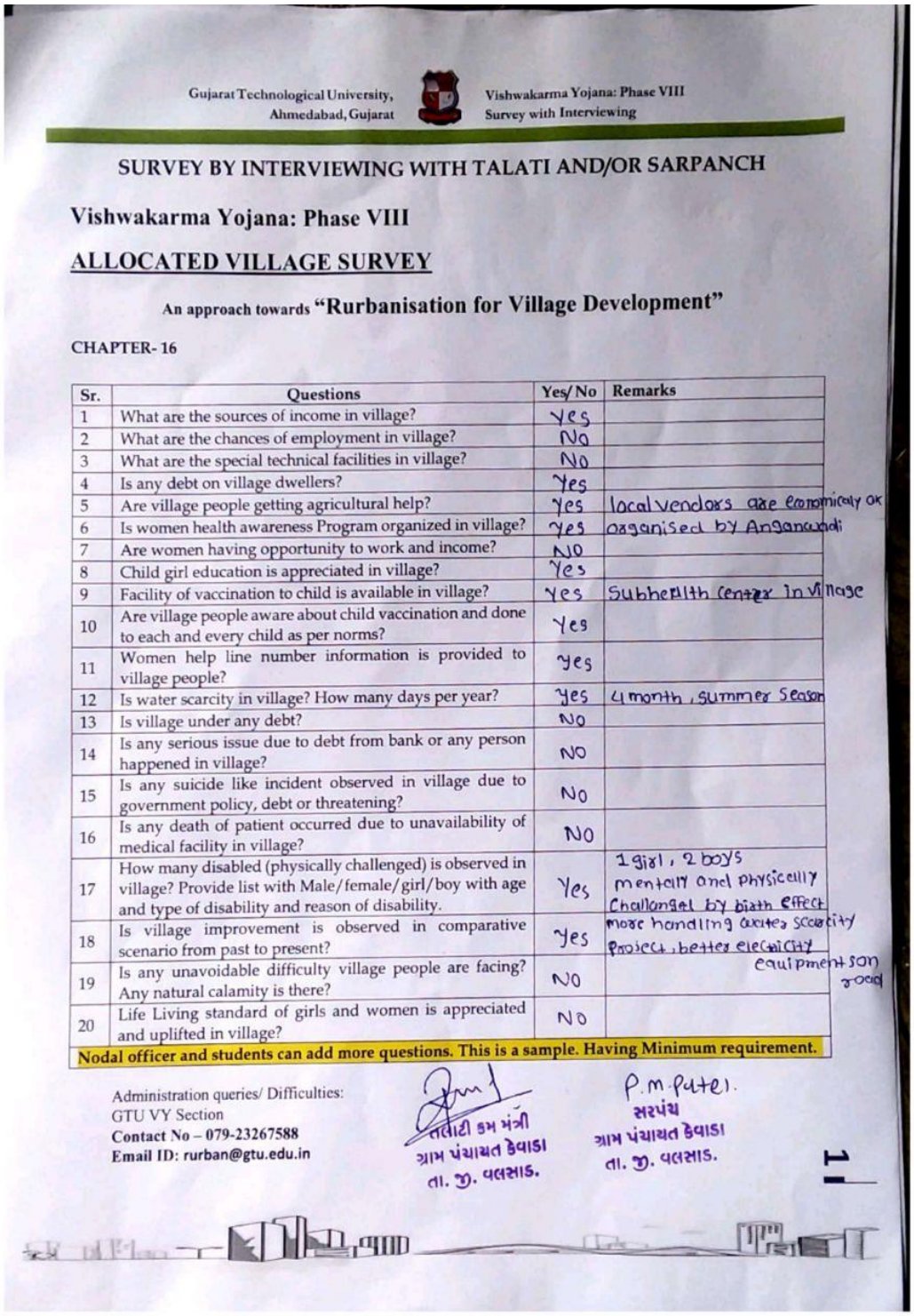
b) Within 500 Days

After an year there might be an maintenance cost which will depend on designs.
Like if there is an anganwadi then the utilization of that will be same but the maintenance cost will also be there like due to damage of some elements of building, any electrical elements etc.
After an year the utilization of bus stop will also increase so there no need or very less need of maintenance.
In pond also very less chance of maintenance because there might be very less damages due to water pressure on liner so that only need to maintain.
The utilization of panchayat office will also increased and people will be able to easily access that building which will provide better experience to the villagers.
The total cleaning of every structure is required after an year. Public toilet will also give an better experience because people will be very much award with public toilet so the people will also be able to access toilet very easily.
There might be need to inspect the water tank because there may have need to do some maintenance work.
Water tank may get some damages due to seepage and the same things will will be same for ponds also.

c) Within 5 years along with cost estimation

After passing three to five years the cost of maintenance of building may increase specially of hydraulic structure like pond and Underground water tank.
Due to the load of water there might be a crack formation in liner of pond or cracks in water tank. So the repair of that will also be required otherwise the seepage will increase that will ultimately reduce the storage of water and that will affect to the villagers.
The maintenance cost for other structure will be common except including contingencies or any disasters.
Based on point of utilization the wear and tear of structure will increase so there might have slight more maintenance cost then before as per passing time.
After 3 to 5 years in ponds there may be the need to change the liner which we have estimated in above estimate of pond. Liner may get damaged due to hydrostatic pressure of water or may due to some other reasons like the sharp soil structure.
If we use concrete liner then this one will be more uneconomical in beginning but in future the maintenance cost of this one will be very much lesser in comparision with plastic carpet liner.
Concrete liner is very safe from soil structure and its optimum thickness can resist water force easily.

CHAPTER 16 : Survey By Interviewing With Talati And/or Sarpanch



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Survey with Interviewing

SURVEY BY INTERVIEWING WITH TALATI AND/OR SARPANCH

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

CHAPTER- 16

Sr.	Questions	Yes/ No	Remarks
1	What are the sources of income in village?	Yes	
2	What are the chances of employment in village?	No	
3	What are the special technical facilities in village?	No	
4	Is any debt on village dwellers?	Yes	
5	Are village people getting agricultural help?	Yes	local vendors are commicaly or
6	Is women health awareness Program organized in village?	Yes	organised by Anganwadi
7	Are women having opportunity to work and income?	No	
8	Child girl education is appreciated in village?	Yes	
9	Facility of vaccination to child is available in village?	Yes	Subhealth center in village
10	Are village people aware about child vaccination and done to each and every child as per norms?	Yes	
11	Women help line number information is provided to village people?	yes	
12	Is water scarcity in village? How many days per year?	yes	4 month, summer Season
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.	Yes	1 girl, 2 boys mentally and physically Challanged by birth effect
18	Is village improvement is observed in comparative scenario from past to present?	Yes	more handling water scarcity Project, better electricity
19	Is any unavoidable difficulty village people are facing? Any natural calamity is there?	No	equipment son road
20	Life Living standard of girls and women is appreciated and uplifted in village?	No	

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

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

તલાટી કમ મંત્રી
ગ્રામ પંચાયત કેવાડા
તા. જી. વલસાડ.

P.M.Patel.
સરપંચ
ગ્રામ પંચાયત કેવાડા
તા. જી. વલસાડ.

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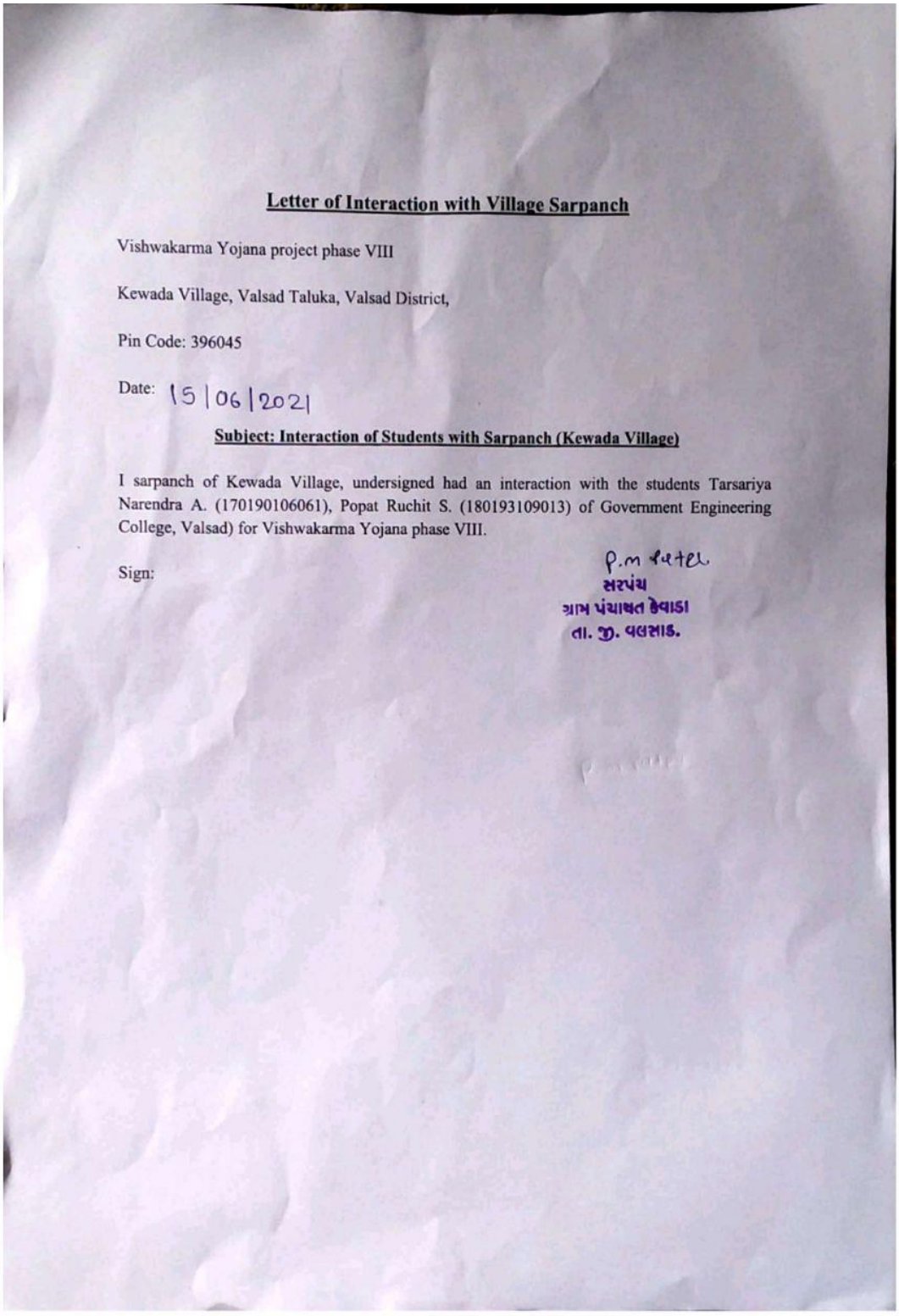
16.1 Letter of Interaction with Village Sarpanch



Letter of Interaction with Village Sarpanch

Vishwakarma Yojana project phase VIII

Kewada Village, Valsad Taluka, Valsad District,

Pin Code: 396045

Date: 15/06/2021

Subject: Interaction of Students with Sarpanch (Kewada Village)

I sarpanch of Kewada Village, undersigned had an interaction with the students Tarsariya Narendra A. (170190106061), Popat Ruchit S. (180193109013) of Government Engineering College, Valsad) for Vishwakarma Yojana phase VIII.

Sign:

P.M Patel.
સરપંચ
ગ્રામ પંચાયત કેવાડા
તા. જી. વલસાડ.

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16.2 Approval Letter for Proposed Designs

Approval Letter for Proposed Design

Vishwakarma Yojana project phase VIII

Kewada, Valsad Taluka, Valsad District,

Pin Code: 396045

Date: 15/06/2021

Subject: Approval Letter for Proposed Design Kewada Village.

I Sarpanch of Kewada village, undersigned gives approval for the following deigned as proposed by the students Tarsariya Narendra A. (170190106061), Popat Ruchit S. (180193109013) of Government Engineering Colllege. Valsad) for Vishwakarma Yojana phase VIII.

Approved Designs For Part 2:

Civil

1. Panchayat Office
2. Public Toilet
3. Underground Water Tank

Electrical

1. Smart Solar based irrigation system
2. Piezoelectric speed breaker electricity generator
3. Intelligent water level indicator with controller

Sign:

P. M. Patel.
સરપંચ
ગ્રામ પંચાયત કેવાડા
તા. જી. વલસાડ.

CHAPTER 17 : Irrigation / Agriculture Activites And Agro Industry, Alternate Technics And Solution

Agriculture in India is still a traditional procedure. But when you compare it with the other foreign countries, they call it Modern Agriculture. The difference between both is the use of Technology methods in Agriculture. Technology and Modern methods in Agriculture have a huge scope in India, slowly, there is a shift that we can observe. But still, it is not on a par level when we compare with the other overseas countries. The most important reason behind this is the lack of awareness among the farmers. Hence we have tried our best to bring the latest Modern Technology methods to Agriculture.

In modern agricultural systems, farmers believe they have more central roles and are eager to apply technology and information to control most components of the system, a very different view from that of traditional farmers. Modern machines can control the hard work of farmers.

Different types of modern farming methods:

1. Aeroponics System of Modern Farming Methods

Aeroponics is the process of growing plants in an air or mist environment without the utilize of soil or an aggregate medium. The word "Aeroponic" is from the Greek meanings of aer and ponos. Aeroponics is a subset of hydroponics and works by suspending plant roots in the air and misting them with nutrient water. This method can provide a better level of control over the amount of water that is used throughout the growing process but may leave plant roots vulnerable to pathogens, if not carefully controlled.

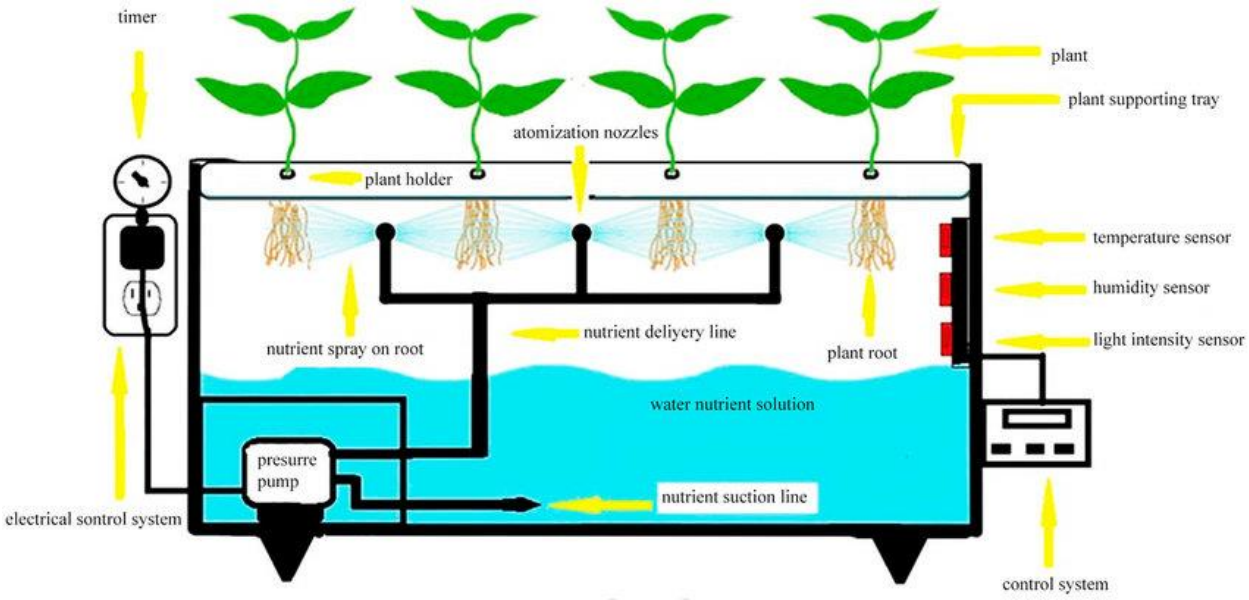


Fig. 17.1 Aeroponics Plant growing system

Aeroponics system culture differs from conventional Hydroponics, Aquaponics, and in-vitro growing. Unlike hydroponics, which uses a liquid nutrient result as a growing medium and essential mineral to maintain plant growth; or aquaponics which uses water and fish waste, Aeroponic is conducted without a growing medium. It is considered a type of hydroponics since water is used in Aeroponics to transmit nutrients.

Aeroponic systems are additional cost-efficient than other systems. Because of the reduced volume of solution throughput, less water, and fewer nutrients are needed in the system at any given time compared to other nutrient delivery systems. The need for substrates is eliminated, as is the need for many moving parts.

Some of the benefits of using Aeroponic farming include:

- Ease of working with plants
- Cost-effective since won't have to spend money on irrigation channels
- Aids in disease-free cultivation as plant-to-plant contact is limited and if a plant does become infected, it can be simply removed from the support structure without disrupting the other plants.

2. Aquaponics of Modern Farming Methods

Aquaponics, on the other hand, is a closed-loop system that relies on the symbiotic relationship among aquaculture (fish) and agriculture (plants) for fertilization. While fish waste accumulates in the water and provides the nutrients essential for plant growth, the plants naturally clean the water. It provides a balanced, yet less regimented, environment.

Fig. 17.2 Aquaponics Method of modern farming

Aquaponics refers to any method that combines conventional aquaculture (raising aquatic animals such as snails, fish, or prawns in tanks) with hydroponics (cultivating plants in water) in a symbiotic environment. In normal aquaculture, excretions from the animals raised can accumulate in the water, increasing toxicity.

An Aquaponic system depends on different live components to work effectively. The 3 main live components are plants, fish (or other aquatic creatures), and bacteria.

Benefits of Aquaponics:

- All normal fertilizer sources from fish waste.
- No reliance on mined and affected fertilizers.
- Efficient, sustainable, and extremely productive.
- Fish are free of expansion hormones and antibiotics.
- Allows continuous making of food.
- It produces both a protein and vegetable crop.
- The integrated method is sustainable and earth-friendly.
- Eliminating soil eliminates soil-borne diseases.

3. Hydroponics of Modern Farming Methods

The hydroponics method is a soil-less type of farming because it requires no soil for the plants to grow. Instead, it uses water as its growing medium. The knowledge of soil-less gardening is called hydroponics. It essentially involves growing healthy plants without the use of a traditional soil medium by using a nutrient like a mineral-rich water solution instead. A plant needs, choose nutrients, some water, and sunlight to grow. Not only do plants grow without soil, they often develop a lot better with their roots in water instead.

Fig. 17.3 Hydroponics

The hydroponics farming method is a subset of hydroculture, which is a method of growing plants without soil by using mineral nutrient solutions in a water solvent. Terrestrial plants may be developed with only their roots exposed to the mineral solution, or the roots may be supported by an inert medium, such as perlite.

The nutrients used in hydroponic farming systems can come from an array of different sources; these can include but are not limited to, a byproduct from fish waste, duck manure, or purchased chemical fertilizers.

Some benefits of Hydroponic Farming:

- By providing constant and readily available nutrition, hydroponics allows plants to rise up to 50% faster than they would in soil. Also, fresh produce can be harvested from a hydroponic garden throughout the year.
- Great for both the environment and the mature product, hydroponic gardening virtually eliminates the need for herbicides and pesticides compared to traditional soil gardening.
- Any water that is used in hydroponic farm gardening stays in the system and can be reused, reducing the constant need for a freshwater supply.
- Arable land is often in small supply and gardening space continues to decrease. A huge option when you lack yard space or have a tiny balcony, hydroponics also lends itself really well to indoor gardening.

4. Monoculture of Modern Farming Methods

The monoculture farming method is the raising of a single crop within a specified area. Most of the commercial farms in the United States are now monoculture in nature, with crops like corn and soy taking top billing. This is in contrast to the traditional technique of farming, which relied on multiple crops being planted within a specific area. Many indoor farms growing medicinal herbs and flowers are measured to be monoculture farms.

Monoculture is the agricultural practice of producing a single crop, single plant, or livestock species, variety, or breed in a field or farming system at a time. Polyculture, where more than one crop is grown in a similar space at the same time, is the alternative to monoculture. Monoculture farming is widely used in both industrial farming and organic farming and has allowed increased efficiency in planting and harvest.

When one crop is grown alone in a field, it is called a monoculture farm. Monoculture farming makes it easier to cultivate, sow seed, control weeds, and harvest, as well as expand the size of the farm operation and improve aspects of profitability and cost. At the same time, monocultures tend to promote the use of the other 5 basic practices of modern agriculture.

Monocultures in grassland are a moderately recent phenomenon. Many grassland systems, such as hay meadows and chalk grasslands, have a more diversified. In the case of chalk grasslands, this diversity has arisen following several years of grazing.

Fig. 17.4 Monoculture Farming

Advantages of monoculture:

- Reduced plant opposition for nutrients, space and solar radiation.
- Control of undesirable or unprofitable organisms.
- Reduction of costs by controlling specialized machinery required for arable operations.
- Maximize profit from the increasing of higher gross margin crops.

5. Tissue culture of Modern Farming Methods

Tissue culture refers to a method in which fragments of a tissue plant are introduced into a new, artificial environment, where they continue to function or grow. While fragments of a tissue culture are often used, it is important to note that entire organs are also used for tissue culture purposes. Here, such growth media as broth and agar are used to facilitate the procedure. While the term tissue culture farm may be used for both plant and animal tissues, plant tissue culture is the more specific term used for the culture of plant tissues in tissue culture.

Tissue culture is the expansion of tissues or cells separate from the organism. This is naturally facilitated via the use of a liquid, semi-solid, or solid growth medium, such as broth or agar. Tissue culture normally refers to the culture of animal cells and tissues, with the more specific term plant tissue culture being used for plants.

Tissue culture usually refers to the growth of cells from a tissue from a multicellular organism in vitro. These cells may be isolated from a donor organism, “primary cells”, or an immortalized cell line. The cells are bathed in a culture medium, which contains necessary nutrients and energy sources necessary for the cells’ survival. The tissue culture is often used interchangeably with cell culture.

Fig. 17.5 Tissue culture farming

Use of Tissue Culture technique:

The tissue culture technique is used increasingly for the production of ornamental plants like orchids, dahlia, carnation, chrysanthemum, etc. The assembly of plants by the method of tissue culture is also known as micro propagation because small amounts of plant material is used.

Advantages of Tissue Culture:

- Tissue culture is a fast technique. Thousands of plantlets can be created in a few weeks time from a small amount of plant tissue.
- The new plants formed by tissue culture are disease-free.
- Tissue culture can produce, plants round the year, irrespective of weather or season.
- Very little space is needed for increasing new plants by tissue culture.
- It helps to speed up the creation of new varieties into the market place.

6. Drones in Modern Farming Methods

An agricultural drone technology is an unmanned aerial vehicle applied to farming in order to help increase crop production and monitor crop growth. Sensors and digital capabilities can give farmers a richer picture of their fields. This information may prove useful in civilizing crop yields and farm efficiency.
Drone technology has been around for decades, taking to the skies to capture movie sequences, collect scientific information and scout territory. But there's a different industry where drones are really beginning to take off farming.

Fig. 17.6 Drones in modern farming

Agriculture is on tap to make up eighty percent of the market for unmanned aircraft in the next couple of decades. With the invention of newer, more effective technologies, drones in agriculture have the potential to launch the agriculture industry into a future of sustainability.

Advantages:

- More information, less time: One of the main benefits of drones is their ability to scout farm fields both quickly and efficiently. Rather than having growers evaluate field's manually on foot or by tractor, this knowledge allows farmers to gain immediate knowledge about the status of their fields in shorter periods of time.
- Improving crop health and efficiency: Drone technology is very effective at collecting data to help farmers improve crop health. Equipped with sensors, drones flying over a field can collect plant height dimensions by gathering range information from the plant canopy and the ground below. By measuring near infrared wavelengths through a multispectral sensor, drone technology can also create vegetation index images, indicating which plants are healthy and absorbing maximum sunlight.
- Water efficiency and other environmental benefits: Thermal cameras are capable to detect cooler, well-watered field regions as well as dry hot patches. Farmers can utilize this data to adjust field irrigation and avoid wasting excess water. This capacity to increase water optimization is particularly valuable in drought-stricken areas, such as California. Most drones presently available for use in the agriculture industry are very costly. However, with new developments and more innovation, drones may start to prove their value in agriculture.

7. Hybrid Seed Technology:

A hybrid seed technology is a cross between two or more unrelated inbred plants. The two dissimilar varieties are cross bred, resulting in a seed that carries one or more favorable traits. Hybrid seeds are commonplace in commercial farming, mainly to increase crop yields. In agriculture and gardening, hybrid seed is used to form by cross-pollinated plants. Hybrid seed production is major in modern agriculture and home gardening.
All of the hybrid seeds planted by the farmer will construct similar plants, while the seeds of the next generation from those hybrids will not consistently have the desired characteristics. Controlled hybrids provide very regular characteristics because they are produced by crossing two inbred strains.

Fig. 17.7 Hybrid seed technology

Hybrids are chosen to develop the characteristics of the resulting plants, such as better yield, greater uniformity, improved color, disease resistance. A main factor is the heterosis or combining ability of the parent plants. Crossing any exacting pair of inbred strains may or may not result in superior offspring. The parent strains used are therefore suspiciously chosen so as to achieve the uniformity that comes from the uniformity of the parents, and the superior performance that comes from heterosis.
The most common advantages are:

- Additional vigorous plants
- Enhanced disease resistance
- Improved crop yields
- Increased taste of fruits and vegetable.

CHAPTER 18 : Social Activities – Any Activates Planned By Students e.g Teaching Learning activities, awareness camp, business idea for SELF HELP GROUP OR ANY OTHER

CASE STUDY : Reducing Social Isolation Through Virtual Group Activity

Project Description

Well Connected and Well Connected Español, Covia Community Services, are a community of participants, staff, facilitators, presenters, and other volunteers who value being connected. 365 days a year, groups meet via phone or web conference for 80+ weekly activities. The primary audience includes English- and Spanish-speaking older adults (60+) living anywhere in the United States.

Socialization Modality

Video Chat, Audio Chat, Art, Games, Exercise, Music, Facilitated Communications and Conversations.

System Embodiment

Participants access Well Connected and Well Connected Español utilizing their own devices, including tablet, desktop computer, laptop, all-in-one computer, captioned phone, smartphone, voice activated assistant technology, or landline.

Fig 18.1 Virtual Meeting

Business Model

No cost to consumer – The Well Connected programs are funded by Covia with additional financial support from individual donors and foundations.

Business model is well defined and all things was interacted by one zoom meeting that is already seen in fig 18.1.

Implementation Approach

Well Connected and Well Connected Español offer over 80 activities each week, covering a range of topics, including art, history, music, museum tours, armchair travel talks, lectures, brain health classes, yoga, meditation, philosophy, support groups, games, and much more. All activities are accessible via phone and/or web conference.

Older adult participants call to register and then receive an updated catalog of offerings. They are welcome to join as many calls as they would like. Additionally, the majority of our facilitators are participants themselves so we welcome dual-involvement in the community, to create the largest impact on one's sense of connectedness. We also partner with our sister program, Social Call, to pair people for individual weekly phone visits.

In addition to individuals joining the Well Connected programs, residential staff or activity coordinators can host a selection of group events as a group activity. This is an affordable and easy way to increase wellness offerings and engage residents.

Outcomes

Reduce Social Isolation; Reduce Feelings of Loneliness; Reduced Depression; Increased Resident Engagement and Satisfaction; Increased Social Networks; Increased Quality of Life; Increased Staff Efficiencies

Well Connected participants self-reported the following impacts of the program:

- 83% increased intellectual stimulation.
- 76% increased social connections.
- 63% improved mental health.

Challenges and Pitfalls to Avoid

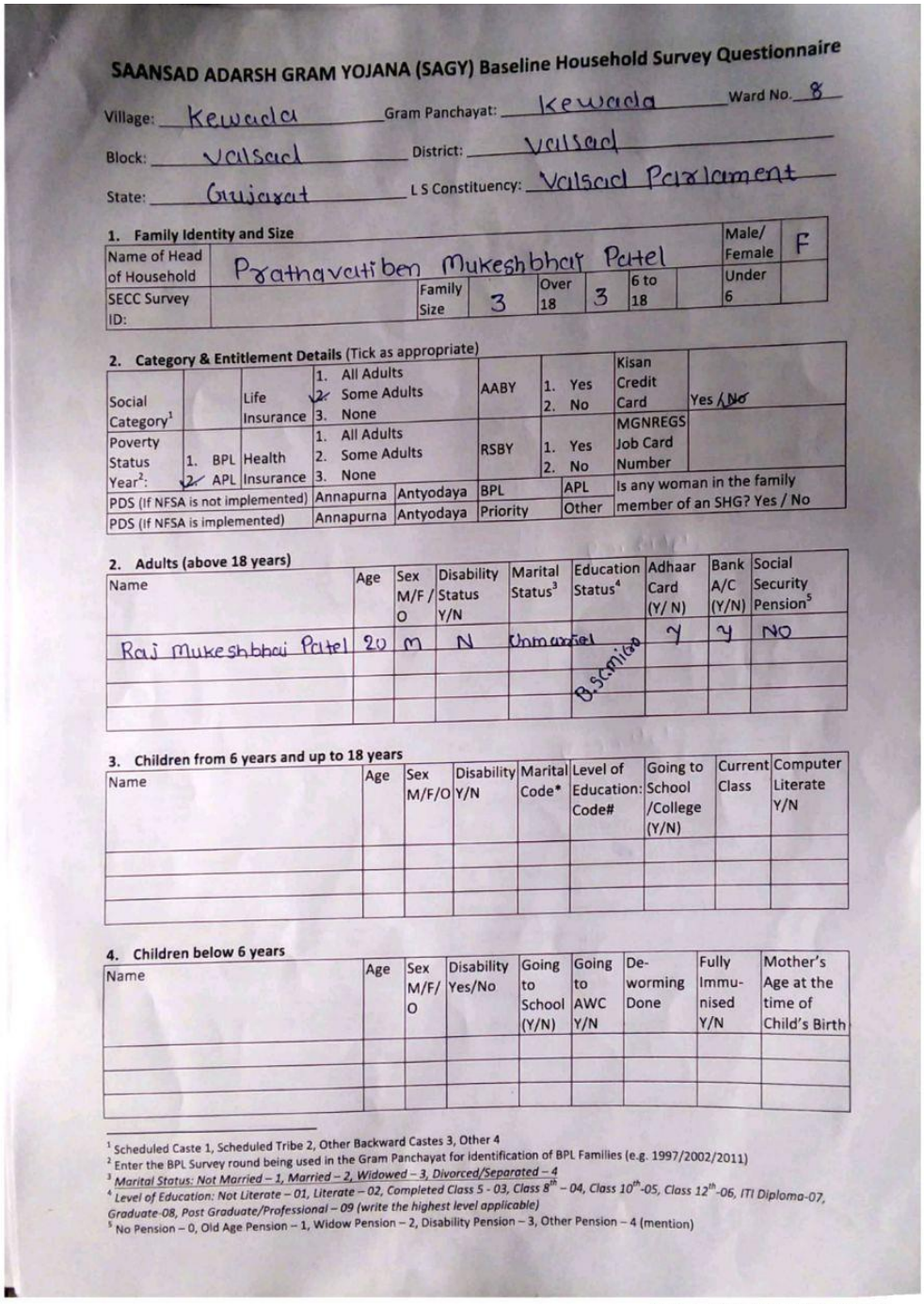
In some ways, virtual communities have their own social norms. Nonverbal behavior must be adapted for the phone, so everyone can feel heard and welcome. We have community guidelines to help with that and we work one-on-one with participants and facilitators to ensure the program is a good fit. If you are considering referring a participant to Well Connected, the ideal candidate is over 60, able to participate in a group social setting, and interested in connecting with peers.

In addition, like in-person events, it can be difficult for individuals to try something new. Participants who have a friend or staff join them for the first call or two have an easier time engaging in future virtual group activities. If one group or topic isn't a good fit, just try a different one!

Lessons Learned/Advice to Share with Others

Some activity coordinators feel hesitant to promote a virtual activity program, as the first response is, "But I want residents to come out of their apartment!" We hear you; we want that too. We have learned (and research proves) that chronic feelings of loneliness can create distrust of others, people respond to that distrust in a way that confirms one's suspicion, and thus, the cycle continues. It is imperative that we offer many creative opportunities for individuals to engage in social connection so that we can break that cycle. We find, once an individual gets a taste of healthy social connections, they want more. They begin to seek other opportunities within the residence or in their local community. In addition, we have activities that are perfect for group engagement in your community room. If your goal is to increase resident engagement, we'll help get you there.

CHAPTER 19 : <<ALLOCATED VILLAGE>> SAGY Questionnaire survey form with the Sarpanch Signature (Scanned copy attachment in the soft copy report and original copy in hardbound report)



SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Kewada Gram Panchayat: Kewada Ward No. 8

Block: Valsad District: Valsad

State: Gujarat L S Constituency: Valsad Parliament

1. Family Identity and Size

Name of Head of Household	Prathavetiben Mukeshbhai Patel							Male/ Female	F
SECC Survey ID:		Family Size	3	Over 18	3	6 to 18		Under 6	

2. Category & Entitlement Details (Tick as appropriate)

Social Category[1]		Life Insurance	1. All Adults 2. Some Adults 3. None	AABY	1. Yes 2. No	Kisan Credit Card	Yes / 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]
Raj Mukeshbhai Patel	20	M	N	Unmarried	B.Sc.Mic	Y	Y	NO

3. Children from 6 years and up to 18 years

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

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)

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SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

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

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

7. Do members take Regular Physical Exercise

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

8. Consumption of Tobacco

	Smoking	Chewing
Adults	NO	NO
Children	NO	NO

9. House & Homestead Data

Own House: ~~Yes~~ ✓ / No	No. of Rooms: 4
Type: Kutcha / Semi Pucca / ~~Rucca~~	
Toilet: Private / Community / Open Defecation	
Drainage linked to House: Covered / Open / None	
Waste Collection System NO	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	150.43
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
Mangoes	24 tonnes	24

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

NO

19. Do children play musical instrument (mention)

NO

Schedule Filled By: Narendra Tarsariya
Principal Respondent: Mukesh bhai Patel
Date of Survey:

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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: Kewada
b. Block: Valsad
c. District: Valsad
d. State: Gujarat
e. Lok Sabha Constituency: Valsad Parliament
f. Number of Wards in the Gram Panchayat: 1
g. Number of Villages in the Gram Panchayat: 1
h. Names of Villages: Kewada

Demographic Information

Number of Households 350 Total Population 1027 Male 530 Female 497

SC HHs 30 ST HHs 380 OBC HHs – Other HHs –

I. Access to Infrastructure / Facilities / Services

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
a.	ANM/ Health Sub Centre	NO	3km Gundlav
b.	Nearest Primary Health Centre (PHC)	NO	Mota vashachhia
c.	Nearest Community Health Centre (CHC)	NO	–
d.	Nearest Post Office	NO	2 Km Gundlav
e.	Nearest Bank Branch (Any)	NO	2 km Gundlav
f.	Nearest Bank with CBS Facility	NO	2 Km Gundlav
g.	Nearest ATM	NO	2km Gundlav
h.	Nearest Primary School	Yes	-
i.	Nearest Middle School	NO	2.5 km Saron
j.	Nearest Secondary School	NO	2.4 km Vejalpore
k.	Nearest Higher Secondary School / +2 College	NO	2.4km Vejalpore
l.	Nearest Graduate College	NO	4 km valsad
m	Nearest ITI / Polytechnic Centre	NO	4.8 km Lilapore
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	N	
p	Nearest Agro Service Centre		
p	MSP based Government Procurement Centre	N	
q	Milk Cooperative /Collection Centre	Y	
r	Veterinary Care Centre		
s	Ayurveda Centre	N	
t	E – Seva Kendra	N	
u	Bus Stop	N	2km Gurellav
v	Railway Station	N	4km valsad
w	Library	N	
x	Common Service Centre	N	

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total 0 Public 0 Private 0

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

V. Education, ICDS

a. Number of Angan Wadi Centres: 2

b. Number of villages without Angan Wadi Centres 0

Names of such villages: –

c. Schools (Number)

Primary Private: – Primary Govt.: 1

Middle Private: – Middle Govt.: –

Secondary Private: – Secondary Govt.: –

Higher Secondary Private: – Higher Secondary Govt: –

VI. Public Distribution System

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

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

VII. Coverage of Villages under different Facilities & Services

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

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	150.43	d.	Pasture / Grazing Land	–	g.	Check Dam	
b.	Irrigated Land	150.43	e.	Forests/ Plantations	–	h.	Wells/Bore Wells	6
c.	Un-irrigated Land	–	f.	Other Common Land		i	Tanks /Ponds	2 Pond 7 Tanks

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

3

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Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire
(Note: Please aggregate information from village level questionnaires wherever relevant)

IX. Parameters relating to Households & Institutions

		Number
a)	Number of eligible Households for pension (old age, widow, disability)	25
b)	Number of Households receiving pension (old age, widow, disability)	40
c)	Number of eligible Households who are not receiving pension	-
d)	Number of Households eligible for Ration Card	All
e)	Number of eligible HHs having ration cards	All
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	300
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	-
h)	Number of active Job Card holders under MGNREGA	25
i)	Number of Job Card holders who completed 100 days of work during 2013-14	300
j)	Number of shops selling alcohol	0
k)	Number of BPL families	50
l)	Number of landless households	100
m)	Number of IAY beneficiaries	-
n)	Number of FRA[2] beneficiaries	-
o)	Number of Community Sanitary Complexes	All
p)	Number of Households headed by single women	-
q)	Number of Households headed by physically handicapped persons	2
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	0
w)	Number of Bharat Nirman Volunteers	0

Name and Signature of Surveyor and Respondent'

Surveyor	PRI Respondent (Preferably Gram Panchayat Chairperson)	P.M. Patel. સરપંચ ગ્રામ પંચાયત કેવાડા Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	15/6/2021 Date of Survey

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

4

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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: Kewada
b. Ward Number: 8
c. Gram Panchayat: Kewada
d. Block: Valsad
e. District: Valsad
f. State: Gujarat
g. Lok Sabha Constituency: valsad Parliament
h. Number of Habitations / Hamlets in the Gram Panchayat: 1
i. Names of Habitations / Hamlets: Kewada

Demographic Information

Number of Households 350 Total Population 1027 Male 530 Female 497

SC HHs 30 ST HHs 380 OBC HHs - Other HHs -

II. Access to Infrastructure/Amenities etc.

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
a.	Nearest Primary School	Yes	
b.	Nearest Middle School	NO	2Km Gundlav
c.	Nearest Secondary School	NO	2Km Bordavadi
d.	Kisan Seva Kendra	NO	7Km Valsad
e.	Milk Cooperative /Collection Centre	Yes	
g.	Health Sub Centre	NO	3Km Gundlav
h.	Bank	NO	3Km Gundlav
i.	ATM	NO	3Km Gundlav
j.	Bus Stop	NO	2Km Gundlav
k.	Railway Station	NO	7Km Valsad

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

1

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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	7km Valsad
m	Common Service Centre	-	-
n	Veterinary Care Centre	No	7km Valsad

ii. Road Connectivity

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

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

iii. Drinking Water Facilities

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

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

b.Hand Pump Coverage in Habitations: 25 *(1-All 2-None 3-Some)*

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

iv. Coverage of Habitations under Waste Management System

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

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

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

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

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

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

v. Coverage of Habitations under Electrification

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

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

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

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

vi. Sports Facilities in the Village

a.Number of Play Grounds in the Village (minimum size 200 square meters): 0

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

vii. Education, ICDS

a. Number of Anganwadi Centres: 2

c. Schools (Number)

Primary Private: - Primary Govt.: 1

Middle Private: - Middle Govt.: -

Secondary Private: - Secondary Govt.: -

Higher Secondary Private: - Higher Secondary Govt: -

2

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SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

viii. Land Category		Area in Acres		Land Category	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	150.43	d.	Pasture / Grazing Land		g.	Check Dam	
b.	Irrigated Land		e.	Forests/ Plnatations		h.	Wells/Bore Wells	6
c.	Un-irrigated Land		f.	Other Common Land		I	Tanks /Ponds	2/7

ix. Entitlement Related Parameters		
1	Number of active Job Card holders under MGNREGA	25
2	Number of active Job Card holders who have completed 100 days of work	300
3	Number of shops selling alcohol	0
4	Number of BPL families	50
5	Number of landless households	100
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	0
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)	P.M Patel. સરપંચ ગ્રામ પંચાયત કેવાડા Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	15-6-2021 Date of Survey

3

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CHAPTER 20 : TDO-DDO-Collector email soft copy attachment in the report

Development scenario of Kewada village, Valsad
1 message

narendra tarsariya <narendratarsariya2000@gmail.com> Fri, 25 Jun 2021 at 12:47 pm
To: collector-val@gujarat.gov.in, ddo-val@gujarat.gov.in, tdovalsad@gujarat.gov.in
Cc: dtbarot@gecv.ac.in, Vishwakarma Yojana <rurban@gtu.edu.in>

Respected Sir/Madam

We are the students of Government Engineering College, Valsad affiliated to Gujarat Technological University-GTU. GTU have been assigned to Vishwakarma Yojna-VY in which students surveys various village and Designs various amenities. To Deliver it to Village and to make village ideal for living better life as per requirements & village problem statements.

As a part of Vishwakarma Yojana's guidelines, we have asked to inform all the respected officers about our project in which we have shortly notified about Kewada Village profile issues for development and our design work for them which is as given below.

Village : Kewada		**Population : 1027 (As of census 2011)**
Civil Designs		
Key issue	**Remark**	**Design given**
Anganwadi condition	Kewada village consists two anganwadies one of which was not in good condition and required redesign.	Anganwadi Redesign
Transportation	Village don't have bus stop also. So proper shed for to stay or to wait for bus habilitation is not there. In some seasons like monsoon and summer people feels very much inconvenient during departure into bus.	Bus stop
Irrigation	Irrigation problem is general for every place. Kewada village already have two ponds and still scarecity of pond and also water problem during some seasons.	Pond
Administration	One village should have better administration facility. Kewada already have one Panchayat office which is very old and some part of that is not in working condition.	Panchayat Office
Open Defecation	Open defecation is general problem for every village and the main reason also for to spread various diseases. So it's need to stop this all for to make one healthy village.	Public Toilet
Rain water harvesting	Now in this era water crisis is very much common for all places. Kewada village also have this problem during some season or can say for some times.	Underground water tank
Electrical Designs		
Key issue	**Remark**	**Design given**
Damaged street light	During the survey, with help of visual inspection it was identified that Street lights were in damaged condition and on some roads, street light was not installed.	Solar street light
Only three phase power supply	Famers told their problem that three phase power supply is only available for 8 hours a day and single-phase power is available for rest of the day, so the water pump can only run for the power supply availability hours and the power supply availability scheduled	Single phase to three phase converter

	is changes every week, So, during the night schedule, Farmers have to stay awake whole night for watering the crops. Which was a problem which can be technically solved.	
Wastage of water	There is a big wastage of water, electricity as well as man power, in current irrigation system, because currently the whole process is manual and open loop.	Smart irrigation system
Anganwadi	According to civil design of Anganwadi electrical layout of Anganwadi	Electrical layout of Anganwadi
Bus Stop	According to civil design of Bus stop electrical layout of Bus stop	Electrical layout of bus stop
Panchayat Office	According to civil design of Panchayat office electrical layout of Panchayat office	Electrical layout of Panchayat office

Civil Designs			
Sr.No.	**Design Name**	**Amount Expenditure**	**Benefit**
1	Anganwadi	Rs. 3,83,000	Best education with facilities the children of village will get.
2	Bus stop	Rs. 1,10,500	Better arrival and departure facilities
3	Pond	Rs. 66,500	Irrigation
4	Panchayat office	Rs. 4,19,000	Better administration
5	Public toilet	Rs. 4,81,000	Open defecation free village
6	Underground Water tank	Rs. 1,35,500	Rain water harvesting
Electrical Designs			
Sr.No.	**Design Name**	**Amount Expenditure**	**Benefit**
7	Automatic intensity controlled solar street light	Rs. 90,000	Improve the existing condition of solar street
8	A.C. to A.C. converter - Single phase to three phase	Rs. 1,900	Water pump can be driven for 24 hours instead of 8 hours
9	Touch screen based automation system	Rs. 2,200	Automatic watering system
10	Smart solar based irrigation system	Rs. 9,000	Electrical layout of anganwadi
11	Piezoelectric speed breaker electricity generator	Rs. 3,000	Electrical layout of bus stop
12	Intelligent water level indicator with controller	Rs. 800	Electrical layout of Panchayat office

Please find here with attached,

1.Detailed Project Report Of Kewada Village

Best Regards,

Narendra Tarsariya (U.G.,Civil Engineering)

Ruchit Popat (U.G.,Electrical Engineering)

Government Engineering College, Valsad.

Gujarat Technological University

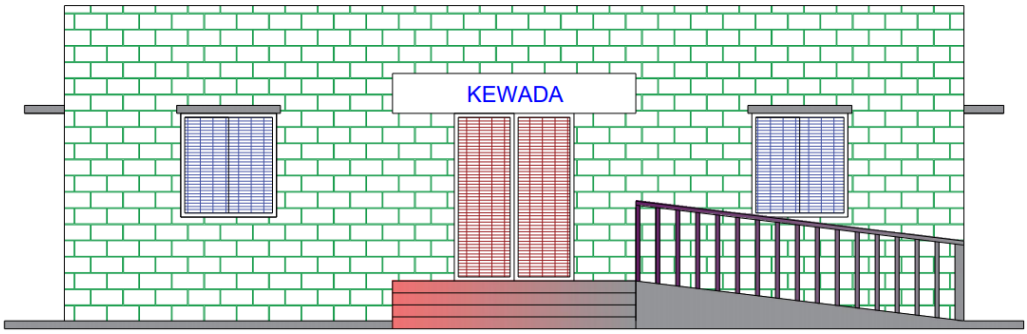
Mail: narendratarsariya2000@gmail.com

Mail: ruchitspopat@gmail.com

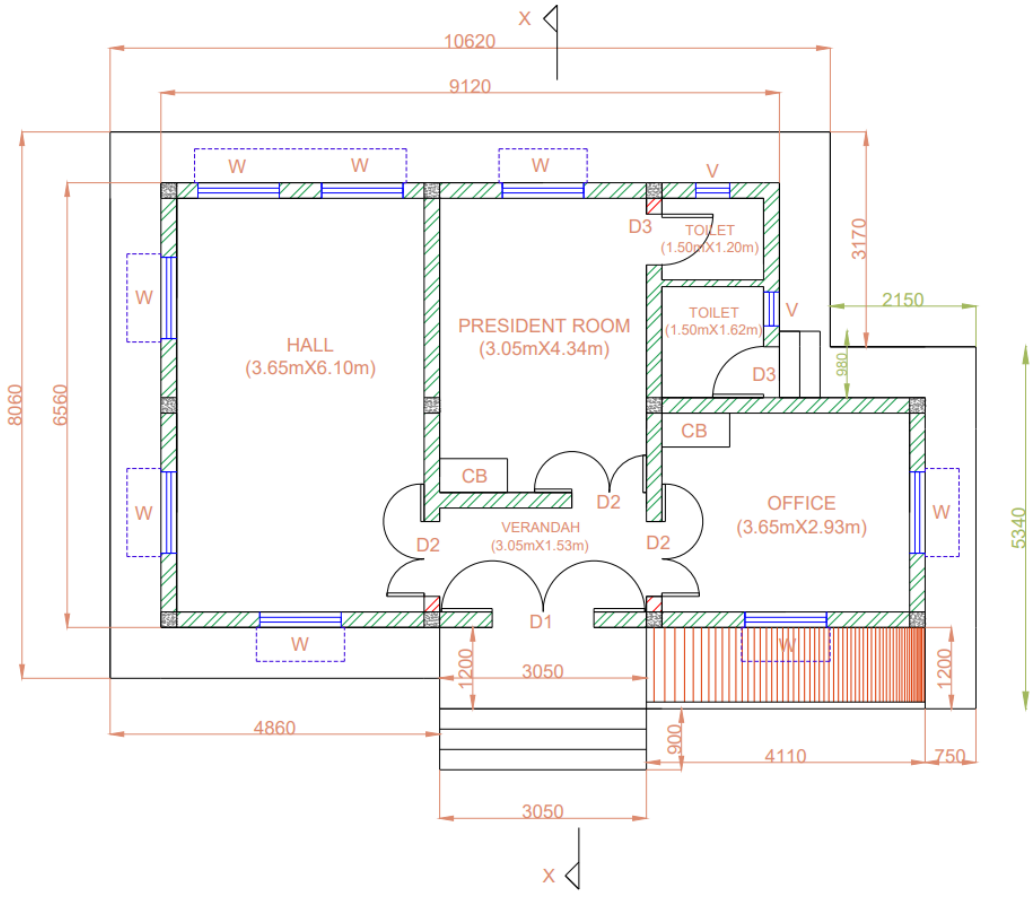
CHAPTER 21 : Comprehensive report for the entire village

21.1 Civil Designs

Design of Panchayat Office

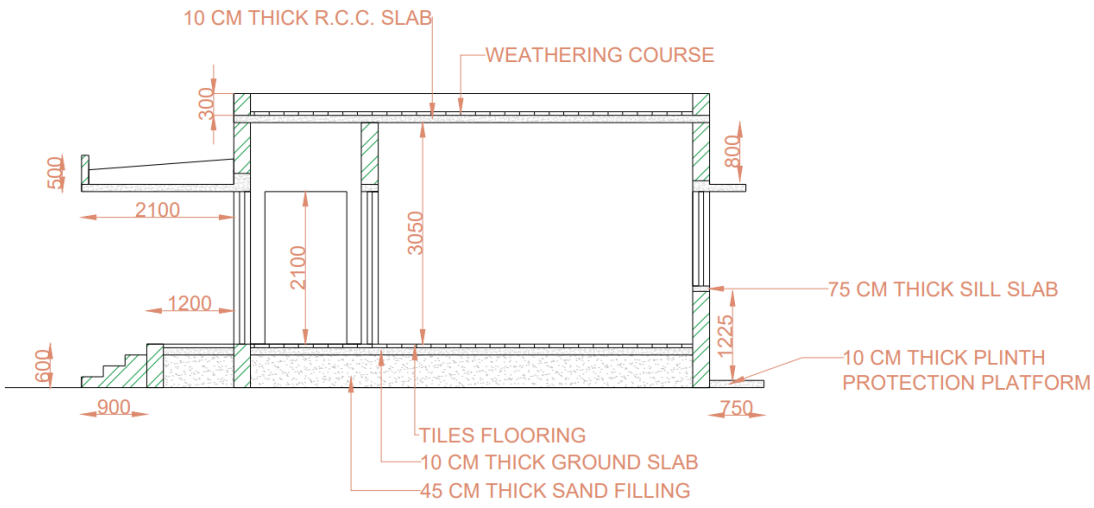


Front Side Elevation



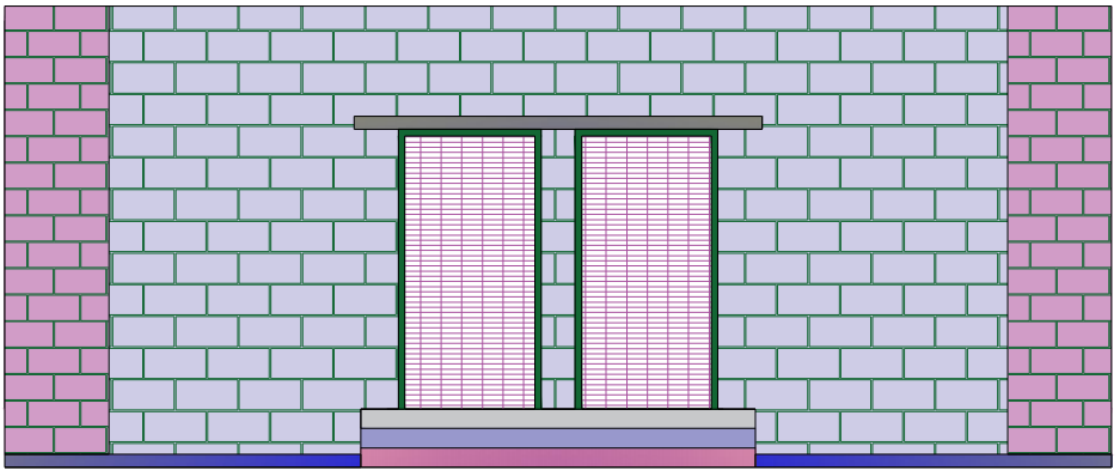
All dimensions are in mm

Ground Floor Plan



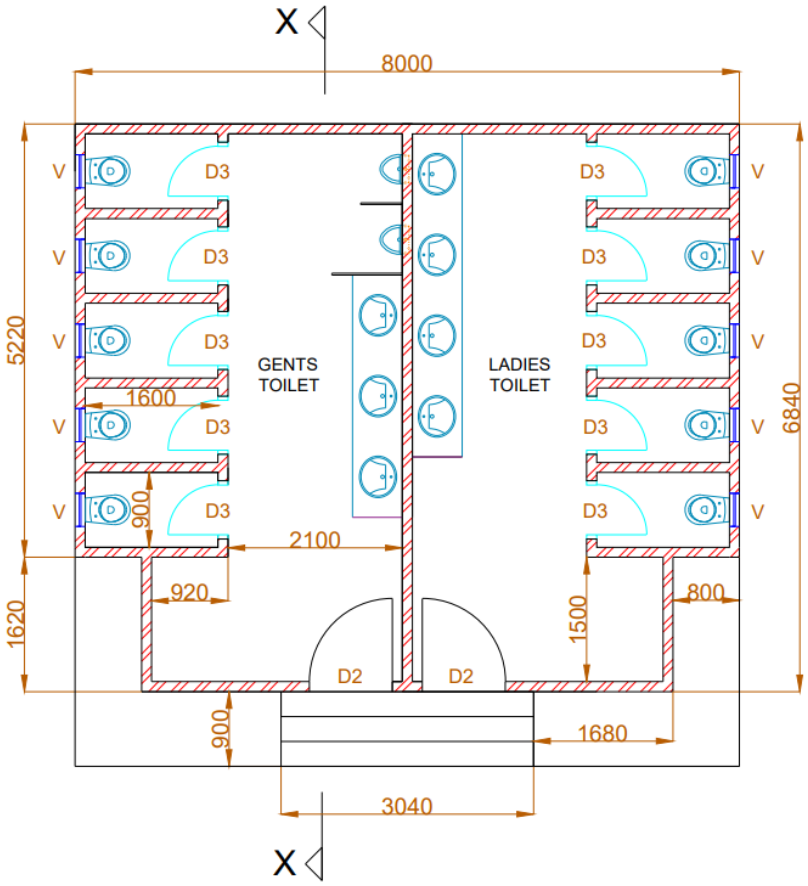
Section X-X

Design of Public toilet

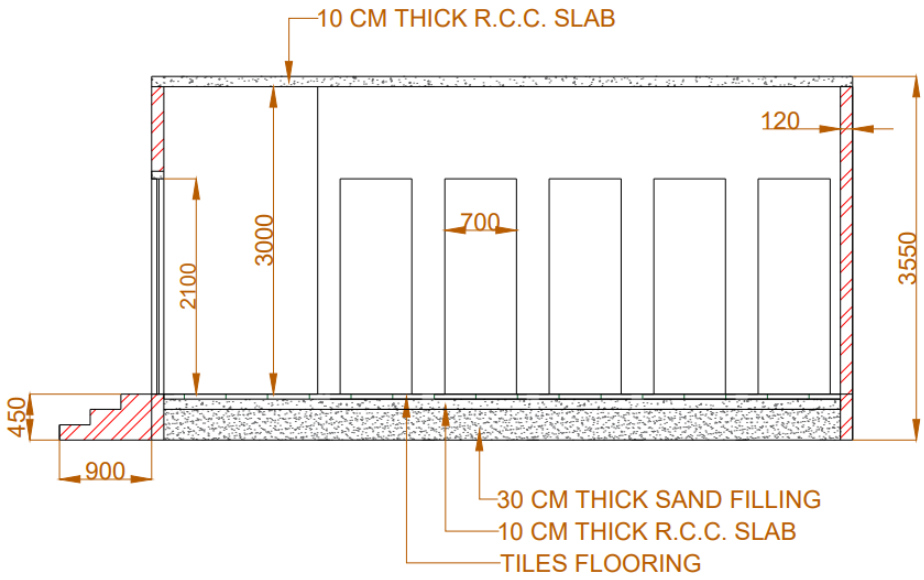


Front Side Elevation

All dimensions are in mm



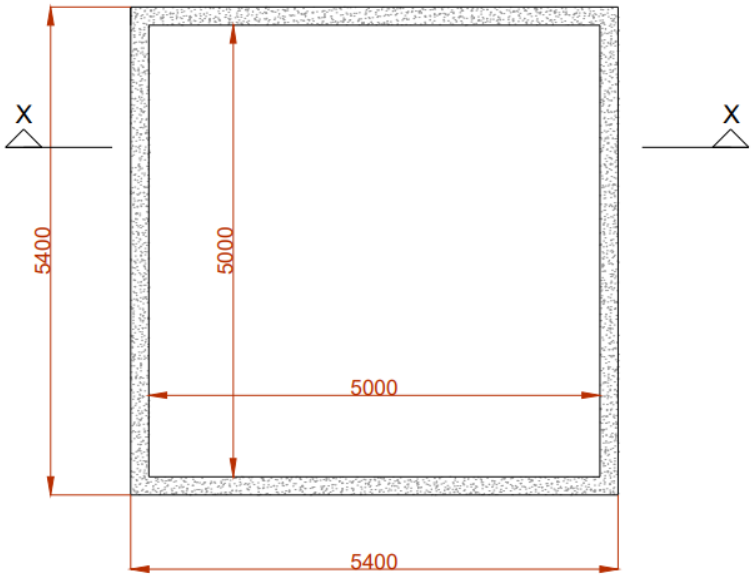
Ground Floor Plan



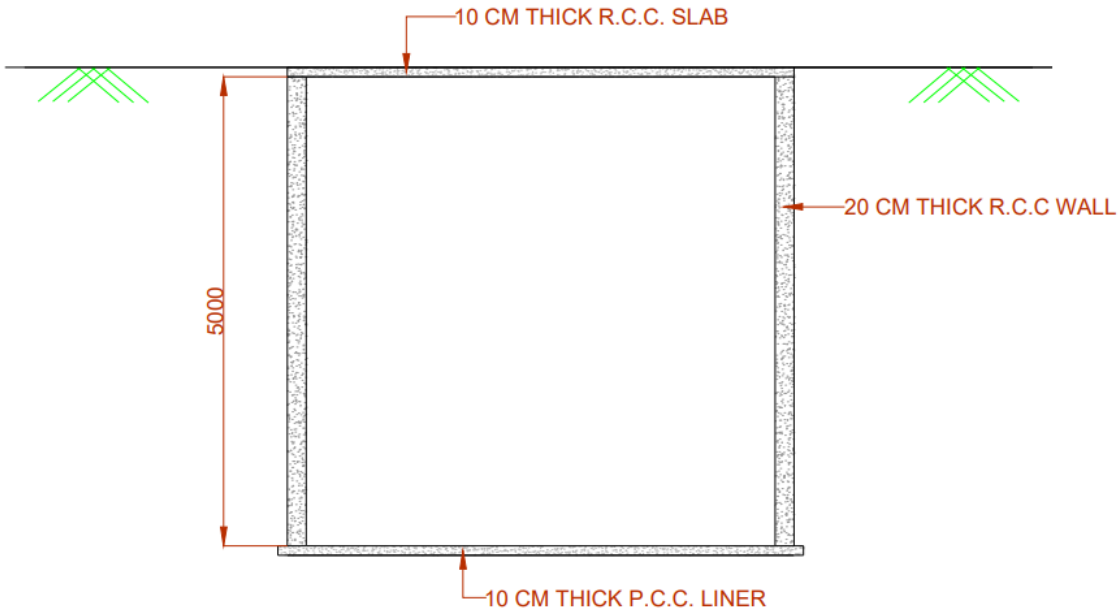
Section X-X

All dimensions are in mm

Design of Underground Water Tank



Plan

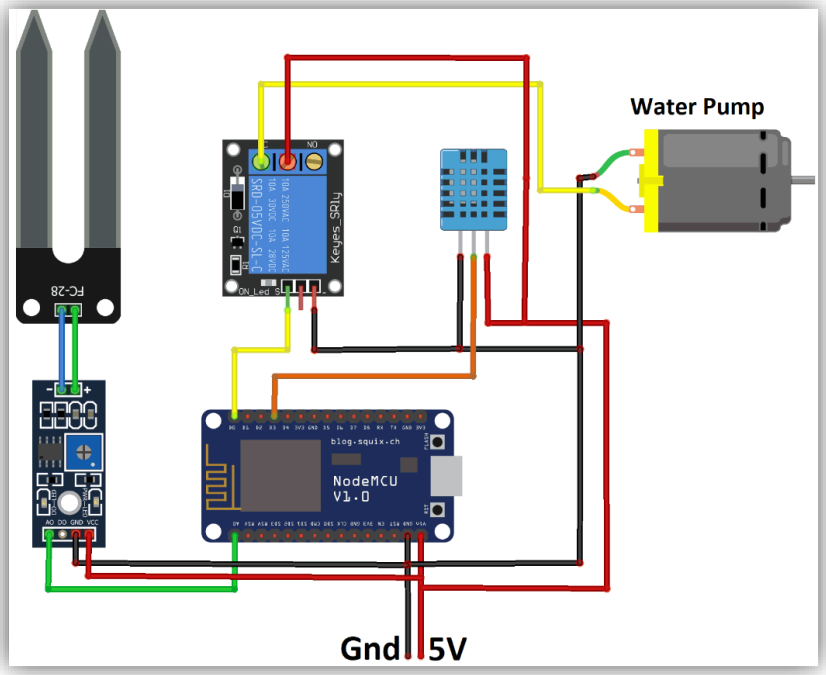


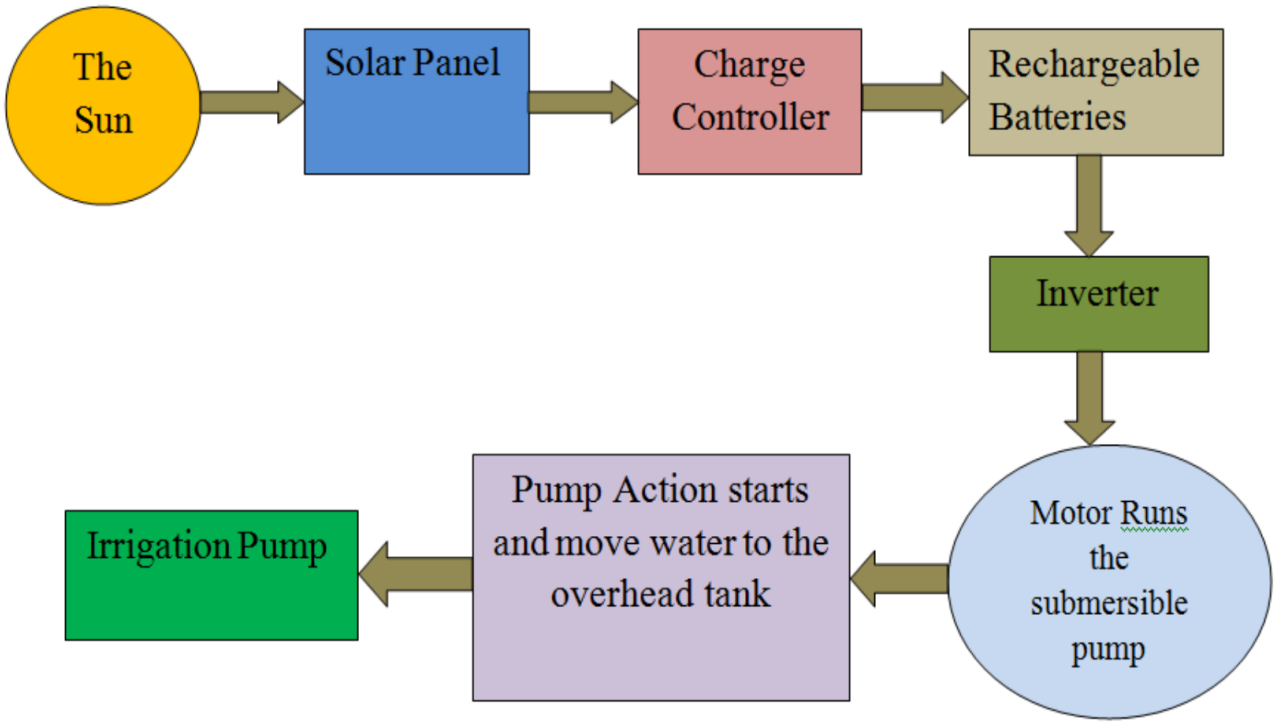
Section X-X

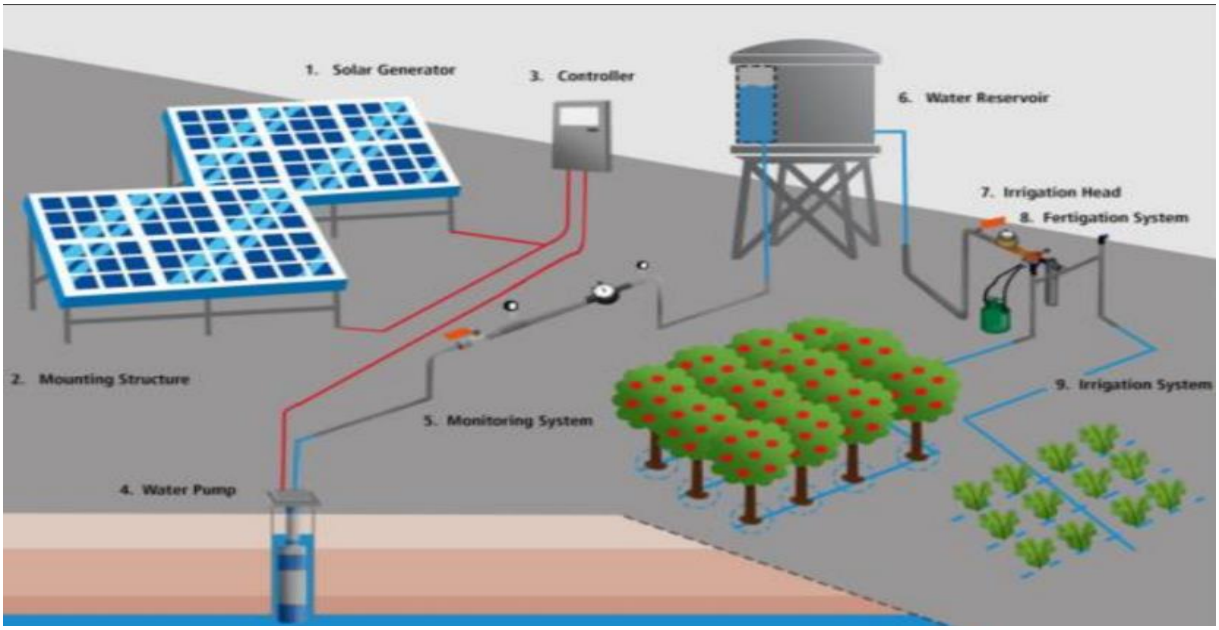
All dimensions are in mm

21.2 Electrical Designs

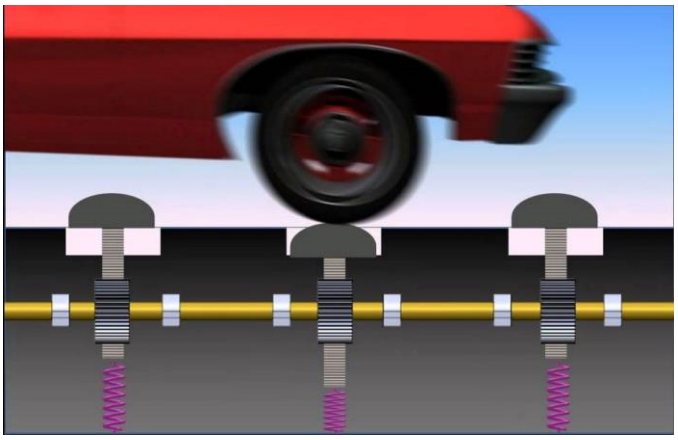
Electrical Design for Smart Solar based Irrigation System

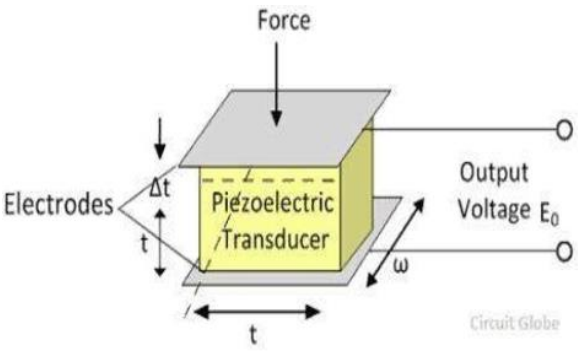


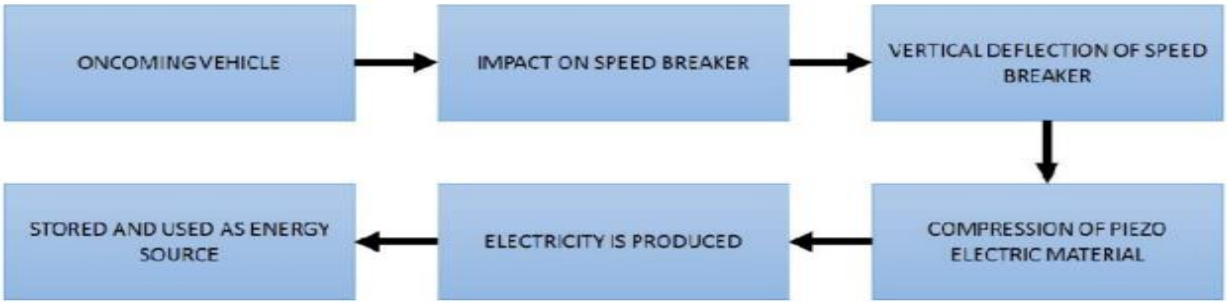




Electrical design for Piezoelectric Speed Breaker Electricity Generator







Electrical Layout design for Intelligent water level indicator with controller