DETAIL PROJECT REPORT

VISHWAKARMA YOJNA: VIII
AN APPROACH TOWARDS RURBANISATION
VANKAL Village

SURAT District

PREPARED BY

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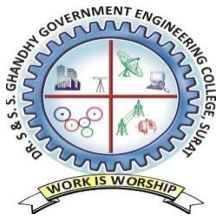

YEAR:2020-21

GUJARAT TECHNOLOGICAL UNIVERSITY
Chandkheda, Ahmedabad– 382424 Gujarat

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CERTIFICATE

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

Detail Project Report for,

VILLAGE: VANKAL

DISTRICT: SURAT

Under

Vishwakarma Yojana: Phase-VIII

In partial fulfillment of the project offered by

GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA

During the academic year 2020-21.

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

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ABSTRACT

"Vishwakarma Yojana: An Approach towards Rurbanisation" is a scheme launched by government of Gujarat for development of villages, which is implemented by GTU. "Design to Delivery" solution for development of villages in 'City' areas will be provided by Vishwakarma Yojana. Vishwakarma Yojana is one of the approaches to reduce urban city pressure and lower the migration rate by developing village with a RURAL SOUL but with all URBAN AMENITIES that a city may have.

According to Census 2011 information the location code or village code of Vankal village is 523848. Vankal village is located in Mangrol Tehsil of Surat district in Gujarat. It is situated 10km away from sub-district headquarter Mangrol and 75km away from district headquarter Surat. As per 2020 stats Vankal village is also a gram panchayat. The total geographical area of village is 1080.74 hectares. Vankal village has a total population of 6390 peoples with 1410 houses.

It is said that for overall development of a country and to raise its economy its necessary to increase its literacy rate. So Vankal village have eight Anganwadi and one Primary schools. Gujarat is the state where the villages are connected with 24 hours of electricity and Vankal is one of that villages. Vankal village have one ponds it used for drinking and irrigation purpose. In Vankal village people have various modes of earning like they for farming, labour and hence earns to their basic necessity. Vankal gets the water for farming and irrigation facilities.

House without toilet is not good for the health of people but here in this village it is not having the public toilets also which is dangerous from the hygiene purpose. village is a sub-PHC and within 5km range, so health related problems can be solving within short period of time. The internal roads in village are badly affected during rainy season and hence its repair and maintenance is required.

Now we are planning to provide designs like biogas plant, skill development centre, public toilet, village gate, soak pit, bus stop. The Vankal village is surveyed, data has been analysed for the village and an Infrastructure facility has been found out by this Yojana with the help of UDPFI guidelines.

Key Words: -

- Rurbanisation
- Sustainable development

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

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ABBREVIATIONS

SHORT NAME / SYMBOL	FULL NAME
TDO	Taluka Development Officer
DDO	District Development Officer
NRI	Non-Residents Indians
UDPFI	Urban Development Plans Formulation and Implementation
SWOT	Strength Weaknesses opportunities Threats
PHC	Primary Health Center
WBM	Water Bound Macadam
ICT	Information and communications technology
CSS	Central Sponsored Scheme
DGVCL	Dakshin Gujarat Vij Company Ltd.
IAY	Indira Awas Yojana
NH	National highway
RTI	Right to Information

Chapter1. Ideal village visit from Surat District of Gujarat State

1.1. Background & Study Area Location

Ena village is located in the district of Palsana taluka Surat. This village is also known as the NRI village because the village's development, particularly complete reinforcement, is accomplished with the help of funds provided by the NRI members of each village resident family. The entrance gate at the village door attracts the more at the very first sight. There are many other facilities like a Primary Health Centre, a Primary school and two Secondary schools, a Gramin bank etc. in the village.

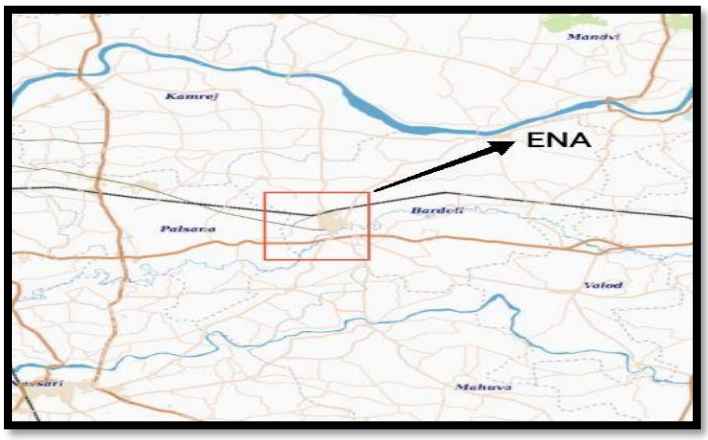


Figure 1-1: Study area, Ena (1)

A panchayat is located in Gujarat State's Palsana taluka, Surat district, India. The Ena's geo-coordinate is the latitude 21.1013846 and longitude 73.0361003. It is 6 km from Palsana sub-district headquarters and 25 km from Surat district headquarters. The village's total geographic area is 621,93 hectares.

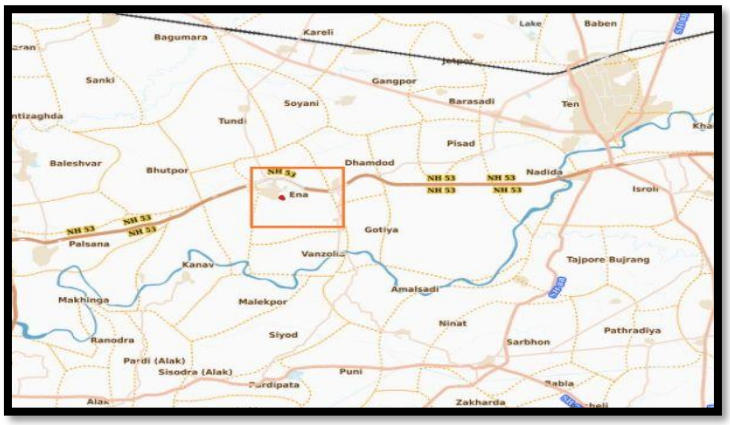


Figure 1-2: Study area, Ena (2)

Figure 1-3: Study area, Ena (3)

1.2. Concept: Ideal Village, Normal Village

Currently, about 70 percent of the country's total population lives in villages. People are migrating to better opportunities and luxurious life from rural to urban areas. Because of these factors, the rate of migration is increasing, resulting in various problems in urban areas, such as the lack of land availability to live in slums, etc. However, the development of these areas is very important as the development of these areas is compulsory for the nation's overall economic growth. The concept of an ideal village is therefore important in order to enhance rural India's needs.

1.2.1. Objectives

- To prevent the migration of anxiety from rural to urban areas, thereby reducing urban pressure.
- Making the village a hub for attracting resources to develop other villages in its vicinity.
- To make it easier, cheaper and faster for agricultural production or other marketable products produced in such villages to access urban markets.
- To contribute to social empowerment through involvement of all sections of the community in the task of village development.
- Create and maintain a cooperative culture of living for inclusive and rapid village development.

1.2.2. Example/Live Case Studies of Ideal Village of India/Gujarat/ Punsari

Punsari is in Gujarat's Himmatnagar. This village offers Wi-Fi connectivity, air-conditioned primary schools equipped with CCTV cameras and cooks preparing midday meals. All the streets in the village have concrete roads, people get chilled mineral water for drinking and there is an independent public transport system. The village is now readying for a high-profile visit of the additional secretary of the Union government to study this model so that it can be replicated across 640 districts in India.

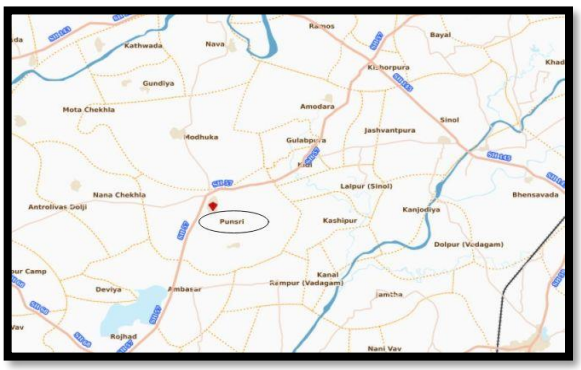


Figure 1-4: Case study area, Punsari (1)

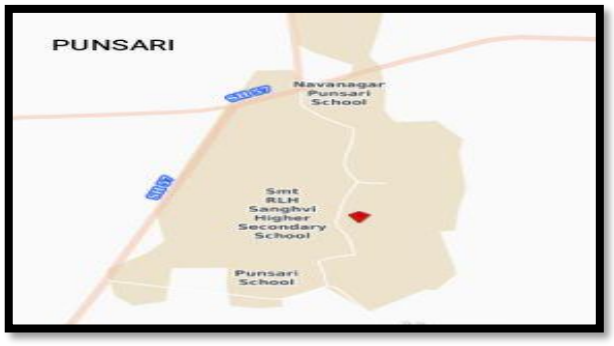


Figure 1-5: Case study area, Punsari (2)

Punsari has won national as well as state awards for Best Gram Panchayat in 2011. Punsari makes a perfect case study as the village has not benefitted from NRIs and has instead relied solely on funds from central and state-sponsored developmental schemes in the past eight years.

The village panchayat pays an annual premium of Rs 25 lakh against insurance for each of the 6,000 villagers who have a cover of Rs 1 lakh and a mediclaim policy of Rs 25,000. The schools have zero dropout rates since 2006 and a reverse osmosis plant supplies 20-litre cans to houses for a token amount of Rs 4.
The village panchayat had a capital of Rs 25,000 seven years ago. Today, the deposits have soared to Rs 45 lakh. “The model can be easily replicated in India. It only takes smart planning, dedicated people participation and a non-corrupt system,” says Patel.

1.2.3. The idea of model/Smart village

1) Connectivity

- Physical connectivity through better roads to towns and other places.
- Easy and low cost means of transport.
- Network digital and mobile.
- Increased connectivity by means of off-grid renewable resources.
- Connectivity to finance.

2) Community

- Participation in village development planning.
- Use planning resources with active involvement with the elected representative.
- Monitor the use of government funds to enhance accountability.
- Influencing both personal and community behavior.

3) Sustainability

- Better health – more maternal and child health concerns.
- Practical and intelligent education.
- Housing and improved living.
- Building capacity of all stakeholders.
- Clean water and hygiene facilities.
- Sustainability of the environment.

4) Technology

- Delivery between villagers of government services.
- ICT and space technology in farmers ' assistance.
- Remote sensing of existing assets for resource mapping and better utilization.
- Land's modernization records.

A progress of one of these areas could have an effect across other areas as well. For example, technology could be used to improve the quality and delivery of other services such as health, education and farming, which in turn contributes to sustainable development. Similarly, the use of renewable energy, apart from meeting energy needs, also contributes towards environmental sustainability. Village tree plantation drives could encourage community participation, benefit the environment, prevent soil erosion and benefit agriculture, conserve water, and finally contribute to the aesthetics of the village. A number of these initiatives have already been taken in different parts of the country, but most of them have been attempted in isolation. The urgent need is to bring about a convergence of all such initiatives, for which 2 things would be essential

a) grassroots level planning
b) mobilization of resources.

Resources available in Ideal Village

1. **Funds under existing schemes** across various sectors such as health, education, Skill development, livelihood etc. could be utilized, and based on the specific demands of the village; resources could be channelized into the development of the village. Some important Centrally Sponsored Schemes (CSS) which could be utilized are NRLM, NHM, SSA, NREGA, BRGF, RKVY and Mid-Day Meal Scheme.

2. **MPLAD** funds (Rs 5 crore per year) could be utilized for the construction of high quality, sustainable assets such as school buildings, hospitals, Anganwadi Centers and school kitchens for Mid-Day meals. Funds could also be channelized into road construction, and the construction of toilets in schools and homes, particularly for girls.

3. **CSR** funds, of which a much larger corpus is available after the latest amendment to the Companies Act, could also be used for the purpose of infrastructure development in the constituency.

4. **Self-help groups**, who are eligible for subsidized loans under various Central and State government initiatives

5. **Gram Panchayats** could also raise loans, if legally permitted to do so under the State Panchayati Raj Acts like in the case of Kerala.

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

The village in India, where life was once portrayed as 'unchanging' and 'idyllic', has in recent decades seen profound changes. The twin shackles that once decided matters for India's villagers, caste and agriculture, no longer exercise their vigorous hold. While a break in caste rigidities has fostered greater fluidity in occupational choices, agricultural stagnation has ensured the constant march, in increasing numbers, of employable people in the villages towards urban areas. At the same time, vote bank politics means that parties and politicians continue to pay lip-service to the cause of villages, chiefly the poor farmer. It is in the light of these changes that the 'culture' surrounding agriculture and the village needs to be understood. While this culture is not altogether a stable one, its state of pronounced flux does hold out certain portents, whether these are understood by policy-makers and the vast majority of Indians, remains open to question.

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

Economic profile

Ena has a population of 51 % (1940) engaged in major or marginal works. Of these, the working population is 63% male and 40% female. Here, 59% of total male populations are major (full-time) workers and 4% are marginal (part-time) workers. For women, 35% of the total female population is the main population and 5% are marginal workers.

Social scenario / profile

Ena Gaam Parivar:

Established in 1985, the National Association of Enawalas acts as a grass roots organization as the individual purpose of creating a better standard of living for people in the village. The main goal at the start of the organization was to improve the Sardar Patel Vidyalaya

school. They were able to improve the school to one of the best schools in Gujarat from the donations of the villagers who immigrated abroad and the intense efforts of the residents in Ena together with the school staff. Highlighted by a senior faculty, a top-notch educational program that prepares students for higher education, a safe and reliable school bus system and the pride of one of the best crickets' fields in Gujarat. Today it serves a beacon of hope for younger generations and parents whose children are enrolled in it.

In 1988, the National Association of Enawalas and its members began a groundbreaking method of raising funds to enhance the school's efforts and also launched a program to improve the quality of water and an effective sewer system for the entire village. Many foreign and domestic residents ' efforts have contributed to the development and success of these programs.

The association decided to change its name for Seva USA, Inc. to Ena in 2007. Our organization Ena for Seva, USA is currently expected to be legally registered as a charity 503(C)(2). This meant any donation they would receive would be fully deductible to the extent permitted by U.S. laws.

In addition, Ena Keravani, an educational trust that operates the Sardar Patel Vidyalaya, has the authority of Reserve Bank of India to obtain foreign assistance (FERA-Foreign Exchange Regulation Act). Another trust that handles public works and village development for water, sanitation, etc. also has the same type of clearance (FERA) from the Indian Reserve Bank.

Their future goal for Ena for Seva is to preserve the next generation's heritage and culture. By inviting Indian experts and dignitaries, they achieve this goal by organizing the tour of India and holding educational, social and spiritual seminars and camps.

Physical & Demographical Growth

Ena is a village in the Surat district of Palsana, Gujarat. The village of Ena has a population of 3777, 1895 males, 1882 females and a total of 888 families residing as per 2011 population census.

In the village of Ena, there are 378 children aged 0-6 who make up 10.01 percent of the total village population. Ena village's average sex ratio is 993, higher than Gujarat's 919 state average. According to the 2011 census, the Ena child sex ratio is 871, below the Gujarat average of 890.

The literacy rate in Ena village is lower than in Gujarat. In 2011, Ena village's literacy rate was 74.43 percent compared to Gujarat's 78.03 percent. In Ena Male, literacy is 76.43 %, while female literacy is 72.45 %.

Table 1-1: Demographical Details of village Ena

Particulars	Total	Male	Female
Total No. of Houses	888	-	-
Population	3777	1895	1882
Child (0-6)	378	202	176
Schedule Caste	260	126	134
Schedule Tribe	2006	1022	984
Literacy	74.43%	76.43%	72.45%
Total Workers	1940	1191	749
Main Worker	1777	1777	0
Marginal Worker	163	73	90

Infrastructures facilities

The Ena village proves to be a model village because of the tremendous useful and efficient facilities. The village appeared to be enriched with many amenities such as a primary health center, a Gramin bank and a national bank, a primary school and 2 secondary schools, water tank, playground, etc.

The primary health center is well-conditioned with the basic medical test facilities and there are also good facilities for the patients being treated. The PHC also has the necessary accessories and is well organized and divided into different wards. The maternity ward is also made handy for emergency. The residents allocated their availability as quickly as possible to the doctors near the hospitals. There is also the provision of medical assistance to the needy at reasonable costs.

Both Gramin Bank and Indian State Bank are made useful to villagers for easy money transactions and banking along with providing ATMs.

Established in 1860, a primary school providing education from Std. 1 to 8 and with the Gujarati medium curriculum, a library for a splendid collection of books is also provided to provide students with effective and better education. The two high schools provide environment for Gujarati and English mediums to prepare the students to emulate the outer world. The teachers are well educated and trained to inform the student about new technologies and e-boarding.

Figure 1-6: Ena Cricket Ground

The village also has a water tank to purify the water from the source with well facilitated water distribution system throughout. This there is also a provision of solid waste collection along with it on daily basis and for their proper disposal dumping grounds are also created.

The villagers also brighten the sports sector. So village has a well-maintained playground where children come in mornings and evenings to play and practice. This also provides a platform for the district and state level cricket matches. Also, many efforts are made towards the maintenance of heritage and culture for second generation by promoting tourism in India, holding educational and social seminars and camps etc.

Figure 1-7: Ena Entrance Gate

Apart from these basic amenities another criteria for the ideal village criteria is its well-maintained RCC roads which makes the transportation easy, comfortable and fast within the village. The issue of water logging does not prevail because of these RCC road conditions. Also, the village has good aesthetic view because of regular sweeping and cleaning of roads. Also, to conserve electricity the street lightings are installed with solar panels.

Figure 1-8: Panchayat Building, Ena

During the meeting with few panchayat authorities it was known that the roads in the village are constructed and maintained using various government schemes. Also, information about the population was figure out. The population of the village is 3777 according to the Census 2011 out of which 1895 are males and remaining 1882 are females. There are 378 kids falling under the age of 0 to 6 years out of which 202 are boys and 176 are girls. The number of people earning are 1970 out of which 242 individuals are totally dependent on the agricultural income. Also, canals are available to increase the efficiency of agricultural output.

Figure 1-9: Panchayat Building, Ena (1)

Figure 1-10: Interaction with Panchayat Member

Figure 1-11: centre of attraction

1.4 SWOT analysis of ideal village/ Smart village

The Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis guides to identify the positives and negatives inside and outside of ideal village.

- **Strength**
  - Excellent electricity distribution with 24* 7 electricity availability.
  - Good public transport service and well-kept roads.
  - High density of population.
  - Increased level of comfort (70% of the houses are connected to the sewerage system and all have running water).
  - Urbanized rural area with a high standard of living, attractive and precious residence.
  - Connecting facilities to all major metropolitan area projects
- **Weaknesses**
  - The village's main weakness is insufficient facilities for people to receive advanced medical treatment as they have to travel to nearby towns or cities for better health care.
  - The village also lacks the industrial growth that indirectly affects the agricultural sector's output. This would decrease the opportunities for employment.
- **Opportunities**
  - In addition to the various facilities it owns that other Indian villages may not yet have the village offers a variety of other development opportunities.
  - As for the overall development of the village's children, there are also organized tours to different parts of the country.
  - Since two higher secondary schools are available, each child must have sufficient primary education.
  - As 24* 7 electricity distribution is available, more opportunities are available to develop the power-generated industry or plants. This results in an increase in the ratio of jobs.
- **Threats**
  - The village may suffer from few of the natural disasters which may prove threat to it. Like, because of the availability of a lot of agricultural land and no provision for

erosion. There is also no reservoir, especially in the village, so it can be a threat in situations such as drought.

1.5. Future prospects of Development of the Ideal Village / Smart Village

Despite these numerous amenities and facilities, the village faces some major issues such as inadequate job opportunities, lack of special medical treatment availability, etc. It is therefore hoped that it will be developed as a smart village.

1.6 Benefits of the visits of Ideal village / Smart Village

As a city development point of view, all infrastructure is well designed and well maintained to provide good aesthetics, i.e. in the village of Ena, an elevated water tank and purifying water plants providing village center for easy and efficient distribution. Likewise, the entire infrastructure is well designed to benefit villagers from communities.

This visit to the village proved to be useful in a variety of ways and also gave an idea for the various development sectors still needed in Indian rural areas that need special attention and concern. Also, different methods and techniques were known which, when actually applied, require a lot of concern. Overall, this visit was useful for the further work of the project.

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

As a point of view of infrastructure, all buildings are properly structured frames i.e. P.H.C. center, gram panchayat building school. The well-maintained bituminous road is used for easy and fast transportation. For other facilities such as the well-maintained and developed cricket stadium, villagers' houses are well developed with well-designed bungalows that provide attractive aesthetics.

Chapter 2. Literature Review

2.1 Introduction: Urban & Rural village concept

Urban

An urban area is characterized by higher population density and in comparison, to areas surrounding it. Urban areas may be cities or towns, but the term is not commonly extended to rural settlements such as villages.

- All places with a municipality, corporation, cantonment board or notified town area committee, etc. (known as Statutory Town)
- All other places which satisfied the following criteria (known as Census Town):
- A minimum population of 5,000;
- At least 75 per cent of the male main workers engaged in non-agricultural pursuits
- A density of population of at least 400 per sq. km.

Rural

In general, a rural area or countryside is a geographic area that is located outside towns and cities. The Health Resources and Services Administration of the U.S. Department of Health and Human Services defines the word rural as encompassing "...all population, housing, and territory not included within an urban area. Whatever is not urban is considered rural.

Typical rural areas have a low population density and small settlements. Agricultural areas are commonly rural, as are other types of areas such as forest. Different countries have varying definitions of rural for statistical and administrative purposes.

Table 2-1: Urban & Rural Main features

Criteria	Main features
Urban structure	Lower building density, agricultural settlement, extensive public spaces, low ratio of built-up areas
Architectural features	Low-rise buildings, integration of residential and other functions, absence of rental housing, individual buildings
Social features	Conservatism, traditionalism, neighbour relations, participation, cooperation, sharing common history
Economic features	Commuting to work, agricultural employment, higher ratio of subsistence, DIY
Public administration	Designation of the municipality, position of the municipalities in the public administration structure
Size features	Number of inhabitants, population density, area, ratio of built-up- space

2.2 Importance of the Rural development

The urban areas are mostly affiliated with all the infrastructure facilities. It is the rural area which still lacks even the most basic infrastructure amenities like primary school, public toilet block, drainage network, road network and many more. Some of the amenities are evident in the

rural areas while some are not. Therefore, rural areas should be more focused upon while allocating infrastructure designs and care should be taken that the norms are implemented strictly.

2.3 Ancient Villages / Different Definition of: Rural Urban Villages

Rural area: RBI defines rural areas as those areas with a population of less than 49,000 (tier -3 to tier-6 cities). It is generally said that the rural areas house up to 70% of India's population. Rural India contributes a large chunk to India's GDP by way of agriculture, self-employment, services, construction etc.

Characteristics of rural area are:

- Lower literacy rate.
- Lack of educational facilities.
- Lack of good health infrastructure.
- Less population density.
- Agriculture as prime employment (more than 75% male).
- Lower standard of living and less amenities.
- Migration in search of opportunities.

United States Census (2000 census) defines rural areas as comprising open country and settlements with fewer than 2,500 residents (population/administrative based); areas designated as rural can have population densities as high as 999 per square mile or as low as 1 person per square mile (population/land use-based). A village is a clustered human settlement or community, larger than a hamlet but smaller than a town, with a population ranging from a few hundred to a few thousand. Though often located in rural areas, the term urban village is also applied to certain urban neighbourhoods. Villages are normally permanent, with fixed dwellings; however, transient villages can occur. Further, the dwellings of a village are close to one another, not scattered broadly over the landscape, as a dispersed settlement. In most parts of the world, villages are settlements of people clustered around a central point. A central point is most often a church, marketplace, or public space. A public space can be a open space (sometimes called a village green), or developed square (sometimes called a plaza or piazza). This type of village organization is called a nucleated settlement. Some villages are linear settlements. They are not clustered around a central public space, but around a line. This line can be natural, such as a river bank or seashore. (Fishing villages are often linear settlements.) Linear settlements can also develop around a transportation route, such as a railroad line.

2.4 Scenario: Rural / Urban village of India population Growth

Table 2-2: Population Growth

	2001	2011
India	102.9	121.0
Rural	74.3	83.3
Urban	28.6	37.7

- For the first time since Independence, the absolute increase in population is more in urban areas that in rural areas
- Rural – Urban distribution: 68.84% & 31.16%
- Level of urbanization increased from 27.81% in 2001 Census to 31.16% in 2011

Census

- The proportion of rural population declined from 72.19% to 68.84%
- The slowing down of the overall growth rate of population is due to the sharp decline in the growth rate in rural areas, while the growth rate in urban areas remains almost the same
- Literacy rate is increased to 74% in 2011 from 64.8% in 2001. The improvement in literacy rate in rural area is two times that in urban areas
- The rural urban literacy gap which was 21.2 percentage points in 2001, has come down to 16.1 percentage points in 2011
- Improvement in female literacy is more than males in both rural and urban areas
- The gender gap in literacy has come down from 24.6 in 2001 to 19.8 in 2011 in rural areas and from 13.4 in 2001 to 9.8 in 2011 in urban areas.

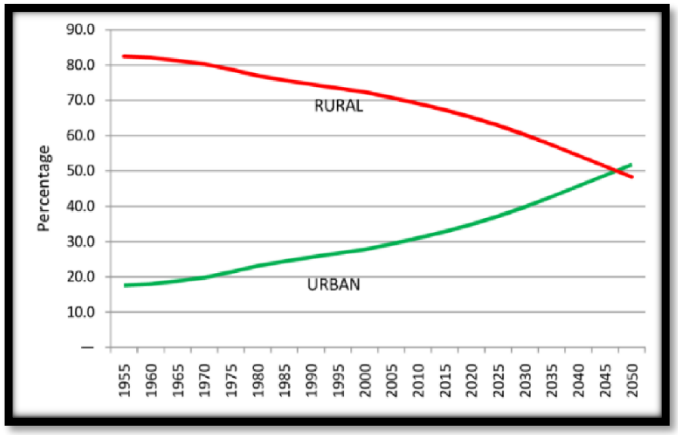


Figure 2-1: Urban and Rural populations in India (%):1950 to 2050

Urban Unit

Table 2-3: Comparison of census

	2001	2011	Increase
Towns	5161	7935	2774
Statutory Towns	3799	4041	242
Census Towns	1362	3894	2532

Rural Area

Areas which are not categorized as Urban area are considered as Rural Area.

Number of Rural Units (or Villages) in India:

Table 2-4: Rural area of India

	2001	2011	Increase
Villages	6,38,588	6,40,867	2,279

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

Table 2-5: Census of Gujarat

	2001	2011	% Increase
Gujarat	50,671,017	60,439,692	19.28

Rural	31,740,767	34,694,609	9.30
Urban	18,930,250	25,745,083	36

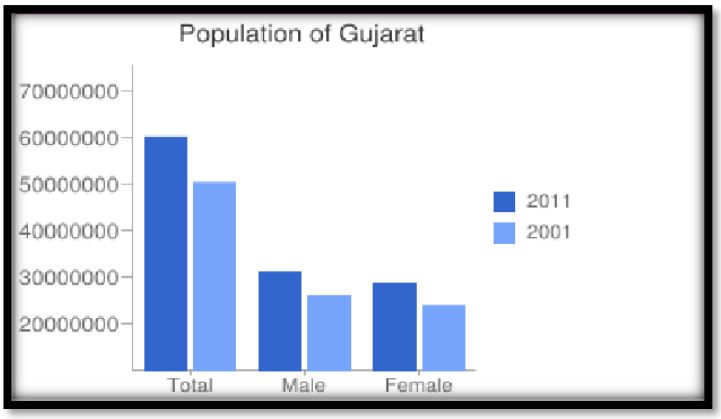


Figure 2-2: Gender vise Population

- Level of urbanization increased from 37.36% in 2001 Census to 42.60% in 2011 Census
- The proportion of rural population declined from 62.64% to 57.40%
- The slowing down of the overall growth rate of population is due to the sharp decline in the growth rate in rural areas, while the growth rate in urban areas remains almost the same
- Literacy rate is increased to 78.03% in 2011 from 58.86% in 2001

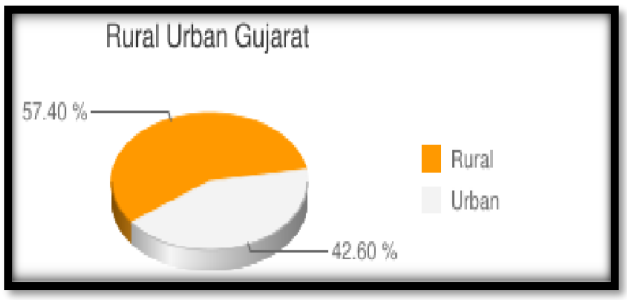


Figure 2-3: Rural – Urban distribution: 57.40% &42.60%

2.6 Rural Development Issues - Concerns – Measures

Key issues in development of human being

1. **Misuse of resources** - We have been misusing resources because we do not know why it matters and what it does in the long run. It does not even comes to mind as we have been doing all our lives. This includes money.
2. **Technological evolution** - It has taken a dangerous turn and will come to bite us in the ass. The process has already started, things we used to see in movies are becoming bitter truth of the society. We want comfort, ease and we are getting it at the cost of our civilization. Simple examples - Social Media and Mobile Phones.
3. **Religion and belief system** - If only our ancestors were wise and had a long vision, they would not have dared to write holy books. Mostly, we believe what our society believes without thinking or reasoning. It has taken away our freedom and turned us against each other.

4. **Our irresponsibility** - We do not take responsibility for our actions. If only we could think how it affects everything in the future. Why are we increasing our population only to leave the world to its terrible fate? We play a role to shape our future whether we realize it or not.

There are innumerable problems like this. All these problems can be avoided or solved through a good and proper education system. The root of these issues lies in the growing mind of a child. It will take centuries, but can be achieved if we keep trying and are persistent enough.

Measures for improvement in agriculture

- Research in the field of agriculture
- Establishment of farmer training centers in rural area
- Aware farmers regarding new researches so that they leave traditional methods
- Use of efficient irrigation methods which requires less water and give more productivity
- Availability of market to sell the products of farmers
- Initiate the co-curricular activities like Animal breeding, Dairy Industry, etc. which benefits farmers and they get more returns
- Provide subsidies to farmers
- Eliminate the discrimination by focusing on lower caste development

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

- Guideline 1: Define community entry points such as major entranceways. Entry point features should reflect village character and may include elements such as landscaping, lighting, public art and signage.
- Guideline 2: Ensure new development respects the natural topography of land, and integrates existing landforms such as hills, terraces, cliffs, valleys, rocky outcrops and watercourses. Avoid altering natural terrain to accommodate development.
- Guideline 3: Avoid the development of looping, circuitous, suburban-style roadway patterns. New roadway patterns should be direct and reflect the traditional development pattern that exists in the village core. Patterns should also provide multiple pedestrian, bicycle and vehicular connections to adjacent and future development.
- Guideline 4: If a direct connection is not possible, develop roadways that terminate onto adjacent open space and/or agricultural land to create attractive, natural view corridors. Ensure turnarounds provide sufficient space for maintenance vehicles.
- Guideline 5: Establish a variety of lot sizes in residential developments. Creating a mix of lot sizes promotes a range in dwelling types and, in turn, creates housing options for residents. Explore innovative servicing methods where lot sizes may be restricted by servicing capabilities.
- Guideline 6: Develop of mix of housing designs along neighborhood blocks to avoid a mass produced or “cookie cutter” appearance. Varied housing styles, colors and materials create a visually interesting streetscape and village atmosphere.

- Guideline 7: Concentrate a mix of uses – commercial, residential, recreational and institutional – within the village core. Locating uses within walking distance of each other strengthens community interaction and viability. The development of "big-box" stores on the periphery of the village or just outside the village boundaries is discouraged.
- Guideline 8: Focus multi-unit residential housing in, or very close to, village cores to create an active pedestrian environment where residents can support a mix of uses and activities. Historic buildings in the village core should not be demolished in favor of developing multi-unit residential housing. Vacant lots or underutilized buildings may offer good opportunities for residential infill or residential conversion.
- Guideline 9: Provide direct pedestrian connections between adjacent uses within villages to ensure safe and convenient pedestrian movement.
- Guideline 10: Ensure prominent buildings, open spaces, public art and/or other attractive features are developed at highly visible locations. Highly visible locations are corner sites, sites that terminate roadways and sites that frame community gathering places. Height, massing, architectural elements and landscaping should be used to create visual interest.
- Guideline 11: Identify opportunities to site, stage or install public art in key locations within the community. Art selection should be done in collaboration with the community

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

Payvihir, Maharashtra

An obscure village in the foothills of Melghat region of Amravati district in Maharashtra, Payvihir, has set an example for the country by communities and NGOs can work together to conserve the environment and ensure sustainable livelihood for people. In 2014, Payvihir bagged the Biodiversity Award from the United Nation's Development Programme (UNDP) for turning a barren, 182-hectare land under community forest right act. In 2015, the village was honoured with the Maharashtra, Wildlife Service Award of its invaluable contribution to environmental conversation in the state.

Some of important features of working communities together for better livelihood:

- In 2012, Payvihir was awarded 182 hectares of degraded land to exercise its community forest right under the Forest Rights Act (FRA) 2006. The gram panchayat of Payvihir decided to devote its energies to regenerate and revive the forest biodiversity of the area.
- Villagers undertook soil and water conservation works, plantation, and protection from fires and grazing. They also ensured a mix of natural regeneration and afforestation,
- Problem like unemployment and migration were tackled by providing village development jobs to the locals under MNREGA,
- Along with money, the village used funds from the tribal welfare department to set up a biogas plant that supplies biogas for three hours a day. The village sell cow dung to that plant at the rate of 75 paise per kg and also buy gas from the plant by paying rs.200 per month,

- To increase tree diversity, the villagers have stated organic plantations of Bamboo, Sitaphal, Hirda, Behada, Mahua, Mango, Neem, Custard apple, Amla, Jamun, Teak and Arjuna trees – it's all for the income for the villagers.
- As for its administrative earnings, the gram sabha of Payvihir has decided to utilize it for the development of health, education and sanitation facilities of the village. It has already ensured zero-waste generation in the village and sustainable employment opportunities for the village youth!

2.9 Other Projects / Schemes of Gujarat / Indian Government

Sardar Patel Awas Yogna

Sardar Patel Awas Yojana for land less agricultural labourers and village artisan living. Below Poverty line in rural areas of the State. Sardar Awas Vasahat, Rampun, dist. Vadodara Govt. has made strategic planning for solution of houses in the village. The poor has right to live new life and to turn to new culture as colony of poor population.

Panchvati yogna

It aims at welfare of rural people of the State (Gujarat), to develop parks and gardens in the village with necessary facilities and implements of joy and amusement are easily available People may spend their time leisurely in the late evening and the women can spend their time peacefully with their children. It aims to build such places where senior citizens of the village may sit peacefully and may ponder over the matters.

Gram Sabha Abhiyan

Gram Sabhas have started effective work in gujarat since the birth date of Shri Jay Prakash Narayan i.e. 11-10-2001 under the guidance of Hon. Chief Minister Gram Sabhas have been undertaken as movement of people empowerment and people participation.

Objectives

- People empowerment
- Platform providing training in healthy democracy
- Opportunities for poor and women to represent
- People participation
- Direct social audit by the people on working of Government/Panchayat.

E Gram Yogna

- To make the various tasks of the panchayat modern, simple, organized, time-bound, rapid, error free, transparent through the implementation of Information Technology.
- To provide E-Services to rural folk which are comparable to those availed by urban people.
- To simplify property tax assessment and collection
- To make the organization, scrutiny and implementation of panchayat rule more effectively.

Chapter 3.

3.1Introduction: Concepts, Definitions and Practices

Concepts

A village that provides for development and proper planning to keep the village clean, healthy, green, pollution free, offense free and disease free with coordination of different government community development and welfare schemes.

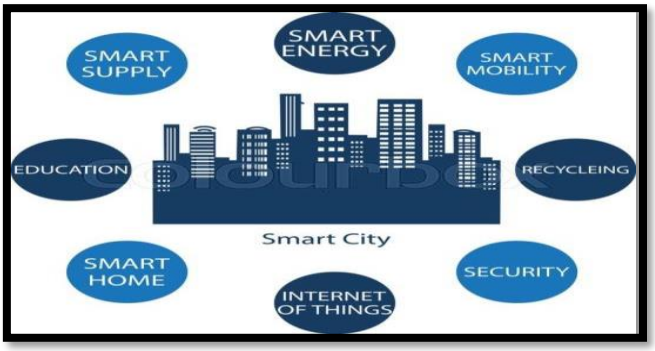


Figure 3-1: concept of city village

Definitions

- Smart Village means a village that has sufficient awareness to increase citizens ' facilities through democratic decision-making.
- Smart Village means a village where young people, men, women, farmers, village craftsmen, backward people and poor people can have equal opportunities for their own growth.
- A village that makes people "Samras" and economically self-reliant by attaining determined goals for convenience and well-being.

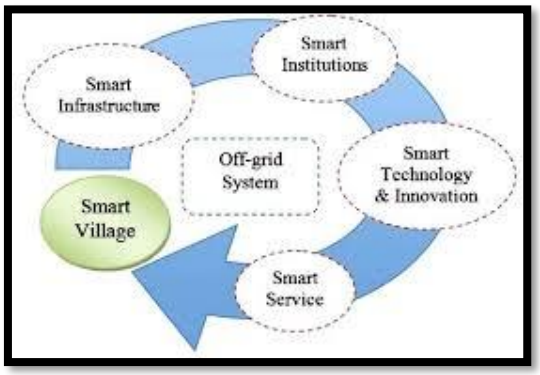


Figure 3-2: concept of smart village

Definition (Electrical)

Smart village is mission taken by national, state and local government of India, to focus on development of rural area. It is derived from ‘Adarsh Gram’ which is the vision of Mahatma Gandhi.

According to electrical concept if the village is totally empowered with sustainable and renewable electricity for all time then it is called smart village. Also, village has smart technical electricity options like solar sources, wind energy, hydro power plants if possible, Biomass energy etc.

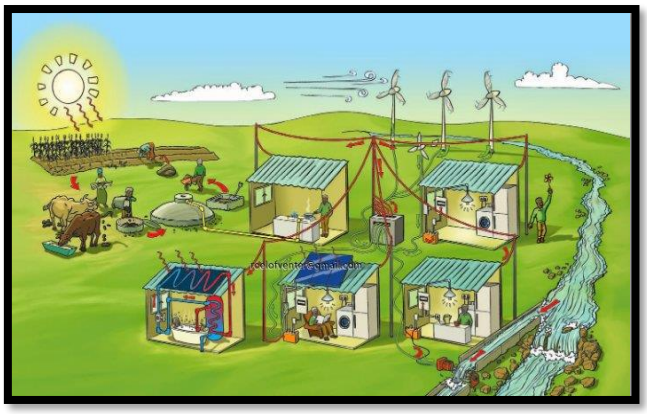


Figure 3-3: Energy supply

The following fig shows the animated picture of smart village by electrical concept In this village whatever energy is used by the villagers are get available from renewable and sustainable energy sources.

3.2 Vision-Goals, Standards and Performance Measurement Indicators

Smart Cities Bench Marks

Transport:

- Maximum travel time of 30 minutes in small & medium size cities and 45 minutes in metropolitan areas
- Continuous unobstructed footpath of minimum 2m wide on either side of all street with Row 12m or more
- Dedicated and physically segregated bicycle tracks with a width of 2mor more, one in each direction, should be provided on all streets with carriageway larger than 10m (not ROW)
- High quality and high frequency mass transport within 800m (10- 15minute walking distance) of all residences in areas over 175persons / ha of built area
- Acess to para-transit within 300m walking distance.

Spatial Planning:

- 175 persons per Ha along transit corridors.
- 95% of residences should have daily needs retail, parks, primary schools and recreational areas accessible within 400m walking distance.
- 95% residences should have access to employment and public and institutional services by public transport or bicycle or walk
- At least 20% of all residential units to be occupied by economically weaker sections in each Transit Oriented Development Zone 800m from Transit Stations
- At least 30% residential and 30% commercial / institutional in every
- TOD Zone within 800m of Transit Stations
- 24 x 7 supply of water
- 100% household water supply.
- 135 liters of per capita supply of water
- 100% metering of water connections
- 100% efficiency in collection of water related charges

Water supply:

- 24 x 7 supply of water
- 100% household water supply.
- 135 liters of per capita supply of water
- 100% metering of water connections
- 100% efficiency in collection of water related charges

Sewerage and sanitation

- 100% households should have access to toilets
- 100% schools should have separate toilets for girls
- 100% efficiency in the collection and treatment of waste water

- 100% households should be connected to the waste water network
- 100% efficiency in the collection of sewerage network
- Solid waste management
- 100% households are covered by daily door-step collection system.
- 100% collection of municipal solid waste
- 100% segregation of waste at source, i.e. biodegradable and nondegradable waste

Storm water drainage

- 100% coverage of road network with storm water drainage network
- Aggregate number of incidents of water logging reported in a Year = 0
- 100% rainwater harvesting

Electricity

- 100% households have electricity connection
- 24 x 7 supply of electricity
- 100% metering of electricity supply
- 100% recovery of cost
- Tariff slabs that work towards minimizing waste

Telephone connections

- 100% households have a telephone connection including mobile

Wi-Fi Connectivity

- 100% of the city has Wi-Fi connectivity

Health facility

- Availability of telemedicine facilities to 100% residents
- 30 minutes emergency response time
- 1 dispensary for every 15,000 residents
- Intermediate Hospital (Category B) - 80 beds per lakh population
- 1 Dispensary for pet for every 1 lakh residents
- 1 Diagnostic center for every 50,000 residents
- 1 Veterinary Hospital for every 5 lakh residents

Education

Primary to secondary education

- 1 Pre-Primary/ Nursery School for every 2,500 residents
- 1 Primary School (class I to V) for every 5,000 residents
- 1 Senior Secondary School (Cass VI to XII) for every 7,500 residents
- 1 school for mentally challenged for 10lakh population
- 1 school for physically challenged for every 45,000 residents
- 1 integrated school (Class I to XII) per lakh of population

Higher education

- 1 college per 1.25 lakh population

- 1 university
- 1 technical education center per 10 lakh population
- 1 engineering college per 10 lakh population
- 1 paramedical institute per 10 lakh population
- 1 medical college per 10 lakh population
- 1 veterinary institute
- Fire fighting
- 1 other professional college per 10lakh population
- 1 fire station per 2 lakh population / 5-7km radium

Sustainable Development Goals

The 17 Sustainable Development Goals of the 2030 Agenda for Sustainable Development are recalled below:

- **Goal 1.** End poverty in all its forms everywhere.
- **Goal 2.** End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
- **Goal 3.** Ensure healthy lives and promote well-being for all at all ages.
- **Goal 4.** Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- **Goal 5.** Achieve gender equality and empower all women and girls.
- **Goal 6.** Ensure availability and sustainable management of water and sanitation for all.
- **Goal 7.** Ensure access to affordable, reliable, sustainable and modern energy for all.
- **Goal 8.** Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all Sustainable Development Goals and Smart Cities Development Engineering Opportunities in the Mauritian Context 5.
- **Goal 9.** Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
- **Goal 10.** Reduce inequality within and among countries.
- **Goal 11.** Make cities and human settlements inclusive, safe, resilient and sustainable.
- **Goal 12.** Ensure sustainable consumption and production pattern.
- **Goal 13.** Take urgent action to combat climate change and its impacts.

Figure 3-4: Smart Cities Standard

- **Goal 14.** Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
- **Goal 15.** Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
- **Goal 16.** Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
- **Goal 17.** Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

  Acknowledging that the UNFCCC is the primary international, intergovernmental forum for negotiating the global response to climate change.

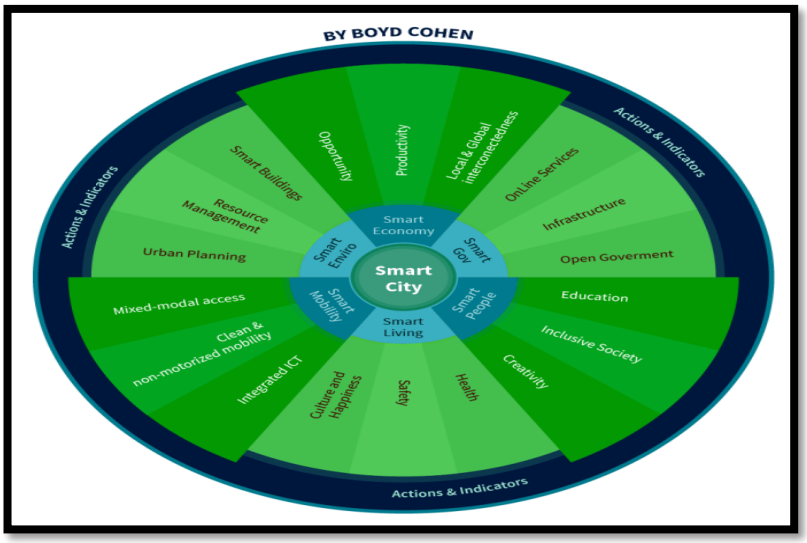


Figure 3-5: Indicator of smart city

3.3 Technological Options

A Smart City depends on three basic processes:

- It needs to acquire information (data)
- It needs to make sense of that information (analysis)
- It needs to act on that information promptly (action)

Various technologies for developing smart villages:

Following various techniques can be promoted improving the life of people in villages and for actual development of smart villages.

- Enhanced Use of Smart Phones and Optical Fiber Technology for Internet Techniques
- Online Library and E- Education
- Smart Agriculture
- Smart and Efficient Public Transport System
- Smart Sewage Management System and Sanitation
- Renewable Energy Sources and Solar Energy

Smart cities models should boost development while not compromising on data privacy and security. It is now important to develop the good practices identified so far, to build on conceptually enhance the suggested solutions.

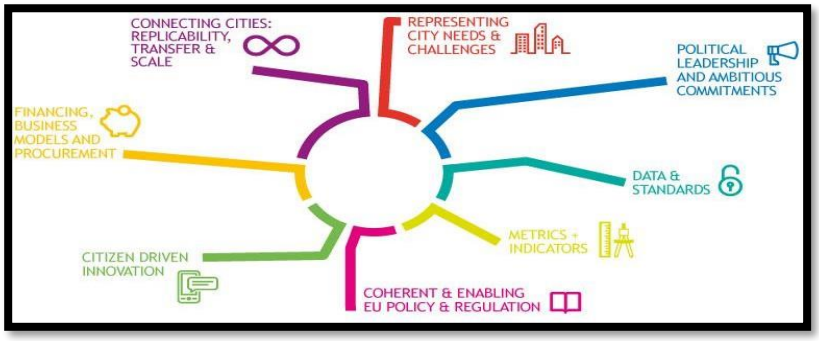


Figure 3-6: Smart city options

In the construction industry, 3D printing can be used to create construction components or to 'print' entire buildings. Construction is well- suited to 3D printing as much of the information necessary to create an item will exist as a result of the design process, and the industry is already experienced in computer aided manufacturing. The recent emergence of building information modelling (BIM) in particular may facilitate greater use of 3D printing.

Figure 3-7: 3D Printing technology

Construction 3D printing may allow, faster and more accurate construction of complex or bespoke items as well as lowering labour costs and producing less waste. It might also enable construction to be undertaken in harsh or dangerous environments not suitable for a human workforce such as in space.

3.4 Road Map and Safe Guards

Smart Maps capture a broad range of detailed data, such as roads (with details including lanes, speed limits, and turn restrictions), shops, offices, points of interest (types, user ratings), and other information (bike and transit routes, building shapes, etc.).

Cities are a useful lens through which to analyze the value of improvements in maps. Cities have a high volume of internet users – at least 140 million of India's 240 million estimated internet users are urban.12 Cities have greater and more complex density of physical infrastructure (roads, shops, restaurants, addresses, etc.), which better maps can help people navigate. Additionally, cities are experiencing change at unprecedented rates as urbanization skyrockets, making accurate, up-to-date geospatial information even more critical. And finally, cities are today, more than ever before, engines of economic and social development in India. The same characteristics that define a Smart Map can be applied to a Smart City. A map is only as good as the benefits it provides its users; a city is smart only if its citizens are at the heart of its design.

3.5 Issues & Challenges

❖ **Urban Water and Sanitation Challenges**

Water and sanitation are two of the greatest challenges in India today. A quick glance at some of the statistics is sufficient to give you a gist of the situation:

- A staggering half of India's 1.1 billion population lives without toilets
- Over 75 million people in rural India do not have access to proper sanitation of the 1.1 million people in the world who defecate outdoors, more than half are in India
- Each year, India logs the highest number of diarrhea-related deaths worldwide; more than 30 percent of all deaths among Indian children under the age of five are diarrhea-related
- Currently 30% of the rural population lack access to drinking water, and of the 35 states in India, only 7 have full availability of drinking water for rural inhabitants
- Water quality problems include Fluoride (66 million people across 17 states are estimated to be at risk), excess Arsenic in ground water (nearly 13.8 million people in 75 blocks are reported at risk), varying iron levels, presence of nitrates and heavy metals, bacteriological contamination and salinity.
- Of the total wastewater generated in the metropolitan cities, barely 30 per cent is treated before disposal. Water supply is not continuous in any of India's metros.

And the statistics go on and on, and the situation seems dire, even hopeless. But articles such as this two-part blogpost by Michael and Susan Dell Foundation's Urvashi Prasad and SemontiBasu make one more hopeful that innovative new approaches are being thought of and tried out, which can help counter these large challenges, or wicked problems. They propose what they call a 'Networked_Approach_to_Change," involving multiple stakeholders in the process.

Proposed strategy for urban water management

The urban area is classified in 6x4 matrix which would need to be implemented in a location specific manner within each urban settlement. These include:

- Sustainable groundwater management
- Focus on recycling and reuse of waste water
- Reducing industrial water footprint
- Protect and priorities local water bodies
- Shift focus to management and distribution
- Use of eco-restorative, low-cost technologies
- Capacity building of urban local bodies
- Sector Overview and Challenges

3.6 Smart Infrastructure - Intelligent Traffic Management

- In a world where infrastructure is truly smart, sensing technologies are embedded in infrastructure and the equipment it interacts with. These sensors are connected to a communication backbone which allows real-time data acquisition and analysis. The

information gathered is analysed, interpreted and delivered as reliable, robust and meaningful information to infrastructure providers, who can then make better informed decisions about the structural health and maintenance of their assets.

- In a sensing environment, infrastructure is able to respond in real time to users' needs. Self-aware infrastructure assets direct their own maintenance, leading to condition-based maintenance, reduced down time and greater operational efficiency of the infrastructure overall.
- Better information leads to an enhanced understanding of the behaviour of infrastructure. The impact of this will lead to transformations in the approaches to design and construction as well as step changes in improved health and productivity, greater efficiency in design and performance, a low- carbon society and sustainable urban planning and management.

3.7 Cyber Security or any other concept

Cyber security is important because government, military, corporate, financial, and medical organizations collect, process, and store unprecedented amounts of data on computers and other devices. A significant portion of that data can be sensitive information, whether that be intellectual property, financial data, personal information, or other types of data for which unauthorized access or exposure could have negative consequences. Organizations transmit sensitive data across networks and to other devices in the course of doing businesses, and cyber security describes the discipline dedicated to protecting that information and the systems used to process or store it. As the volume and sophistication of cyber attacks grow, companies and organizations, especially those that are tasked with safeguarding information relating to national security, health, or financial records, need to take steps to protect their sensitive business and personnel information. As early as March 2013, the nation's top intelligence officials cautioned that cyber attacks and digital spying are the top threat to national security, eclipsing even terrorism.

Elements of cyber security

- Network security
- Application security
- Endpoint security
- Identity management
- Database and infrastructure security
- Cloud security
- Mobile security
- Disaster recovery/business continuity planning
- End-user education

3.8 Retrofitting- Redevelopment- Greenfield Development District Cooling

Green buildings are designed to reduce the overall impact of the built environment on human health and natural environment by:

- Efficiently using energy, water and other resources.
- Protecting occupant's health and improving employee productivity.
- Reducing waste, pollution and environment degradation.
- Following examples can be considered for green buildings:
- Green buildings may incorporate sustainable materials in their construction (e.g., reused, recycled content, or made from renewable resources).
- Create healthy indoor environments with minimal pollutants (e.g., reduced product emissions).
- And feature landscaping that reduce water usage (e.g., by using native plants that survive without extra watering).
- A green building is a structure that is environmentally responsible and resource-efficient throughout its life-cycle. These objectives expand and complement the classical building design concerns of economy, utility. Durability and comfort.

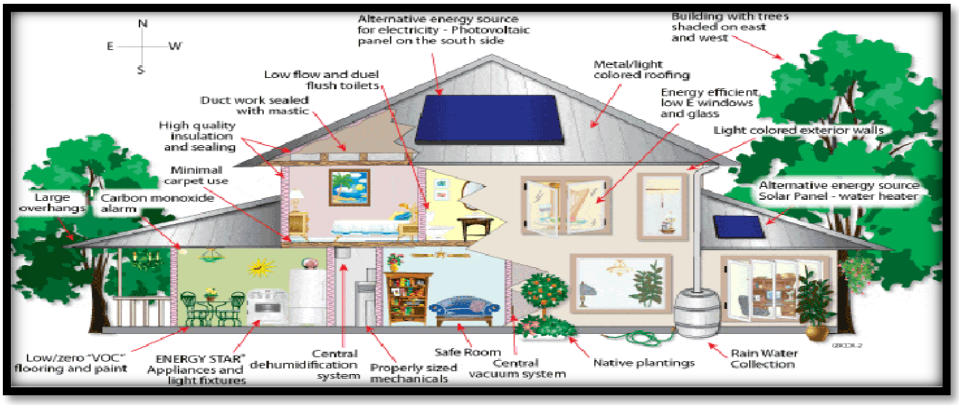


Figure 3-8: Green building

What are the features of a Green Building?

- Minimal disturbance to landscapes and site condition
- Use of non-toxic and recycled / recyclable material
- Efficient use of water and water recycling
- Use of energy efficient and eco-friendly equipments
- Use of renewable energy
- Quality of indoor air quality for human safety and comfort

Figure 3-9: Basic principle

- Effective controls and building management systems

District Cooling and Heating

Heating all the buildings in a neighborhood or an entire city. A heating network generates and distributes heat in the form of hot water and superheated steam using one or more generating units. They generally uses a range of different primary energy sources for heat generation, including natural gas, locally- generated energy and renewables in the form of household waste incineration, biomass (wood, etc.), biogas, solar, geothermal and heat recovered from wastewater.

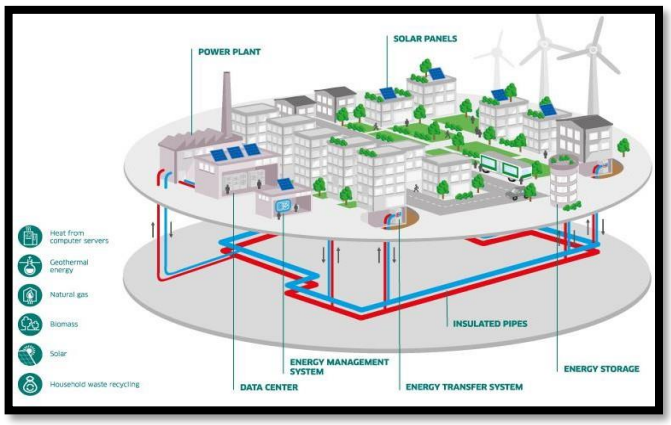


Figure 3-10: District cooling and heating

A heating network has four main component parts:

- one or more heat generating units,
- a primary pipeline network that transfers the heat to the delivery points,
- Heat exchanger substations installed in connected buildings,
- a secondary pipeline network that distributes the heat in the form of hot water from the delivery points (substation) to the radiant sources in individual homes or offices.

3.9 Strategic Options for Fast Development

Mobility as a Service (MaaS)

Moovel, an innovative MaaS platform combines and facilitates the use of multimode transport and shared mobility services and enables payments via a single interface. This smart urban mobility solution offers a multimodal capability which bundles transport options such as public transport, on-demand services, vehicle sharing, bike sharing and ride hailing. With access to the Moovel app, customers can book and pay for mobility services through an integrated account.

Sustainable Travel Behavior

Innovactory is committed to making the travel behavior of its users more sustainable through development of TimesUpp, a smart travel assistant. Used by more than 150,000 people, TimesUpp "transforms a user's calendar into the perfect travel assistant, advising on the best time and method of transport to get to their destination, with real-time updates on traffic jams and other unexpected delays."

In 2017, Innovactory introduced TimesUpp incentive programs with the goal of reducing transport-induced emissions and "prevented more than 250,000 car trips from being executed. This resulted in a CO2 saving of almost 650 tons." In 2018, TimesUpp launched the Smart Traveling! Campaign — an initiative of SmartwayZ.NL with stakeholders from public and private sectors — to reward commuters when they reduce usage of their car by switching to cycling, public transport or working from home.

Intelligent Traffic Management Solution (ITS)

PSI Roads is an intelligent traffic management solution that provides decision support enabled by artificial intelligence. This smart city mobility solution offers intelligent traffic management services such as change of traffic light phases, road user information, and dynamic changes in traffic capacity. This mobility solution is designed to help transport authorities meet strategic goals by minimizing vehicle emission levels and reducing traffic congestion in residential areas.

Traffic Congestion Service

An estimated 30% of traffic congestion in urban areas is caused by drivers looking for a parking space. Parquery — a cloud-based smart parking solution implemented in more than 15 cities worldwide — provides parking managers with accurate data on parking space usage and "also supports adaptive street light management, intelligent traffic management, and retail services for easy navigation in a smart city."

Micromobility Management

Micromobility — including systems and fleets of shared bikes and electric scooters — "is the hottest tech in transportation," according to CityLab. "The appeal of cycling and scooters to cities and startups alike is obvious: Micromobility systems complement each other while stealing trips from other modes." Read more about e- scooter sharing and e-scooter solution providers in our special market insight report E-Scooters: A Passing Fad or Smart Mobility?

eCooltra is a European innovator in scooter sharing with a fleet of more than 3,000 electric scooters deployed in five cities. By using the eCooltra app, customers can book and unlock a free-floating scooter and pay only for minutes of usage. This e- mobility solution aims to improve the customer's quality of life, contribute to urban sustainability, and reduce CO2 emissions.

Public Transport Innovation

In Poland, an innovative passenger information system was designed and implemented in the City of Lublin. This project included modernization of urban transport infrastructure and the city's fleet of bus vehicles. The project involved installation of GSM and GPRS equipment in the vehicles; electronic displays at bus stops; dispatch center software; and a website offering dynamic information to passengers. For its innovation in traffic management and transport solutions, Lublin was named “Smart City of the Year" among cities with population between 100,000 and 350,000”. By modernizing transport infrastructure and improving communications with passengers, Lublin shows that mid-size cities can achieve far- reaching upgrades in the user experience and quality of urban mobility.

Transport Poverty Reduction

The HiReach project, a research and innovation action funded under Europe's Horizon 2020 program, has the mission of finding solutions to improve accessibility, inclusion and equity of mobility by:

- Exploring viable business models for affordable, modular and replicable mobility services (community transport, ridesharing, minibus)
- Generating and testing mobility solutions created by startups and entrepreneurs
- Enabling the viability and scaling-up of new mobility business models

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

Technologies can improve the drinking water quality of smaller villages as well as larger cities. It uses the Pressure Driven Membrane Processes. These are suitable for all capacity units e.g. they are adaptable from household level unit or community level unit to large scale unit. Water purification technologies make use of the nuclear energy and solar energy also.

Radiation Hygienization of Municipal Sewage Sludge:

The Sewage is the waste water generated from domestic premises and consists mainly of human waste. It typically contains 99.9% water and about 0.1% solid. The solid waste in sewage is typically organic in nature and is broken down in the sewage treatment plants resulting in sewage sludge as a by product. In Radiation Hygienization process dry sludge generated at STP's is hygienized using radiation technology using standard Gamma facility at a Dose of 10 kg. Such radiation plants are operating in India for sterilizing medical products.

Refuse Derived Fuel: An Emerging Processing Technology in MSWM:

Refuse Derived Fuel (RDF) is a processed form of Municipal Solid Waste (MSW) and it can be a substitute to coal energy. The process of conversion of garbage into fuel pellets involves primarily Drying, Separation of incombustible, Sizereduction and Pelletisation.

3.11 Initiatives in village development by local self-government

The local government has all the responsibilities for the development of village. Local development partly via local institutions was supposedly a scheme to better understand rural communities, and be more responsive to the perceived aspirations and constraints of the rural folk. Local Governments were considered to be more successful in promoting local participation and empowerment, democracy and cost effectiveness within the framework of the One-Party System. So local government should initiate the village development by using all these factors.

3.12 Smart Initiatives by District Municipal Corporation

Objectives for an innovative & modern Solid Waste Management

- To devise a system of storage of waste and segregation of recyclable waste at source.
- To improve system of primary collection of waste.
- To devise more efficient system of day to day cleaning, conventionally and mechanically.
- To devise system to eliminate practices of throwing garbage on the road causing nuisance& health threat.
- To modernize the system of community waste storage & synchronize the system of primary collection as well as transportation of waste.
- To eliminate manual handling of waste and open transportation vehicles.
- To improve the system of transportation of waste by ensuring "handling waste only once".
- To construct four more semi close body transfer station to strengthen the existing primary collection-transportation and secondary transportation system.
- To reduce quantity of waste going to landfill site by adopting suitable technology.

- Land to be acquired for other landfill disposal site.
- To derive income from the processing of waste.
- To ensure safe disposal of waste including bio-medical wastes.
- To have public participation.

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

The Role of Citizens in " Smart City "

The " smart city " is an umbrella for cities that use information technology to improve services and provide better quality of life to its citizens. Citizen participation is often highlighted as an important part of the smart city concept. Citizens are an important aspect of smart cities. A city cannot be built smart until and unless citizens do not participate in the transformation. So, know the role of citizens in building smart city. The Success of Smart city is defined only when it is accepted by its citizens as the core aim of the smart city is to build a city which is solely for its people. When we talk about the concept of smart cities then they primarily are cities which is smart enough to provide sustainable, environment friendly urban infrastructure to its citizens where it has all smart facilities popular as smart solutions, which can ease their life. If a smart city is not as per the needs of its citizens then it is completely not a successful smart city. Citizens' acceptance should be the main focus while transforming a city into a smart city.

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

- First of all, we need to study the smart village project in minute detail.
- Then, we need to compare the climate, soil condition, available resources, existing infrastructure, etc.
- The manpower is also an important aspect.
- Required skills for its implementation is also mandatory.
- And not to forget, the funds! If we are adapting a technology from a developed country, it is necessary that we also keep check if sufficient funds are available or not.
- A feasibility report should be prepared to check whether its implementation is beneficial or not.

3.15 Electrical concept

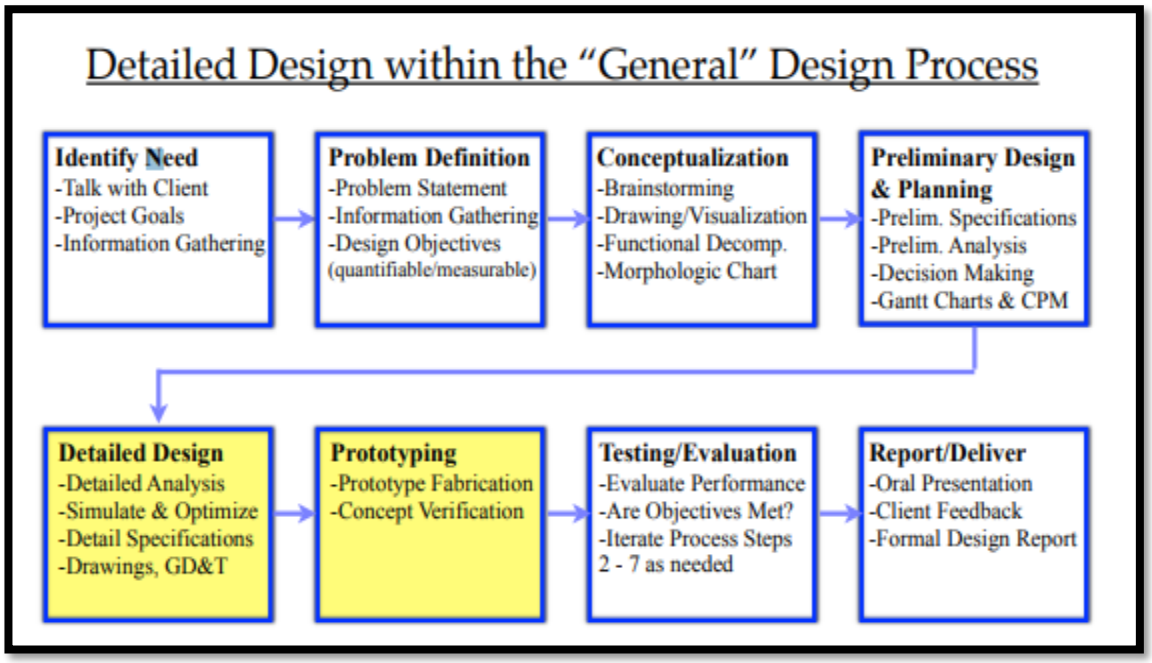


Figure 3-11 Design process

Prototype:

- Prototyping is a highly important activity in the design process.
- At some point, the design team must construct a prototype too.
- Prove the design functions as intended Meet the main/key objectives Communicates the design concept to the client/customers.

Chapter 4. About Vankal Village

4.1 Introduction

4.1.1 Introduction About Vankal Village details

Vankal is a Village in Mangrol Taluka in Surat district of Gujarat State, India. It is located 75 km towards west from District headquarters Surat.

Latitude: 21.4363852

Longitude: 73.2378269

Pin code: 394430

Nandola (4.8km), Chadariya (5.6km), Zankhvav (9.9km), Mota Miya (11km) are the nearby village of vankal village within 15

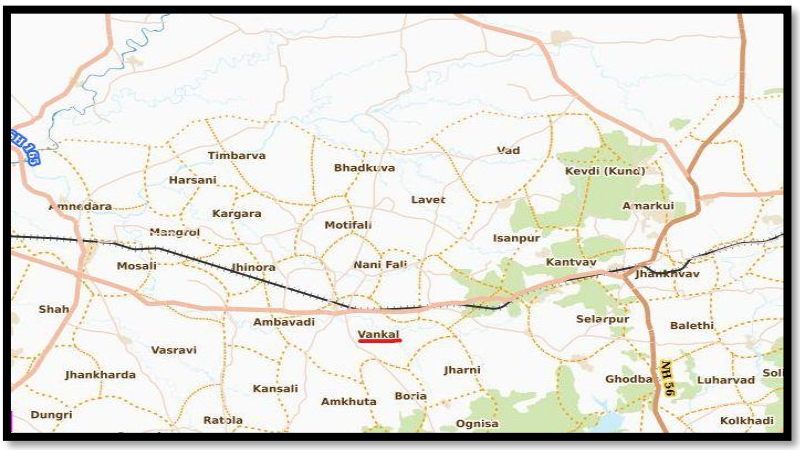


Figure 4-1: Location of Vankal (1)

4.1.2 Justification/ need of the study

Village studies have their own importance. These have enriched the knowledge of the Indian Society in general and rural India. These have given great encouragement to the growth of rural society. After independence, planners in India realised that unless Indian villages were properly studied, no real progress could be made. Scholars now began to pay more and more attention to village studies.

To develop the village for making it an ideal village, it is necessary to first understand its location, resources etc. So we can come to know its advantages owing to various factors like location, water bodies available, proximity to sea and so on. Not only that we can also take care of the threats posed owing to the same and take care of it to reduce the dangers and impacts on the village.

4.1.3 Study Area (Broadly define)

It is the study of political or geographical area including its history, geography, language, and general culture. As our project is related to development of a village, our study area is the history of development of village, infrastructure facilities in village, existing condition of village.

4.1.4 Objectives of the study

The objective of village study is to give idea about its layout, its design, the facilities available in village, requirement of people, things required to develop village. It helps in

planning rural reconstruction, useful information related construction, requirements. It helps to getting information about needs of people, social reality.

4.1.5 Scope of the Study

The scope of the study is

- Analysis of study
- Problem identification
- Solution of the problem
- Designing new facilities

4.1.6 Methodology Frame Work for development of your village

- Survey of the village
- Grouping existing infrastructure facilities
- SWOT analysis of the village
- Deducing the requirements of the village
- Provision of infrastructure facilities as per URDPFI norms

4.1.7 Available Methodology for development of related to Civil/Electrical

- Approach road in better condition
- Drinking water facilities
- Wells
- Lakes

4.2 Vankal Study Area Profile

4.2.1 Study Area Location with brief History land use details

The village is located in Mangrol taluka of Surat district.

Brief history

Vankal village is a small village situated in Mangrol. It has some very good infrastructure like water supply. On the other hand, while we are on the topic of water management, the discharge of water i.e. the drainage is very poor.

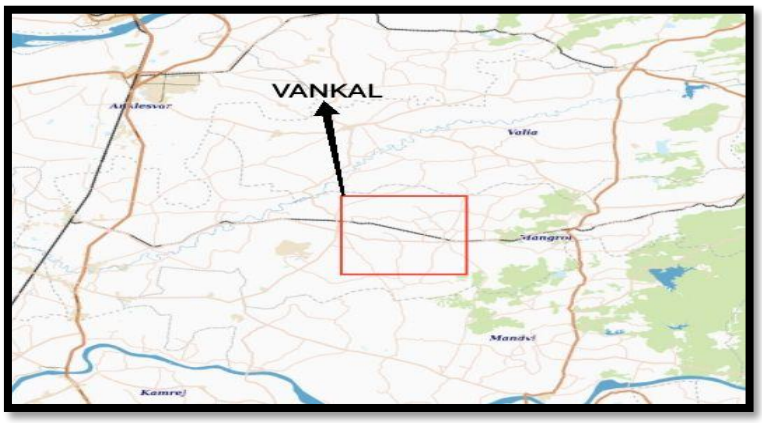


Figure 4-2: Location of Vankal (2)

4.2.2 Base Location map, Land Map, Gram Tal Map

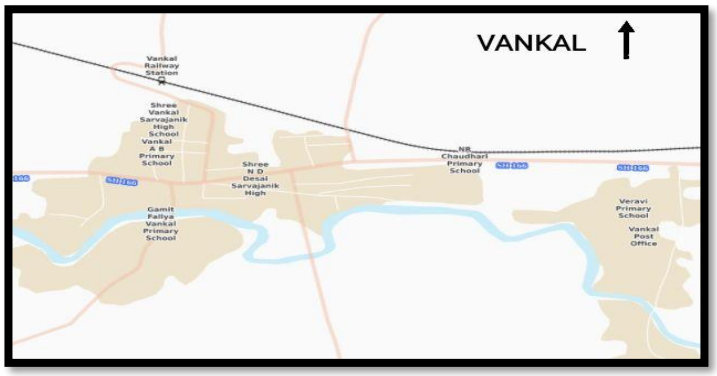


Figure 4-3: Location of Vankal (3)

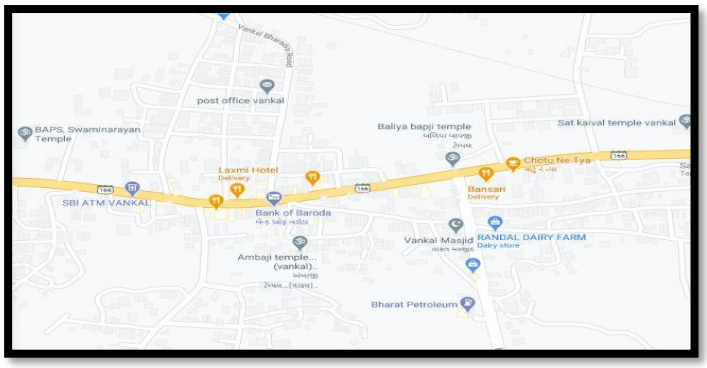


Figure 4-4: Location of Vankal (4)

4.2.3 Physical & Demographical Growth

Growth of village is mainly due to agriculture. Main crops are sugarcane and soyabeans. Also, the Dudh Mandali plays a huge role in the development of the village.

4.2.4 Economic generation profile / Banks

Village has a provision of Bank in a village. The economy of village is depend on agricultural activity. Most of the people of village are economically stable.

4.2.5 Actual Problem faced by Villagers and smart solution

The main problem face by villagers include:

- Absence of Government facilities – due to this, the villagers are only relay on private sectors.
- Absence of water drainage – this gives rise to disease and an unhygienic environment.

4.2.6 Social scenario -Preservation of traditions, Festivals, Cuisine

The villagers have unity between them. They get together to celebrate festivals like Navarata, etc. The villagers celebrate all the festivals of Indian culture. This includes Navaratri, Diwali,etc. The main food of the fellow villagers is rotlo and dal. Which represent Indian taste.

4.2.7 Migration Reasons / Trends

The reason for migration is water problems, garbage problems and lack of job opportunities.
But major role is played by thought that if we move towards cities we will get more facility instead of focusing to develop their own village.

4.3 Data Collection Vankal Village

4.3.1 Describe Methods for data collection

First step for collecting data was visiting the Vankal village of Mangrol taluka in Surat district. Data collection is carried out by interacting with people like Sarpanch, Talati, Farmer, etc. of the respective village.

Data collected from talati includes number of classes available for study, availability of library, computer lab, other activities carried out in school and their needs related their activities. Data related to farming such as: which type of technique use for farming like drip irrigation or any other, availability of water source of water for irrigation works, availability of rains, etc. collected from interacting with farmer. Basic data such as population, sex ratio, area of village, all other details as geographic details, demographical details, educational, institutional details, physical infrastructure facilities, etc. are collected from sarpanch office.
However, for collection of above mentioned data we took upon a systematic approach by following Simplified Planning Techniques:

Identifying Data Needs and Data Collection List

- The basic presumption of simplified information gathering methodologies is that there is always a certain amount of uncertainty attached to any set of data, and that the available data may or may not be complete as compared to what is required for ensuring perfectness in decision making. This presumption implies that decision-making most often involves an element of imperfect data and good decision maker makes good use of extrapolation of the collected data though the application of simplified survey techniques.
- The methods of rapid information collection institutionalize existing good practices and even common sense. They rely mostly on direct observation, seek several views of any one “fact” (cross checking) and make use of checklists and semi- structured dialogues instead of lengthy and often costly questionnaire- based surveys. Due to difficulties of measuring much of socio- economic information directly, rapid survey techniques make liberal use of proxy indicators to trace ranking, trends and shifts. These rapid methods must not be considered as substitutes to specialist investigations and should be used for quick access to information for rapid decision- making.

Data Checklist

The data collection checklist is a precise and exhaustive listing of topics/issues and sub-topics/issues related to the information need. The process begins with the preparation of an initial checklist. The next stage is to define the method of acquiring information about each sub-topic in

the list. The checklist is flexible and allows the surveyor to adapt and impro vise in the field. The steps involved in the preparation of the checklist are as follow:

Data Collection Techniques

Information or data can be divided into two types. i.e. Primary data and Secondary data. Primary data is collected first hand by investigator, thus through primary survey. Secondary data is second hand data, initially collected by some other investigator for other purpose but later on used by an investigator for his own purpose.

Primary Data Collection Techniques

Primary data are those which are collected for the first time and are always given in the form of raw material and original in character. Before beginning the primary data collection process, the technique of data collection, the questionnaire thereof and the survey sample selection technique is to be finalized. To process, analysis and interpret primary data, suitable statistical methods are needed.

Visual surveys / Reconnaissance survey

Visual surveys are direct inspection surveys, which are performed by survey teams moving in a vehicle or walking. This type of survey can be used in the initial stages of the investigation, often after preparing initial checklist.

Inspection

Direct Inspection: The direct inspection of conditions or activities is employed in many kinds of surveys where human communication is not required to elicit the information.
Indirect Inspection: The findings of the initial survey can be substantiated with the help of key indicator survey, which are specific to the objectives of the analysis.

Personal Interview/Dialogue

A number of types of surveys are undertaken face to face or by telephonic conversation. In case of quantitative survey, the structured dialogue is one way where précised questioning takes place.

Secondary Data Collection techniques

Secondary data are those, which have already been collected by someone other than the investigator himself.

- **Published Sources**

  Mostly secondary data is collected from published sources, which makes it reliable.

- **Unpublished Sources**

  Statistical and non-statistical data can also be collected from various unpublished sources.

Type of Surveys Socio-Economic Survey

Demographic survey is concerned with collection of socio-economic data regarding characteristics of human populations, such as size, growth, density, distribution, and vital statistics. This survey forms base for not only understanding current socio demographic characteristics of specific area but also projections of future population and related infrastructure. However this survey is to be done in rare cases only as Census of India provides detailed information of demography.

Density Surveys

Density surveys are done to understand the relationship between built-up area and population density. It is taken up for assessment of infrastructure requirements, to reduce congestion, appropriate availability of land for specific activities and services required by residents for good quality of life.

Residential Density

Residential density surveys are undertaken with the objective to understand the accommodation density, built-up area density (built-up area per land area) and the residing population density. Based on the analysis from this survey, the decisions on the control and promotional measures can be taken.

There are two separate aspects of this objective, first is less congestion within dwelling unit and second is low- high density in a neighbourhood or the study area. Another reason for such surveys is to control number of people residing in an area so as to provide appropriate/sustainable or decentralised services and utilities for the area.

Residential density is normally expressed in terms of:

- Houses per unit land (dwelling units/hectare),
- Habitable rooms per unit land (rooms/hectare) (Accommodation density) and
- Persons per unit land (persons/hectare) (Population Density).

For comparison at later stages and analysis of the residential areas, the study area can be further divided into zones/sub-divisions of similar housing types/conditions and tentative observation of density or based on similar pattern for survey within the study area.

As accommodation density and population density are calculated for same unit of area, these can be compared to reach at number of persons (occupancy rate) per habitable room. Thus it is used to determine whether particular area is underutilized or over-utilised. This information can be used in future planning to decide which areas are to be decongested and in which areas density can be increased.

Infrastructure Surveys

Infrastructure survey includes the survey of existing infrastructure within and surrounding the study area in terms of its population. The result of infrastructure survey is compared to benchmarks and parameters provided by National/Government authorities. Such survey includes physical as well social infrastructure. This survey is commonly integrated with the land use survey to cohesively understand the use of land and to save on time and manpower.

- Physical infrastructure indicators transportation, water supply, wastewater, sewerage,

and solid waste management infrastructure.

- Social infrastructure indicators: educational, civic and utilities, health care, recreation infrastructure etcetera.

4.3.2 Primary details of survey details

The results of primary survey carried out in the village are described below:
Vankal is a Village in Mangrol Taluka in Surat District of Gujarat State, India. It is located 75 KM towards west from District headquarters Surat.
Time difference: 2 hours

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

The houses in the village depends upon the financial condition of the family. The house size on an average for the dwellers is 16" * 39".Though there are houses built under PMAY – Pradhan Mantri Awas Yojana, geo- tagging of those houses is not done yet.

4.3.4 No of Human being in One House

Average number of members varies between one to as much as ten in the village. However, on an average, there are 4 person living per household.

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

For the construction of houses, mostly, cement, sand, aggregate, reinforcement bars i.e. concrete is used.
They also use Bricks, paver blocks and other materials for residential construction.
Lets not forget our kacha makan of the village vankal being a village certainly has clay houses built up using the clay and dung.

Out Sourced Material

The construction materials are generally bought in the village from kosamba and bardoli which is merely at a distance of 35 km. it takes just 30 minutes to reach Kosamba and bardoli.

4.3.6 Geographical Detail

The geographic details of the Vankal village is as follows:

Table 4-1: Vankal – Geographical detail

Sr. No.	Description	Area in hectare
1	Village	1080
2	Forest area	0
3	Residential area	25
4	Agricultural area	864

Distance to nearest Railway Station:
Kosamba railway station is the nearest railway station from Vankal It is located at 35km distance. One can reach upto the railway station via NH 8. It takes approximately 47-50 minutes to reach there.

Distance to nearest Town:
The nearest town is Kosamba which is located at 35 km distance. It takes almost 47-50 minutes to reach Kosamba

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

The population details as per Census of 2011 are tabulated below:
As mentioned earlier, we conducted survey in the village by designing self-survey form to reach to current demographic details in the village. The result of the survey is also tabulated below:

Table 4-2: Census 2011 of village

Particulars	Total	Male	Female
Total No. of Houses	1410	-	-
Population	**6390**	**3213**	**3177**

4.3.8 Occupational Detail - Occupation wise Details / Majority business

Following are the three major occupations prevalent in the village:

Table 4-3: Occupational Detail

Name of Three Major Occupation groups in Village	Farmer
	Animal Husbandry
	Labour

4.3.9 Agricultural Details / Organic Farming / Fishery

Table 4-4: Agricultural Details

Name of Three Major crops grown in Village	Sugarcane
	Soyabean
	Cotton

4.3.10 Physical Infrastructure Facilities - Manufacturing HUB / Ware Houses

There manufacturing hubs/warehouses present in the village. Paneshwar milk dairy present in the village which produce all kind of products with small setup.

Figure 4-5: Paneshwar milk dairy

4.3.11 Tourism development available in the village for attracting the tourist

There is no tourism spot in the village to attract the tourist except few temples. Therefore we are designing a heritage design so that it will attract tourist.

4.4 Infrastructure Details

4.4.1 Drinking Water / Water Management Facilities

For drinking purpose, water is supplied from via
The main source of drinking water are:

- Piped water supply and
- Underground water

Piped water – from Water Tanks

The village has two overhead tanks and one underground tank and one tank resting on ground; the details of which are tabulated below:

The quality of drinking water is satisfactory

Figure 4-6: Piped water

Figure 4-7: Overhead Tank

Overhead Tank: There are 4 overhead tanks in the village each of 1,10,000 litre capacity. All are in working condition. Quality of water is also satisfactory.

Water purifier: There is one water purifier in the main area of village while for outskirt they use well water.

Figure 4-8: Water purifier

Underground sump: There are seven underground sumps located in the village with capacity of 1,10,000 litre capacity each.

Figure 4-9: Underground sump

Table 4-5: water storage details

Sr. No.	Type	Number	Capacity
1	Overhead tank	4	1,10,000 litre
2	Underground sump	7	1,10,000 litre

4.4.2 Drainage Network / Sanitation Facilities

Drainage network

In the village, till date open drainage facility exists. This drainage line runs along both the sides of the road.

Figure 4-10: Drainage network

House drainage

30% drainage line exists in the village. The villagers dispose off the waste water nearby their houses.

Figure 4-11: House drainage

The absence of drainage network creates water-logging near the house. This creates an unhygienic environment which can give rise to many diseases.

Sanitation facilities

All the houses in the village have constructed septic tanks at their own cost.

Because of sandy soil in this area, the water percolates quite fast. The cleaning of the tank is not required even once.

Public Toilet Block: Public toilet 2 present in this village and its condition are not quite well.

Figure 4-12: Public Toilet

4.4.3 Transportation & Road Network

Figure 4-13: Approach road

Approach road: The approach road of the village is the same as for Kosamba which is very well maintained.

Internal raods: Some of the internal roads are not well maintained. The WBM roads of some of the streets are well-maintained while the remaining either require maintenance or are disrupted by rains.

Some of the internal streets are Kachcha roads.

Local Transport – Bus stand: though the village has bus stand, it requires maintenance, and is not in usable condition.

The internal transport facilities like auto, taxi, etc are available in the village. All the houses have private vehicles like bike, bicycles. Very few houses have car.

Figure 4-14: Bus stand

4.4.4 Housing condition

Most of the houses in the village are pucca houses. While some of the kuchcha houses still exist in the village, their proportion is much less.

Figure 4-15: House (1)

About 15% houses in the village are kuchchh houses. Very few houses are well furnished with exterior paint, or distemper.

Figure 4 16: House (2)

Figure 4-17: House (3)

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

Infrastructure assets such as rural roads, tracks, bridges, irrigation schemes, water supplies, schools, health centers and markets are needed in rural areas for the local population to fulfill their basic needs and live a social and economic productive life.

Health Facilities

Sub-centre : There is no sub center in the village .

For treatment, the villagers have to go to PHC located in its on village.

Figure 4-18: Prathmic Seva kendra

Education Facilities

Anganwadi: Vankal village has eight Anganwadis.

Primary School: Four primary schools are located in the village. All are government schools. Each school has one male and one female teacher along with Principal & clerk & maid staff. Mid-day Meal Scheme is currently enforced in both the primary schools. It is a scheme by Government of India to provide free meals at noon to the school children keeping in mind the nutrition value to prevent malnutrition.

As new schools are opened near the village, the admission rate has reduced to a great extent in the schools although the physical condition of the infrastructure is quite good.

Also with the communication distance reducing between the village and Surat district because of quality approach roads, many of the residents prefer to send their children to the city.

Secondary and Higher Secondary School: Secondary and Higher Secondary School does exist in the village. So, it is not an issue.

Community Hall

The village has the community hall in the village.

Figure 4- 19: Community hall

Public Library

Public library is not present in the village. But school provides library to everyone.

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

Panchayat Building: Recently, by observing the building fit for the purpose. So, as expected its condition quite good too.

Figure 4-20: Panchayat Building

Primary School: Four primary schools are located in the village. All are government schools.

Each school has one male and one female teacher along with Principal & clerk & maid staff.

Figure 4-21: Primary School

Secondary and Higher Secondary School: Secondary and Higher Secondary School does exist in the village.

4.4.7 Technology Mobile/ WIFI / Internet Usage Details

Most of the people of the village use mobile smart phones. The mobile signal strength is excellent in the village for almost all networks.

There is no public WI-FI spot located in the village. However, cellular data works quite well, without buffering.

4.4.8 Sports Activity as Gram Panchayat

Gram Panchayat does not hold any sports activity in the village. However, the kids and youth of the village play various games like gully cricket and other street games on the ground.

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

The definition of socio-cultural is something that involves the social and cultural aspects.

Public Garden /Park/Playground

The village neither have public gardens nor playgrounds.

Village Pond/Lake

One pond as well as one lake is present in the village.

Figure 4-22: Pond

People bathe the buffaloes inside these ponds. Not only this, they still come to wash clothes besides the pond.

Other Recreation Facilities

Not much recreation facility exists in the village except the temple garden gatherings.

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

Milk Co-operative Society: A milk co-operative society exists in the village. Almost all of the households of all the Vankal village raise cattle. Mostly buffaloes are raised and milk is sold to this mandali. This is one of their major occupation.

4.4.11 Any other details

Suggestions for Sustainable Infrastructure Facilities & Repair &Maintenance of existing Public Infrastructures:

The village street lights can be equipped by solar power.

4.5Electrical Concept

4.5.1 Renewable energy source planning particularly for villages

Renewable energy is a process to collect energy from natural sources. These sources are sunlight, bio-mass, biogas wind, rain, tides, waves, and geothermal heat.

The requirements of renewable energy:

Renewable energy is used to clean, exorbitant energy. They different from minerals fuels mainly in their deference, profusion and potential for use anywhere on the planet, but above all in that they produce neither greenhouse gases which cause climate change, nor polluting emissions**.**

1) Solar energy**:** Solar energy involves capturing the energy from the sun and converting it Electricity. We use that electricity to light and hear our homes, power machines illuminate our streets etc.

Figure 4-23 Solar Energy

2) Biomass**:** The fuel developed from natural and organic materials or wastes, which are renewable and sustainable sources of energy is known as Biomass. Some types of fuels use to produce biomass are

- Woody production and Forest rubbish
- Many agricultural crops and waste
- Animal waste
- Municipal solid waste

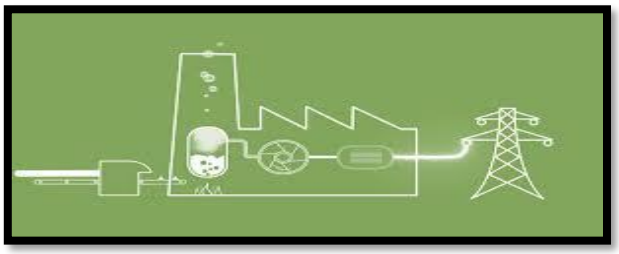


Figure 4-24 Biomass

4.5.2 Irrigation Facilities

Irrigation is the process of applying controlled amounts of water to plants at needed intervals. **i**rrigation helps to grow agricultural crops, maintain landscapes, and during periods of less than medium rain.

The many types of irrigation facility but two types of irrigation facility are effective.

- Drip irrigation
- Sprinkler irrigation

1) Drip irrigation: Drip irrigation is also known as trickle irrigation; the drip irrigation is effective for villages. The drip irrigation is near the plant and drop by drop falling in the plant's base. Water is delivered near the root zone of plants, drop by drop.

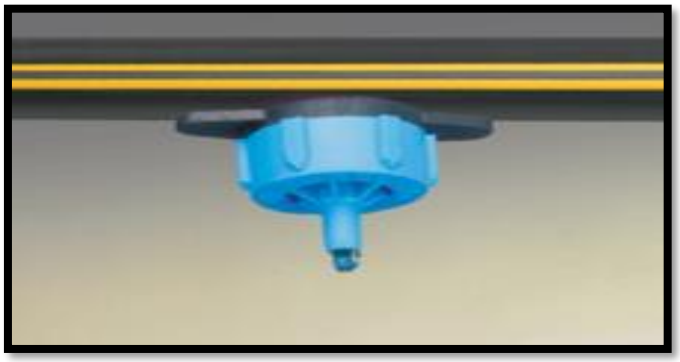


Figure 4-25 Drip irrigation

Figure 4-26 Sprinkler irrigation

2) Sprinkler irrigation: The sprinkler irrigation is also known as overhead irrigation. In this method, irrigation water is applied to the land in the form of a spray. Water is sprayed by employing the network of main pipe, sub main pipes and lateral pipes.

4.5.3 Electricity Facilities with Area

- I visited a village and I saw that there aren't good facilities for electricity. we should provide the electricity in the village through solar cells, cable wire, bio gas, biomass etc.
- I saw the people are using 100watt bulbs and people are wasting lots of energy using energy instruments.
- We can solve the energy problem providing awareness of energy in our future gen.

4.6Existing Institution like - Village Administration – Detail Profile

4.6.1 BachatMandali

There is no any bachat mandali exist in our village.

4.6.2 DudhMandali

Paneshwar milk dairy present in the village which produce all kind of products with small setup.

4.6.3 Mahila forum

No such type of activity is take place in village.

4.6.4 Plantation for the Air Pollution

Yes tree planation work exist in our village. As it is a village, villagers grow tree for their living, for good weather condition and many more knowing their profit. But majorly for maintaining weather condition and air pollution.

4.6.5 Rain Water Harvesting - Waste Water Recycling

No work is done for rainwater harvesting, so we have decided to take it as one of our design.

4.6.6 Agricultural Development

Vankal village is blessed with agriculture land and that too with hard working farmers. People use many modern facility according to availability from government.

4.6.7 Any Other

Vankal village people work themselves instead of making any labourer to do work by which they can save money and use wisely for their development. They are now creating many temples and focusing on pond development

Chapter 5. Technical Options with Case Studies

5.1 Concept (Civil)

5.1.1 Advance Sustainable construction techniques / Practices and Quantity Surveying

Design of a Sustainable Building: A Conceptual Framework for Implementing Sustainability in the Building Sector

The building industry is a vital element of any economy but has a significant impact on the environment. By virtue of its size, construction is one of the largest users of energy, material resources, and water, and it is a formidable polluter. In response to these impacts, there is growing consensus among organizations committed to environmental performance targets that appropriate strategies and actions are needed to make building activities more sustainable. With respect to such significant influence of the building industry, the sustainable building approach has a high potential to make a valuable contribution to sustainable development. Sustainability is a broad and complex concept, which has grown to be one of the major issues in the building industry. The idea of sustainability involves enhancing the quality of life, thus allowing people to live in a healthy environment, with improved social, economic and environmental conditions. A sustainable project is designed, built, renovated, operated or reused in an ecological and resource efficient manner. It should meet a number of certain objectives: resource and energy efficiency; CO2 and GHG emissions reduction; pollution prevention; mitigation of noise; improved indoor air quality; harmonization with the environment. An ideal project should be inexpensive to build, last forever with modest maintenance, but return completely to the earth when abandoned.

Definition

The practice of creating structures and using processes that are environmentally responsible and resource efficient throughout a building's lifecycle from siting to design, construction, operation, maintenance, renovation and deconstruction.

Sustainable Building Principles

It is estimated that by 2056, global economic activity will have increased fivefold, global population will have increased by over 50%, global energy consumption will have increased nearly threefold, and global manufacturing activity will have increased at least threefold. Globally, the building sector is arguably one of the most resource-intensive industries. Compared with other industries, the building industry rapidly growing world energy use and the use of finite fossil fuel resources has already raised concerns over supply difficulties, exhaustion of energy resources and heavy environmental impacts—ozone layer depletion, carbon dioxide emissions, global warming, climate change. Building material production consumes energy, the construction phase consumes energy, and operating a completed building consumes energy for heating, lighting, power and ventilation. In addition to energy consumption, the building industry is considered as a major contributor to environmental pollution, a major consumption of raw materials, with 3 billion tons consume annually or 40% of global use and produces an enormous amount of waste. The principal issues associated with the key sustainable building themes has been mapped out and collated in the table 5-1

Table 5-1: Sustainable building issues

Title	Key Theme	Principal Issues
Economic	**1.0 Maintenance of high and**	Improved productivity; Consistent profit growth; Employee
sustainability	**stable levels of local**	satisfaction; Supplier satisfaction; Client satisfaction
	economic growth and	Minimizing defects; Shorter and more predictable
	employment	completion time; Lower cost projects with increased cost

	1.1 Improved project delivery	predictability; Delivering services that provide best value to
	1.2 Increased profitability &	clients
	productivity	and focus on developing client business
Environmental	**2.0 Effective protection of**	Minimizing polluting emissions; Preventing nuisance from
sustainability	**the environment**	noise and dust by good site and depot management; Waste
	2.1 Avoiding pollution	minimization and elimination; Preventing pollution
	2.2 Protecting and enhancing	incidents and breaches of environmental requirements;
	biodiversity	Habitat creation and environmental improvement;
	2.3 Transport planning	Protection of sensitive ecosystems through good
		construction practices and supervision; Green transport plan
		for sites and business activities
	3.0 Prudent use of natural	Energy efficient at depots and sites; Reduced energy
	resources	consumption in business activities; Design for whole-life
	3.1 Improved energy	costs; Use of local supplies and materials with low
	efficiency	embodied energy; Lean design and construction avoiding
	3.2 Efficient use of resources	waste; Use of recycled/sustainability sourced products
		Water and Waste minimization and management
Social	**4.0 Social progress which**	Provision of effective training and appraisals; Equitable
sustainability	**recognizes the needs of**	terms and conditions; Provision of equal opportunities;
	everyone	Health, safety and conducive working environment;
	4.1 Respect for staff	Maintaining morale and employee satisfaction;
	4.2 Working with local	Participation in decision-making; Minimizing local
	communities and road users	nuisance and disruption; Minimizing traffic disruptions and
	4.3 Partnership working	delays; Building effective channels of communication;
		Contributing to the local economy through local
		employment and procurement; Delivering services that
		enhance the local environment; Building long-term
		relationships with clients; Building long-term relationships
		with local suppliers; Corporate citizenship; Delivering
		services that provide best value to clients and focus on
		developing client business

Sustainable building approach is considered as a way for the building industry to move towards achieving sustainable development taking into account environmental, socio and economic issues. It is also a way to portray the industry's responsibility towards protecting the environment. The practice of sustainable building refers to various methods in the process of implementing building projects that involve less harm to the environment—*i.e.*, prevention of waste production, increased reuse of waste in the production of building material—*i.e.*, waste management, beneficial to the society, and profitable to the company. Hill and Bowen state that sustainable building starts at the planning stage of a building and continues throughout its life to its eventual deconstruction and recycling of resources to reduce the waste stream associated with demolition. The authors then describe sustainable building as consisting of four principles: social, economic, biophysical and technical. Amongst the published work relating to the principles of sustainable building are collated.

Sustainable Implementation: A Framework of Strategies and Methods

In order to achieve a sustainable future in the building industry suggest adoption of multi-disciplinary approach covering a number of features such as: energy saving, improved use of materials, material waste minimization, pollution and emissions control *etc*. There are many ways in which the current nature of building activity can be controlled and improved to make it less environmentally damaging, without reducing the useful output of building activities. To create a competitive advantage using environment-friendly construction practices, the whole life-cycle of buildings should, therefore, be the context under which these practices are carried out. A review of literature has identified three general objectives which should shape the framework for implementing sustainable building design and construction (Figure 1), while keeping in mind the principles of sustainability issues (social, environmental and economic) identified previously. These objectives are:

1. Resource conservation
2. Cost efficiency and
3. Design for Human adaptation

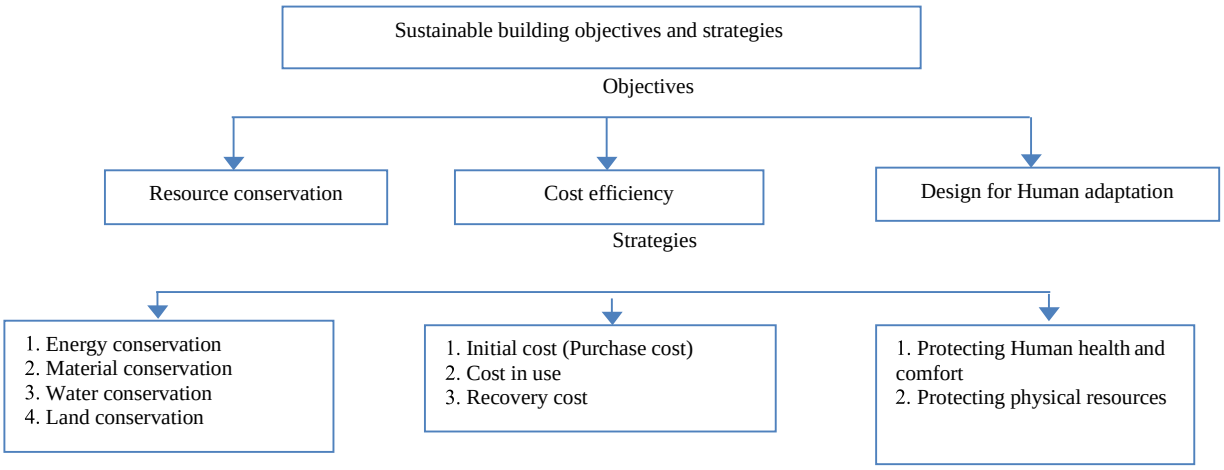


Figure 5-1:Framework for implementing sustainability in building construction.

Resource Conservation

"Resource conservation" means achieving more with less. It is the management of the human use of natural resources to provide the maximum benefit to current generations while maintaining capacity to meet the needs of future generations. The concept has become a major issue in debates about sustainable development. Halliday observe that certain resources are becoming extremely rare and the use of remaining stocks should be treated cautiously. The author called for the substitution of rare material with less rare or renewable materials. Bold statements about the need for radical improvements in the use of materials and energy resources have achieved recognition in policy circles. The argument is that productivity improvement is necessary to minimize impacts on the capacity of natural systems to assimilate waste materials and energy. According to Graham, the building industry is a major consumer of natural resources, and therefore many of the initiatives pursued in order to create ecology sustaining buildings are focusing on increasing the efficiency of resource use. He stated that the ways in which these efficiencies are sought are varied. He cited examples ranging from the principles of solar passive design which aim to reduce the consumption of non-renewable resources, the consumption of energy production, life cycle design and design for construction. Methods for minimizing material wastage during building construction process and providing opportunities for recycling and reuse of building material also contribute to improving resource consumption efficiency.

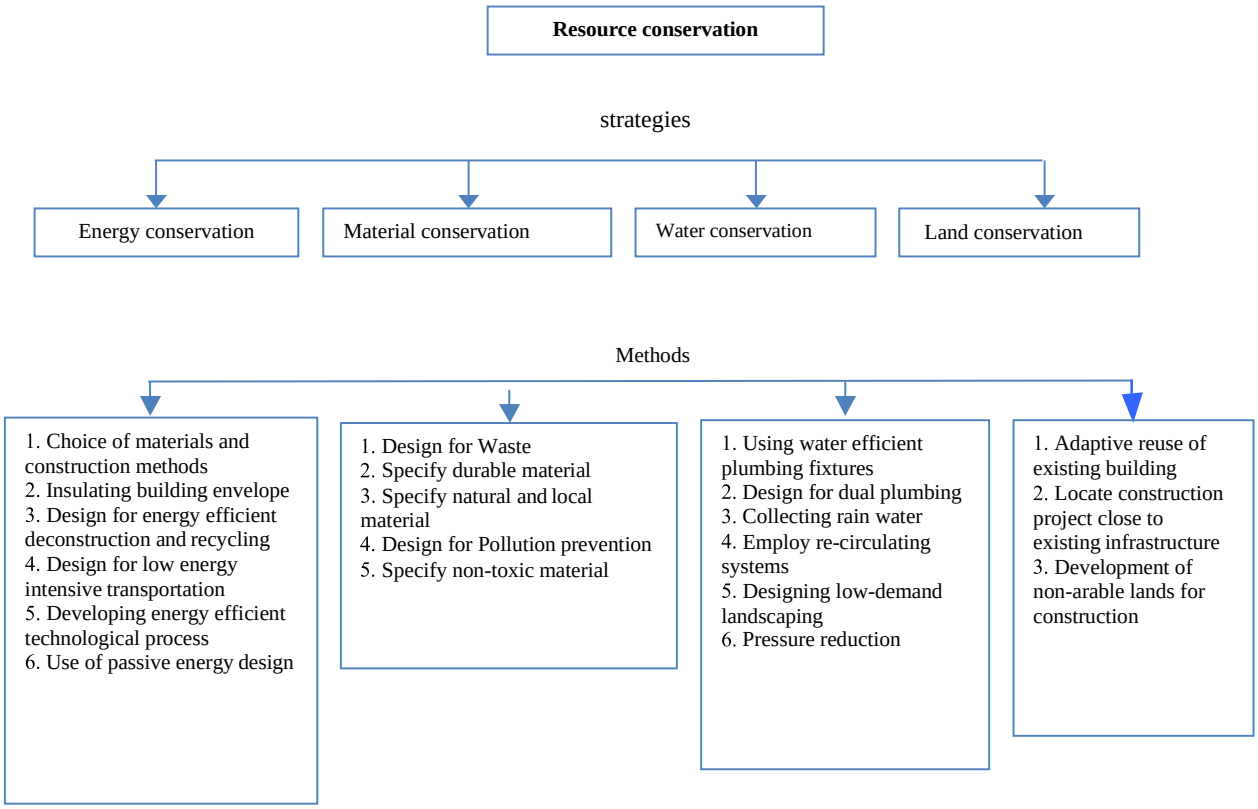


Figure 5-2:Strategies and Methods to achieve resource conservation.

Energy Conservation

Energy use is one of the most important environmental issues and managing its use is inevitable in any functional society. Buildings are the dominant energy consumers. Buildings consume energy and other resources at each stage of building project from design and construction through operation and final demolition. According to Lenzen and Treloar, the kind and amount of energy use during the life cycle of a building material, right from the production process to handling of building materials after its end life can, for example, affect the flow of greenhouse gases (GHGs) to the atmosphere in different ways over different periods of time. Their consumption can be largely cut back through improving efficiency, whichis an effective means to lessen greenhouse gas emissions and slow down depletion of nonrenewable energy resources. With this realization, increasing more attention is being paid to the improved energy conservation in building sector over the years, partly because the sector harbours a considerable potential of primary energy saving and reduction of emissions, having a negative impact on the environment. Energy use in a life cycle perspective includes energy needed for both operational and embodied energy. The operational energy requirements of a building can be considered as the energy that is used to maintain the environment inside that building. Thormark life cycle analysis of building shows that operational energy accounts for 85–95% of the total energy consumption and CO_2 emissions of a building which comes from occupancy through heating, cooling, ventilation, and hot water use. This will include energy from electricity, gas, and the burning of fuels such as oil or coal.

As the energy needed for operation decreases, more attention has to be paid to the energy use for the material production, which is the embodied energy. The embodied energy of a building is the total energy required in the creation of a building, including the direct energy used in the construction and assembly process, and the

indirect energy that is required to manufacture the materials and components of the building. This indirect energy will include all energy required from the raw material extraction, through processing and manufacture, and will also include all energy used in transport during this process and the relevant portions of the energy embodied in the infrastructure of the factories and machinery of manufacturing, construction and transport. The energy life of a building can therefore be considered to be made up of numerous inputs of operational and embodied energy throughout a building life cycle. Therefore the main goal in energy conservation is to reduce the consumption of fossil fuels, as well as increasing the use of renewable energy sources. This could be achieved by the consideration of the following methods:

Water Conservation

With the fast development of the global economy, depletion of water resources is becoming an environmental issue of the utmost concern worldwide. The United Nations World Water Development Report (WWDR) indicates that water for all our uses is becoming scarce and is leading to a water crisis. The effects a sector can have on the environment are nowhere more apparent than in the building industry. Building construction and its operations draw heavily on water from the environment. Growth in urban water use has caused a significant reduction of water tables and necessitating large projects that siphon supplies away from agriculture. Water used to operate buildings is a significant component of national water consumption. However, this is not the only form of water consumed throughout a building's life cycle. Water is also consumed in the extraction, production, manufacturing, and delivery of materials and products to site, and the actual on-site construction process. McCormack called this the "embodied" water. Water conservation technologies and strategies are often the most overlooked aspects of a whole-building design strategy. However, the planning for various water uses within a building is increasingly becoming a high priority, in part because of the increasing recognition of the water savings that can be realized through the implementation of water saving initiatives. The literature reveals a number of strategies that can be employed to reduce the amount of water consumed through a building life cycle. In general terms, these methods include:

1. Utilizing water-efficient plumbing fixtures such as ultra-low flow toilets and urinals, waterless urinals, low-flow and sensored sinks, low-flow showerheads, and water efficient dishwashers and washing machines, to minimize wastewater.
2. Design for dual plumbing to use recycled water for toilet flushing or a gray water system that recovers rainwater or other non-potable water for site irrigation. Gray water is produced by activities such as hand washing, and does not need to be treated intensively as sewage. It can be recycled in a building to irrigate ornamental plants or flush toilets.
3. Collecting rainwater using rainwater and grey water storage for irrigation greatly reduces

the consumption of treated water. Rainwater can also be used for household applications including drinking water. In fact, people in many regions of the world have traditionally relied on harvested rainwater for their water supply.

Land Conservation

Land is an important resource upon which the construction industry depends. Land use through urban expansion has been identified as a growing problem in both developed and developing worlds. Although more land may be reclaimed from the ocean, land reclamation on a large scale is undesirable since it could severely interfere with ecosystems. Soil erosion, groundwater contamination, acid rain and other industrial pollutants are damaging the health of plant communities, thereby intensifying the challenge and necessity to restore habitats.

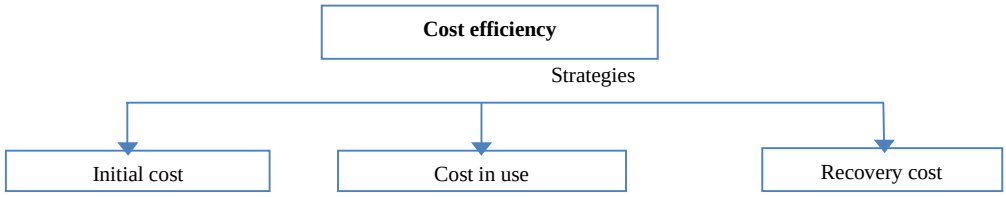
Sustainable design must develop a respect for the landscape and expend more effort understanding the interrelationships of soils, water, plant communities and associations, and habitats, as well as the impacts of human uses on them. The impact of the construction industry on the environment and the expansion of urban areas show the importance of land as a vital indicator of sustainability with the potential to become an absolute

indicator of sustainable construction. Land can be conserve by adopting a policy of zero expansion of existing urban areas. This could be achieved by adaptive reuse of an existing building, thereby eliminating the need for new construction. In addition, placing sustainable building project within easy access of public transportation, medical facilities, shopping areas and recreational facilities, would prevent the expansion of built environment and occupation of agricultural and eco-sensitive areas. These methods would promote better use of urban land through a higher population density that would make better use of infrastructure services and transport systems. Another potential spin-off is the development of non-arable land for construction purposes, linked together by energy efficient mass transportation system.

Cost Efficiency

Construction clients are demanding assurance of their buildings' long-term economic performance and costs. In addition, the construction project supply chain of developers, suppliers, manufacturers, design and construction teams are under increasing pressure from clients to minimize total project cost and consider how much a building will cost over its life cycle and how successfully it will continue to meet occupier's requirements. Buildings represent a large and long-lasting investment in financial terms as well as in other resources.

Improvements of cost effectiveness of buildings is consequently of common interest for the owner, the user and society. The concept of sustainability as applied to the construction of buildings is intended to promote the utmost efficiency and to reduce financial costs. There is considerable evidence to suggest that many organizations, in both the private and public sectors, make decisions about building related investment based on estimates of the initial construction cost, with little or no consideration for costs relating to operation and maintenance throughout the life of the building. Design decisions require choice of construction structure, building materials and building installations which are often accompanied by errors in investment through an inadequate economic control of decisions. Sharply rising energy costs have highlighted the opportunity for overall savings in the life of a building that can be achieved by investing in more energy efficient solutions initially. Savings on other operating and maintenance costs can also be considered, e.g., using building finishes that do not need frequent re-painting. A building's economic operation should be considered throughout the construction stage and also in terms of its maintenance and conservation throughout its useful life. In order to ensure that these objectives are achieved, the concept of life-cycle costing analysis (LCCA) will play significant roles in the economics of a building project. Life cycle cost analysis (LCCA) is an economic assessment approach that is able to predict the costs of a building from its operation, maintenance, and replacement until the end of its life-time. The effective implementation of life-cycle costing involves utilizing a thoughtful, comprehensive design along with construction practices with selected environmental considerations. Life cycle cost (LCC) is therefore an important tool for achieving cost efficiency in construction projects. This paper has identified three principal life cycles cost to be considered at the outset of a construction project. The initial cost, the cost in use and the recovery cost.



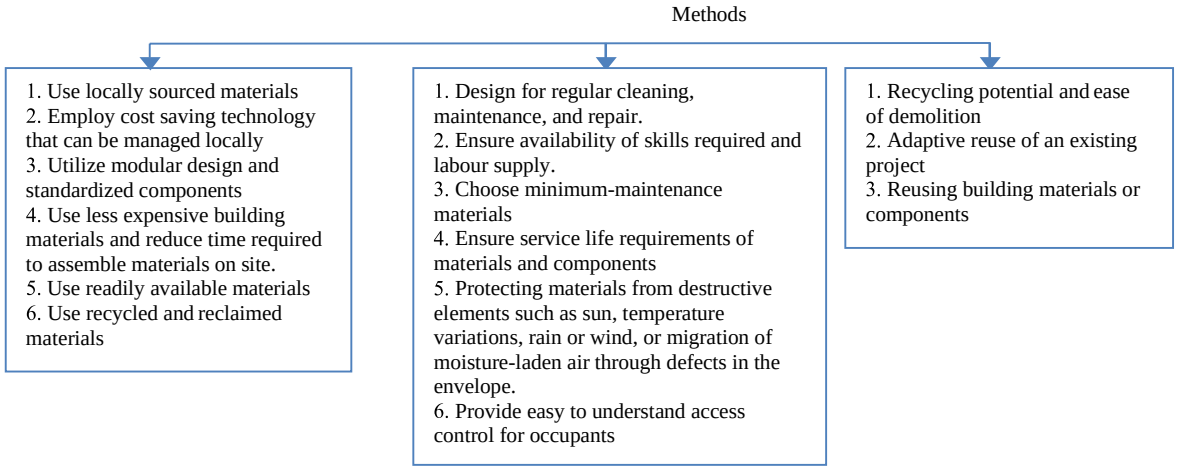


Figure 5-3: Strategies and Methods to achieve cost efficiency

Initial Cost

Also referred to as the acquisition cost or the development cost, the initial cost covers the entire cost of creating, or remodelling, the building, such as cost of land/building acquisition costs, professional consultants fee, the cost of the materials that compromise the completed building, and the cost of putting it all together. When planning the acquisition of a major asset, Emmitt and Yeomans observed that organizations spend considerable time and effort in making an economic evaluation of the initial cost. For many clients, this is their primary and often only concern. Cost reductions may be possible by selecting less expensive building materials and reducing the amount of time required to assemble them on site, but this assumes that these costs can be discovered. Other methods associated with initial cost reduction in building include the following:

1. The design should optimize the use of locally-available materials. In most cases, locally manufactured products are cheaper than their imported counterparts since their transport costs are not as huge and they do not come with import duty.
2. Use of cost saving construction technology such as the use of masonry stone for building foundation instead of reinforced concrete saves a lot of cost. This method is only suitable for low-rise buildings such as bungalows. For high-rise structures, careful structural design can be utilized so as to have the most optimum foundation design type to ensure less material is excavated.
3. Identify opportunities to minimize initial construction costs, through use of modular designs and standardized components where these are compatible with high quality, distinctive architecture that is appropriate to its context. For instance, a standardized plan with uniform office sizes provides an organizational framework that can be reconfigured as required, even the company changes. The design should also support technological changes.

Cost in Use

Otherwise known as the running cost or operation cost, the cost in use is set by the made at the briefing stage and the subsequent decisions made during the design and assembly phases. It also involves regularly scheduled adjustments and inspection to protect a building so that it goes on to supply the same comfort and appliances-resources and the cost of parts to perform repairs. Furthermore, decoration, fabric of building (*i.e.*, roof, xternal walls), services (*i.e.*, heating and ventilation) also took place at this level. or many years, running costs were only given superficial attention at the design stage, although this has changed with the use of life cycle costing techniques that help to highlight the link between design decisions and costs in use. Materials and components

with long service lives do cost more than those not expected to last so long and designing to reduce both maintenance and running costs may result in an increase in the initial cost. However, over the longer term, say 15 years, it might cost the building owner less than the solution with lower initial cost. Cost reduction in the use of building can achieve by taking into consideration the following.

1. Taking adequate measures within the design of key building elements to provide dedicated and generous space for regular cleaning, maintenance, and repair to the central or major elements of the HVAC system and ensure that access points are readily identified and locatable.
2. Ensuring that the skills required are within the competence of available labor supply. Absence of abundant labor with building facilities maintenance skills can result in increased maintenance costs. Where local skills are available for example bricklayers, structures should be designed to make maximum use of such skills. A project can specify brick manholes in favor of precast concrete ones in order to harness available skills.
3. Choosing minimum-maintenance materials. Where possible, select building materials that require little maintenance (painting, retreatment, waterproofing, *etc*.). For example Wood plastic composite (WPC) low-maintenance advantages over wood continue to drivegrowth in wood replacement applications.

Recovery Cost

There is a third cost that is rarely considered—the cost of demolition and material recovery. This is partly because the client may well have sold the building long before the building is recycled and partly because such costs are traditionally associated with the initial cost of the future development. Again this may be of little concern to the current client who is looking for short term gain with minimal outlay. However, if we are to take environmental issues seriously, then the following methods should be implemented to reduce or eliminate
recovery cost.

1. Recycling potential and ease of demolition should be considered during the design phases and costed into the development budget. It enhances the sustainability of construction industry. Waste means new resources for new constructions. In most cases, making products by recycling demolition wastes creates less air pollution and water pollution than making new products. Recycling also creates jobs as well as saving valuable resources, thus protecting the natural environment.
2. The adaptive reuse of an existing project significantly reduces waste and conserves the energy used for material manufacturing and construction. The energy embodied in the construction of a building and the production of materials will be wasted if the existing resource is not properly utilized.
3. Reusing building materials or components is a way of minimizing waste production, if an old building is not completely available for reusing. In such cases, it may be preferred to renovate and reuse individual components, such as windows, doors and interior fixtures. Attention to the life cycle cost of building project in terms of both design and choice of materials will minimize the overall costs for owner and users. It is important to determine how long the building is designed to last and whether it is likely that functional requirements will change in this time. Moreover, if it is likely that re-sale value will be enhanced by ability to adapt to new uses, then appropriate design can substantially reduce the costs of adapting to new uses. Thus, increasing cost effectiveness of a building is a critical strategy for creating sustainable building.

Design for Human Adaptation

One of the main purposes of a sustainable building is to provide healthy and comfortable environments for human activities. A building must accommodate the activities it is built for and provide floor-space, room volume, shelter, light and amenities for working, living, learning, curing, processing *etc*. Furthermore, the building must supply a healthy and comfortable indoor climate to the people using it. In meeting these basic requirements, the building should not cause harm to its occupants or the environment and must, for example, be structurally stable and fire safe. Sustainable development requires that the building does not cause unnecessary load or risk to the environment, for example in the form of energy use. To promote and enhance human adaptation the following two design methods should be considered.

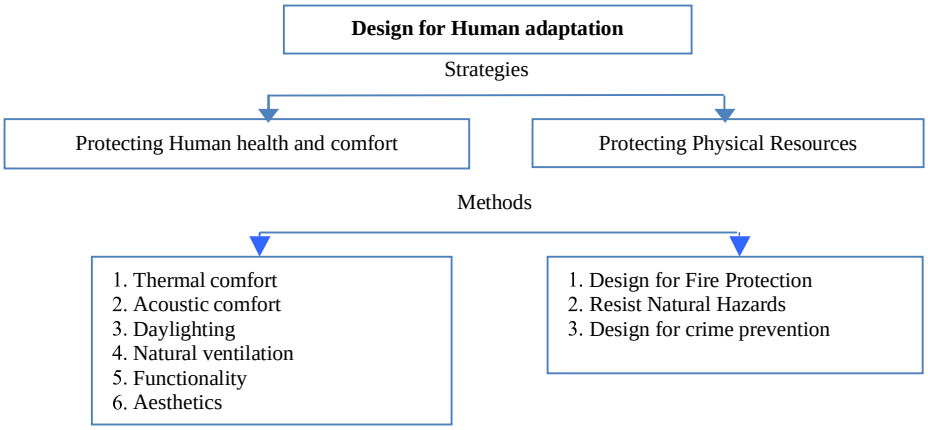


Figure 5-4:Strategies and Methods to achieve human adaptation

Protecting Health and Comfort

Well-being (health and comfort) is an important aspect determining the quality of life of an occupant. In a modern society, where individuals spend more than 90% of their time indoors—and more than 70% of their time indoors at home, an essential role of architecture is to provide occupants' health, physiological comfort, physiological satisfaction and productivity. The concept of health is significant for identifying the concept of a "sustainable building" in terms of building performances (*i.e.*, indoor air quality, thermal comfort, lighting quality and acoustics). A sustainable industry must balance human needs with the carrying capacity of natural and cultural environments. A healthy building is free of hazardous material (e.g., lead and asbestos) and capable of fostering health and comfort of the occupants during its entire life cycle, supporting social needs and enhancing productivity. A healthy building recognizes that human health needs, and comfort, are priorities. Many building designers have been preoccupied with style and form-making, disregarding environmental quality and human satisfaction in and around the built environment. According to Sev, a product may save energy and perform well; however, if it does not positively affect the occupants' comfort and enhance productivity, it is not a sustainable product. A review of the literature identified the following (but not limited to) methods as a necessity in enhancing the coexistence between the environment, buildings and their occupants.

1. Thermal comfort is a key to occupant's satisfaction and productivity. Maintaining thermal comfort for occupants of buildings or other enclosures should be one of the important goals of every building designer. The environmental parameters which constitute the thermal environment are: Temperature (air, radiant, surface), humidity, air velocity and the personal parameters: clothing together with activity level. Building envelope considerations, such as reflective roofing, low-E windows, window tinting and solar shading are

some of the tools that enable designers to optimize thermal comfort as well as improving energy efficiency. Siting the building according to seasonal heat gain and use is another key to thermal comfort, as is landscaping.

2. The acoustical environment of a workspace is typically given little or no attention during project planning and design. Acoustic comfort must be achieved by controlling sources of noise from mechanical and electrical equipment and from sources exterior to the building. Proper selection of windows, wall insulation and wall framing, and materials are essential to reducing noise from outside. Some sound insulating materials, such as acoustic ceiling tiles and straw-bale construction, can offer the advantages of recycling and using natural materials. Hard versus absorbent surfaces also have a major impact on noise level inside a space. Noise elimination, control or isolation from HVAC equipment should also be addressed through acoustic zoning, equipment selection, construction and appropriately designed ducts, piping and electrical systems. There may be opportunities to meet project sustainability goals in conjunction with good acoustical design if they are considered early in the project development phase.
3. Daylighting involves designing buildings for optimum use of natural light and provides numerous benefits over artificial lighting. Generally it is understood to be beneficial both to health and well-being. Maximising good daylight in housing is therefore an important consideration. Good daylight means levels of daylight which are sufficient to see properly without glare or excessive contrast. Too much direct sun can actually cause discomfort and ill health, particularly with highly reflective surfaces.

Protecting Physical Resources

Protecting physical resources is one of the most important principles of sustainable design and construction. Consideration must be given to design that incorporate building resilience against natural and man-made disasters such as fire incident, earthquake, flooding and crime attack. Hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage and the methods to achieve these tasks are as follows.

1. Plan for Fire Protection. The most crucial aspect of a building's safety involves a systems approach that enables the designer to analyse all of the building's components as a total building fire safety system package. As buildings become more complex and architects push the design envelope ever further, it is vital to consider fire safety implications of new buildings or other construction or refurbishment projects at the concept design stage. An important precondition is that its fire safety facilities enable independent and adequate fire response performances by the building's occupants. The consideration of Fire Stopping and Passive Fire Protection measures are vital to the stability and integrity of a building or structure in case of fire. A fire strategy will only achieve maximum effectiveness if the passive fire protection measures, such as insulated fire-resisting partitions, cavity barriers, specialist fire-stopping of gaps in structure with their proven fire performance properties, are built into the fabric of a building. Passive fire protection not only maintains the stability of a building's structure during fire, they provide stability and separate the building into areas of manageable risk (Fire Compartments). These are designed to keeps escape routes safe and helps isolate and limit fire, heat, and smoke allowing the occupants to escape and the fire fighters to do their job safely. Such protection is either provided by the materials from which the buildings was constructed or, have been added to reinstate or establish the fire integrity.

2. Resist Natural Hazards. Recent natural and human-induced events have highlighted the fragility and vulnerability of the built environment to disasters. In most of these cases, occupants are left to pay for the recovery effort, including repairing damaged buildings and infrastructure, from the impacts of hurricanes, floods, earthquakes, tornados, blizzards, and other natural disasters. Hazard resistance methods should be an important project design requirement in the same way that environmental considerations are now integral parts of project documents. For example, flood mitigation techniques include elevating buildings above floor levels in flood prone areas; making buildings watertight to prevent water entry, incorporation of levees and floodwalls into site design to keep water away from the building. Adding retrofitting techniques such as ferro-cement veneer, vertical corner reinforcement embedded in mortar and introducing tie beams and adding buttress to brick masonry and mud-wall housing will also go a long way in protecting against natural hazards. For details of other hazards preventions methods, the reader is referred to Whole Building Design Guide by the National Institute of Building Sciences.

Conclusions

Sustainable building is considered as a way for the building industry to move towards protecting the environment. The promotion of sustainable building practices is to pursue a balance among economic, social, and environmental performance in implementing construction projects. If we accept this, the link between sustainable development and construction becomes clear; construction is of high economic significance and has strong environmental and social impacts. With the growing awareness on environmental protection, this issue has gained wider attention from construction practitioners worldwide. Implementing sustainable building construction practices has been advocated as a way forward in fostering economic advancement in the building industry while minimizing impact on the environment. In order to reduce these detrimental impacts of construction on the environment and to achieve sustainability in the industry, three principles emerge: resource efficiency, cost efficiency and design for human adaptation. They form framework for integrating sustainability principles into construction projects right from the conceptual stage.

The framework has considerable potential to accelerate the understanding and implementation of sustainability in building construction. It provides a brief overview of sustainability principles, strategies and methods, and emphasizes the need for an integrated and holistic approach for implementing sustainability in building projects. It is intended to provide a general framework for improving the quality and comparability of methods for assessing the environmental performance of buildings. It identifies and describes issues to be taken into account when using methods for the assessment of environmental performance for new or existing building properties in the design, construction, operation, refurbishment and deconstruction stages. It is not an assessment system in itself but is intended to be used in conjunction with, and complimentary to existing assessment systems such as BREEAM, BEES, LEED, *etc*.

The sustainability requirements are to a greater or lesser extent interrelated. The challenge for designers is to bring together these different sustainability requirements in innovative ways. The new design approach must recognize the impacts of every design choice on the natural and cultural resources of the local, regional and global environments. These sustainability requirements will be applicable throughout the different stages of the building life cycle, from its design, during its useful life, up until management of the building waste in the demolition stage. This framework lays the groundwork for the development of a decision support tool to help improve the decision making process in implementing sustainability in building projects. The full decision support tool will be described in the model currently being developed for use in the UK building industry

5.1.2 Soil Liquefaction

Liquefaction During 1988 Earthquakes and a Case Study

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SYNOPSIS Several parts of north eastern India, Bangladesh and Burma were rocked by an earthquake on August 6, 1988. The author carried out earthquake damage survey due to liquefaction in Assam region. Wide spread liquefaction in the area was observed. Guide bunds and approach roads of a road bridge near tezpur performed excellently against liquefaction during the earthquake for which they were designed. Another earthquake of magnitude 6.6 visited Nepal Bihar border region which shook northern Bihar and Nepal region and was felt as far as Jaipur in the west and Shillong in the east. Large scale liquefaction has also been reported due to this earthquake.

Figure 5-51: Railway Track Near- Bar Lonqphar

Liquefaction of saturated sands has often been one of the causes of earthquake damage to structures resulting in loss of the life and property. On Augusut 6, 1988, several parts of the north, north-eastern India were rocked by an earthquake. The tremors werP. also felt in Nepal, Bangladesh, Burma and Soviet Union. The author c.arried out the earthquake damage survey due to liquefaction of foundation soil in Assam region during the field visit from August 11 to August 19, 1988. Widespread catastrophic damage due to liquefaction of embankments, bridges and foundation soil was observed.

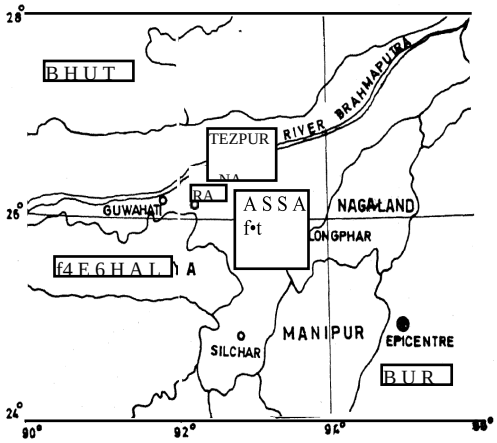


Figure 5-6: Location of Epicentre

On Augusut 21, 1988 another earthquake occurred on Bihar Nepal Border region. The damage was reported from areas of Bihar, West-Bengal, Bhutan and Nepal. The shock was felt at far off distances such as Tripura, Orissa, Madhya Pradesh, Rajasthan etc. Department of Earthquake Engineering, University of Roorkee, Roorkee, sent a team to Bihar to carry out a damage survey.

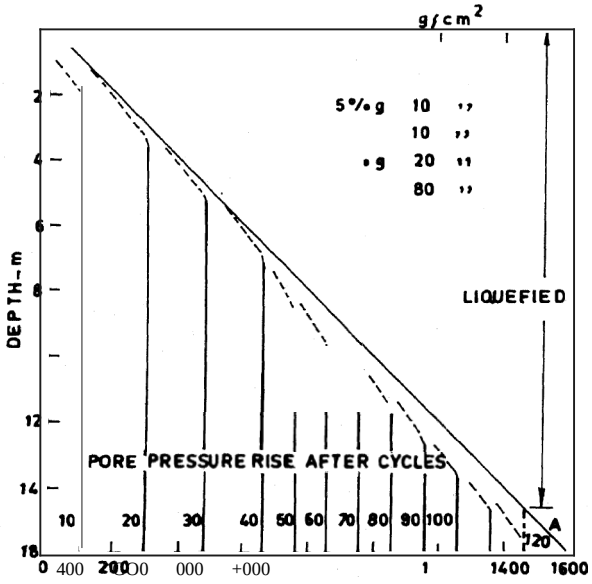


Figure 5-7: Z00 POR E PRESSUR E RIS E - g / c m

5.1.3 Sustainable Sanitation

Case Study on Sustainability of Rural Sanitation Marketing in Vietnam

From 2003 to 2006, a rural pilot project was conducted in Vietnam with technical support from the non-governmental organization (NGO) International Development Enterprises (IDE) and funding from Danish International Development Assistance (DANIDA). The project tested whether a sanitation marketing approach could improve rural access to sanitary toilets in 30 communes in six districts of the coastal provinces of Thanh Hoa and Quang Nam. Research for the case study took place between June and August 2009. Local sanitation statistics were collected in all study communes. Semi-structured interviews were held with the promoters, providers, and some local government authorities. Interviews were held with district and provincial authorities and at a national level with the Non-Governmental Organizations (NGOs), national authorities, and donors involved in rural sanitation. With the help of participatory tools, focus group discussions were held with sixty-one householders who had built sanitary toilets or upgraded their unsanitary ones, and sixty householders who had either no toilet or a still unsanitary one. Finally, the study team visited a very small and non-random sample of installed toilets to observe the quality of construction and hygiene as per the national standards of the Ministry of Health.

Rural Sanitation Developmentin Vietnam

According to the National Bureau of Statistics, the rural population of Vietnam numbered 61.7 million people in 2007, 73% of the total population. In 1998 only 24% had sanitary toilets. The government of Vietnam (GoVN) therefore adopted a new sector strategy (GoVN 2000), financing policy (Ministry of Agriculture and Rural Development (MARD) 2003) and two new national programs, the National Target Program I (NTP I) from 1999

to 2005 (GoVN 1998) and NTP II from 2006 to 2010 (GoVN 2006, MARD 2005). The rural sanitation targets for 2010 are:

- 70% of rural households use sanitary toilets and have good sanitary practices;
- 70% of the farmers and animal raising householdsin rural areas use sanitary animal husbandry facilitiesand practices;
- All kindergartens, schools, health stations, markets, district head offices and other public offices in rural areas have enough clean water and sanitary toilets;
- Environmental pollution from rural industries, espe- cially related to food and food processing is reduced

Table 5-2: Estimated amoutnts and sources of funding for RWSS under NTP I

ources of Funding	Central Budget	Other Budgets	nternational Assistance	People's Self-Investments	Credit by Households	Total
Amount	1,420,000	1,221,585	1,008,600	2,518,702	323,863	6,492,750
% of total	22	19	16	38	5	100
Source: CERWASS 2006.						

In 2003, Vietnam adopted new guidelines for Informa- tion-Education-Communication (IEC) on clean water supply and safe sanitation and hygiene. The guidelines included training at all levels, but especially for local civil servants, on diversification of messages and channels, the use of participatory methods, dissemination of good models and practices, and resource allocation. A pilot program conducted in four provinces from 2001 to 2006 showed that the program made most communes andleaders adopt participatory and demand-responsive proj-ects (Nguyen and Stoltz undated). However, as of 2003, application at larger scale had not yet started (CERWASS 2003).

Table 5-3: Access to clean water and sanitary toilets in rural areas

FIGURE 1: ACCESS TO CLEAN WATER AND SANITARYTOILETS IN RURAL AREAS BEFORE AND AFTER NTP I

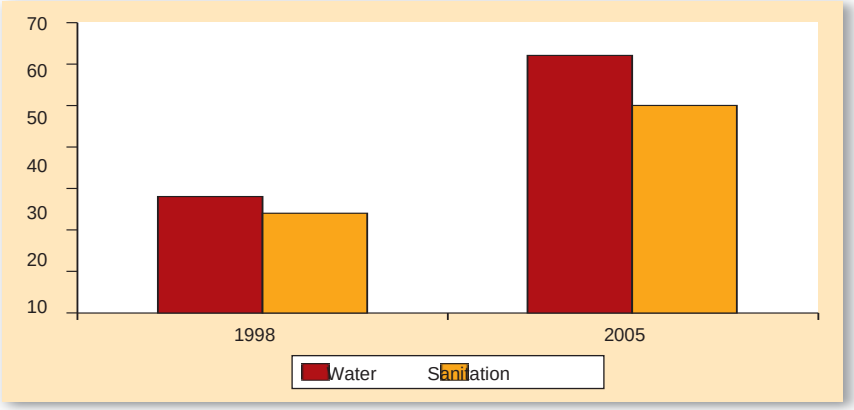


Table 5-4: Access to clean water and sanitation in rural regions in december 2005

Region	% Accessto Clean Water	% Accessto SanitaryToilets
Nine Dragons River Delta Region	66	35
Red River Delta Region	66	65
South East Region	68	62
Highlands Region	52	39
Northern Mountains	56	38
Middle and South Sea Coast Region	57	50
East North Region/Middle North	61	56
National Average	62	50
Source: GoVN 2006		

Because of the slower increase in rural sanitation, a pilotproject was therefore started in two provinces to test if arural sanitation marketing approach could enhance accessto sanitary toilets. The approach and results of this project are summarized in the next section.

The Rural Sanitation MarketingPilot Project

IDE, or International Development Enterprises, is a non-profit organization, which uses business principles and un-subsidized markets to help poor rural households sell their products and services better, and so reduce their poverty. IDE has been active in Vietnam since 1991. The Vietnambranch has six offices and 30 staff members.

From January 2003 to December 2006, with a six-monthgap in 2005, IDE carried out a pilot project on rural sanita- tion marketing in 30 communes in six districts of two prov-inces, Thanh Hoa and Quang Nam (Figure 2). Both are coastal and have above-average poverty levels, but no ethnicminorities. The pilot communes had a total population of270,000 or almost 54,000 families. Of these, 16% had san- itary toilets, 24% unsanitary toilets and 60% no toilet be-fore the pilot project began. Poor households constituted19% of the population at that time (IDE 2006). The aim of the pilot project was to test if it were possible to increaseand accelerate the growth of sanitation coverage withoutproviding household subsidies by enlarging the demand and improving the supply for sanitary toilets.

Table 5-5: Cost reduction of toilet models offered under pilot, by household (IN USD)

Type of Toilet	Pre-Pilot Cost (Dec ’02)	Average Cost Under Pilot Project (adjusted to Dec ’02) (Adjusted)[2]	June ’06 (Actual)
Double vault composting toilet		$ 52.20	$ 58
Single vault pour-flush toilet	$ 65	$ 58.50	$ 65
Semi-septic tank toilet		$ 63.90	$ 71
Septic tank toilet	$ 150–200	$ 87.30	$ 97

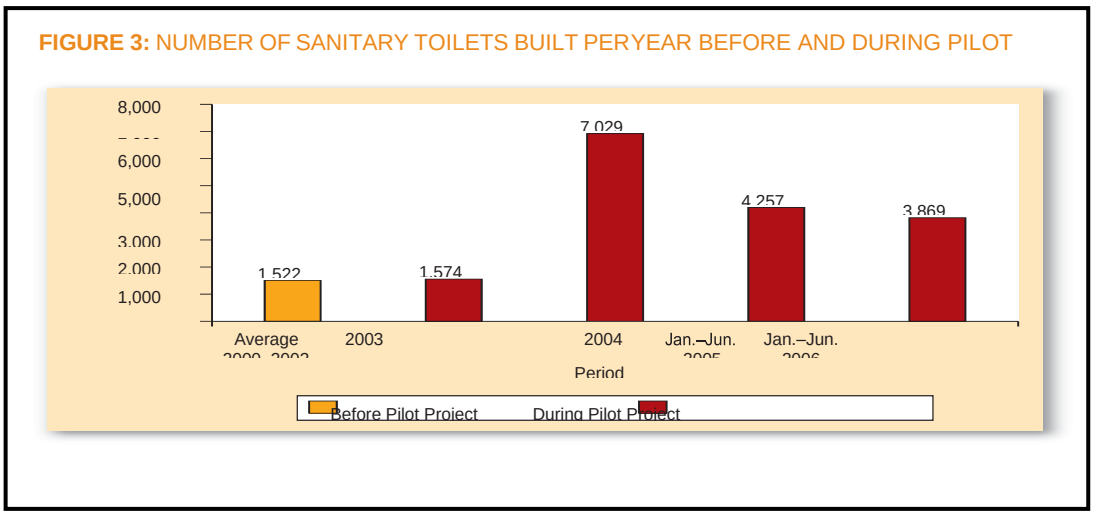


Figure 5-8: Number of sanitary toilets built per year before and during pilot

Figure 3 shows the construction progress over time. The out-put was still limited in 2003, because until August of thatyear the focus was on research, organization, and training.Actual construction only covered four months from Septem-ber to December 2003. Outputs increased rapidly in 2004.As Figure 3 illustrates, they were four times the average out-put of the conventional program in the preceding three years. The lower outputs in 2005 reflect the gap betweenPhase I and Phase II, when support from IDE stopped tem- porarily. In 2006, the outputs are also lower than in 2004,because they are for the first six months only, after whichIDE ended the monitoring support.

5.1.4 Transport Infrastructure / system

Case study: Manchester Metroshuttle

The Manchester Metroshuttle service was launched in 2002 as a flagship zero-fare transport offer for Manchester city centre. The initial momentum came from CityCo Manchester, a group representing the interests of Manchester's city centre, who recognised the lack of accessibility to businesses and shops in the city centre as limiting to growth – the scheme would build on the existing Centreline service which linked the two main train stations. The city also wanted to reduce traffic congestion. The main impetus for making the service free at point of use was scepticism on behalf of funding partners that the revenue generated from charging fares would outweigh the operational costs of ticketing and enforcement. It also meant the service was universally accessible, allowing all people to get to work and to shops and services.

The first two Metroshuttle lines were introduced in 2002, with a third route introduced in 2005. Zero-fare buses link rail stations, tram stops, shopping areas and businesses across the city. The service is funded by a partnership between CityCo, Manchester City Council, Transport for Greater Manchester, National Car Parks, and Allied London, a major local landowner. Running costs, which are also partly funded by advertising, are £1.2 million per year. The hybrid vehicles that were introduced in 2010 were funded through subsidies from the Department for Transport. The stakeholders in the PPP also decide on the routes, which were designed to link up key transport nodes and businesses. In 2013, there were 2.8 million passengers on the Metroshuttle, an increase of 32 per cent since 2006.

The Heart of Manchester Business Improvement District regarded the service as a valuable part of the city's infrastructure which supports the retail development of the city. 39 per cent of Metroshuttle users are in the city centre for leisure and recreation, and 36 per cent use the service to commute, demonstrating its value both for retail and city centre jobs.

Figure 5-9: Manchester transport system

5.1.5 Vertical Farming

Madhuri Shrikant Sonawane Assistant Professor

Vertical farming is cultivating and producing crops/ plants in vertically stacked layers and vertically inclined surfaces. The entire world is on the verge of population explosion and there is a gravest challenge of feeding the population. The population explosion has led to the decreased per capita land. Earlier with the aim of supplying the food to ever increasing population agricultural scientist stretched their innovative approaches to the tune of developing hybrid/ improved high yielding varieties, improved techniques, improved tools and implements, integrated practices in water, nutrient management and insect, pest management, greenhouse technology and even the genetically modified crops.

Figure 5-10: Vertical Farming

All these efforts once were revolutionary, now sound inadequate. In 1915, Gilbert Ellis Bailey coined the term "vertical farming" and wrote a booktitled "Vertical Farming". In the early 1930s, William Frederick Gerick pioneered hydroponics at the University of California at Berkley. In the 1980s, Åke Olsson, a Swedish ecological farmer, invented a spiral-shaped rail system for growing plants and suggested vertical farming as a means for producing vegetables in cities. Professor Dickson Despommierin in 1999 came up with an idea of vertical farming. His concept was to grow the food in urban areas itself utilizing less distance and saving the time inbringing the food produced in rural areas to the cities. He intended in growing food within urban environments and thus have fresher foods available faster and at lower costs.

Today, the context of vertical farming has completely changed and is confined to the aim of utilizing each and every inch of land and space, no matter whether it is urban or rural for growing maximum possible food for the hungry population. It has now emerged as a new farming technology all over the world. In India also, vertical farming is stepping in International Archive of Applied Sciences and Technology Int. Arch. App. Sci. Technol; Vol 9 December 2018: 122-125 © 2018 Society of Education, India [ISO9001: 2008 Certified Organization]

www.soeagra.com/iaast.html IAAST ONLINE ISSN 2277- 1565 PRINT ISSN 0976 - 4828 IAAST Vol 9 December 2018 123 | P a g e ©2018 Society of Education, India actually.Many entrepreneurs are coming forward for vertical farming with high net returns. Vertical farming can be implemented in buildings, warehouses, rooftops and balconies.

5.1.6 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure

Case study

The durability of concrete structures is influenced by various factors, for example, ecological presentation, electrochemical responses, mechanical stacking, affect harm and others. Of all of these, consumption of the fortification is likely the primary driver for the disintegration of steel strengthen cement (RC) structures. Consumption administration is ending up progressively important because of the developing number of maturing foundation resources (e.g. spans, burrows and so on.) and the expanded prerequisite for imprompt upkeep with a specific end goal to keep these structures operational all through their outline life (and usually, past).

The primary RC repair, restoration and recovery approaches by and large utilized can be extensively arranged under an) ordinary, b) surface medications, c) electrochemical medicines and d) outline arrangements. The overall point of this examination was to recognize the key consumption administration strategies and embrace exact examinations concentrated on full-scale RC structures to explore their longhaul execution.

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

Their commitments might be comprehensively arranged as I) Investigations on how particular medications and materials perform, ii) Investigations on the viability of existing techniques for estimations and creating options, iii) Changes to the current hypothesis of consumption commencement and capture furthermore iv) Changes to administration system methodologies. The key discoveries from each examination bundle can be condensed as takes after: Macrocell movement seems, by all accounts, to be a result instead of a reason for beginning anode development in repaired solid structures, as has beforehand been exhibited;

ICCP has industrious defensive impacts even after the interference of the defensive current; Discrete galvanic anodes introduced in the parent concrete encompassing the fix repair are an achievable contrasting option to galvanic anodes inserted inside the fix repairs of RC structures;

5.1.7 Sewage treatment plant

A Case Study on Sewage Treatment Plant (STP), Delawas, Jaipur

The basic needs of human survival, i.e. water, food & shelter are no more easily accessed resources. The ever-increasing demand of human being cannot be meet successfully through present conventional resources. The indiscriminate population explosion raises the demand of food and fodder for continue life on earth. Due to domestic waste, sewage and industrialization, our environment (rivers, ponds and other natural resources) is polluting. In Indiancontext, the situation is very drastically. The situations has only be handled by not throwing sewage directly to natural resources and reuse the treated water that ultimately reduces the overall demand of fresh water.

However, India treats only 20% of its sewage and rest fall directly into rivers causing severe problems. The Problem faced by government and scientists in India is the mentality of people about the sewage treated water. This paper focuses on the mentality of people and coup it with the present situation and effectively reduces the overall demand in scientific healthy manner. The main aim of paper is to use the treated water in a way; whichdoes not harm human and environment along with consideration of mentality of society. The work area is STP Delawas, PratapNagar, Jaipur, which is setup in 2006, and operation &management is under the charge of M/S VatechWabag Ltd. The survey for knowing people's concern conducted in Sitapura area is the source of knowledge about people's views. The STP collects water from 25Km surrounding with gravity flow & no pumping is use for sewage upliftment for sending it to plant, which is a great achievement for itsengineers. The STP covers the area from Vidhyadhar nagar to Pratap Nagar, Sanganer. However, in study the authors also notice some illegal and careless practice of the plant and advice them to solve as soon as possible.

Figure 5-11: Sewage treatment plant

5.2 Concept (Electrical)

5.2.1 Programmable Load Shedding

Introduction

Electricity is one of the most important requirement of modern civilization, without which various indispensable applications will bind to bring standstill. As we know that demand of electricity is increasing now days. So electric utilities prefer load shedding when the demand exceed the supply .Thus in a distribution system it needs to be precisely measured for specific periodoftime.Programmable load shedding time management system" is a reliable & effective load shedding technique that takes over the manual task of switch ON/OFF the electrical supply with respect to time. It uses real time clock (RTC) interfaced to the 8051 family microcontroller. The paper "effective load shedding technique for utility department "will provide real & competent load shedding techniques such that distribution substation can be monitored & load shedding from one particular place. In this project load shedding will be depicted on the basis of chronological load curve analysis of a particular area.

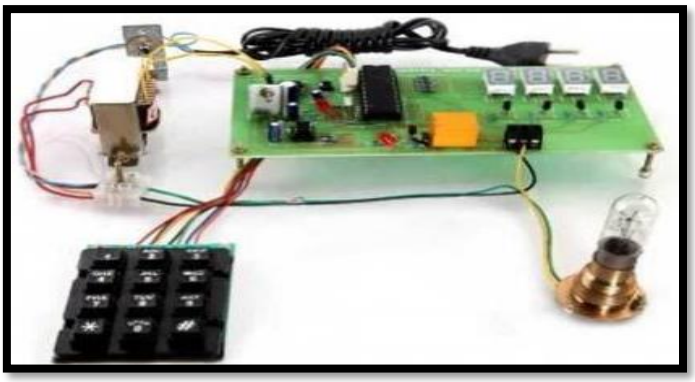


Figure 5-12: Programmable load circuit

The frequency conditions of the overall power system will directly depend on the amount of active power that the generator could deliver to the system. Also, the prime mover's stored energy plays an important role on the system behavior. This stored energy varies drastically from thermal, to hydro units. For gradual increases in electric load, or sudden but mild overloads, unit governors will sense speed change and therefore increase power input to the generator. Extra load is handled by the unused capacity of all accessible generators functioning and synchronized to the system. If all generators are operating at their maximum capacities and the spinning reserve is zero, then the governors may be powerless to relieve overloads.

METHODOLOGY

The main purpose of electric power system is to accord the power structure to consumer's loads. An electric power system consists three parts:

1. Power generation
2. Transmission
3. Distribution system.

Electric power is generated at 11kV, 50Hz in a power generating station. For transmitting over long distances, it is stepped-up to 400kV, 220 kV as it is necessary to reduce power losses while transmitting power. Power is carried through a high voltage lines of transmission network. Usually, these voltage lines run into hundreds of kilometers and it deliver to grid. These load centers (cities) are connected to grid through a sub-transmission network of ordinarily 33kV (or sometimes 66kV) lines. These lines dismiss into a 33kV (or 66kV) at substation, where the voltage is to be stepped-down to 11kV for power distribution to load.

Related works

So In this project "The Programmable load shedding time management system" we are connecting three loads operating through microcontroller using relay circuits. Here 230V AC supply is rectified to 12V DC which is then converted into input circuit supply of 5V DC with the help of voltage regulator. AS we know that in power system relays are used to trip the circuit at a time of any fault or disturbance. So to shed the particular load, relay receives the command from microcontroller. Input load shedding time is provided through input matrix keypad. When real time clock (RTC) set time come equal to the input load shedding time the microcontroller gives command to the relay to shed the particular load from the system and finally the shed time is displayed on the LCD display.

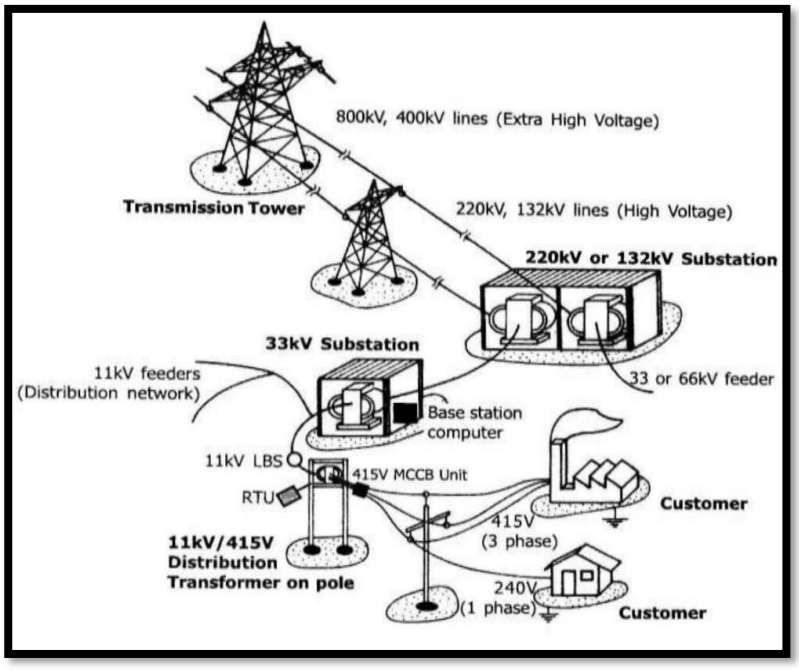


Figure 5-13:Methodology

5.2.2 Railway Security System using IoT

Introduction

Even with greatest of ideas to avoid railway accidents, many trains accidents still happen worldwide. This paper shares an idea on how to avoid train collision by using an automated control incorporated in the trains. In this proposed paper we have implemented ideas such as pre-crashing using RFID sensor, ultrasonic sensor in-order to choose an array of commands which would run as per the conditional algorithm created in the microcontroller. We would also have a EPM to control the speed of the motor to lessen speed. This system will be more efficient since it was fully automated and also it was cost effective.

We wanted to be apart of our surrounding with some change and advancement so that it can bring the better life of the middle class and lower class people to travel in high security and advanced locomotion's .the train is one and only most widely used transportion,and not only for this they are used for goods transportation also .Indian railways are not able to facilate the customer properly due to crowded amount of people. Statistics show that the leading cause of death by injury in railways traffic accidents(two train collision each other). There are number of causes for which an accident can occur, some of them are; lack of training for driving or less experienced, use of mobile phone while driving, unskilled drivers, driving while intoxicated, bad railway tack condition, overloading in train and negligence traffic management.

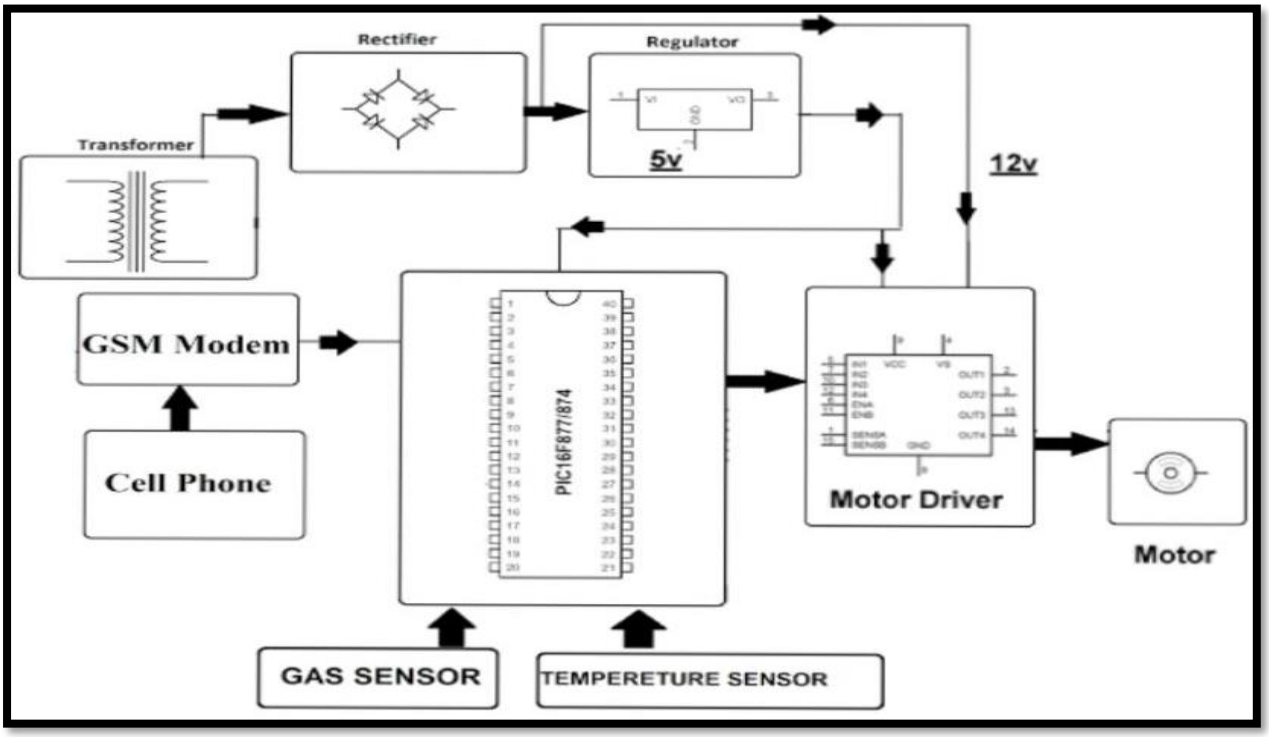


Figure 5-14: Railway security system flowchart

PROPOSED METHODOLOGY

This project discusses the technical and design aspects in detail and also provides the proposed railway track crack control system. This project also presents the details of the implementation results of the railway track crack control system utilizing simple components inclusive of a GPRS modem and IR based crack detector assembly. The proposed method has been

designed for robust implementation in the Indian scenario. The Arduino UNO has 14 input/output pins to which all other devices get connected to it. The IR sensor and the ultrasonic sensor detect the crack and the object in the railway track. The detected crack and the object will get sensed in the form of signal. A signal conditioning unit (SCU) is a device that coverts one form of signal into another. A driver circuit is an electrical circuit or an electronic component used to control another circuit or component. [3]The alarm and the motor will electrically get operated by a relay switch. The generator converts mechanical energy into electrical power which can be used for external circuit. The generator will generate the energy and recharge the battery while the motor starts running. The battery provides a static potential power or electrical charges to other devices. The liquid crystal display (LCD) displays the detected output.

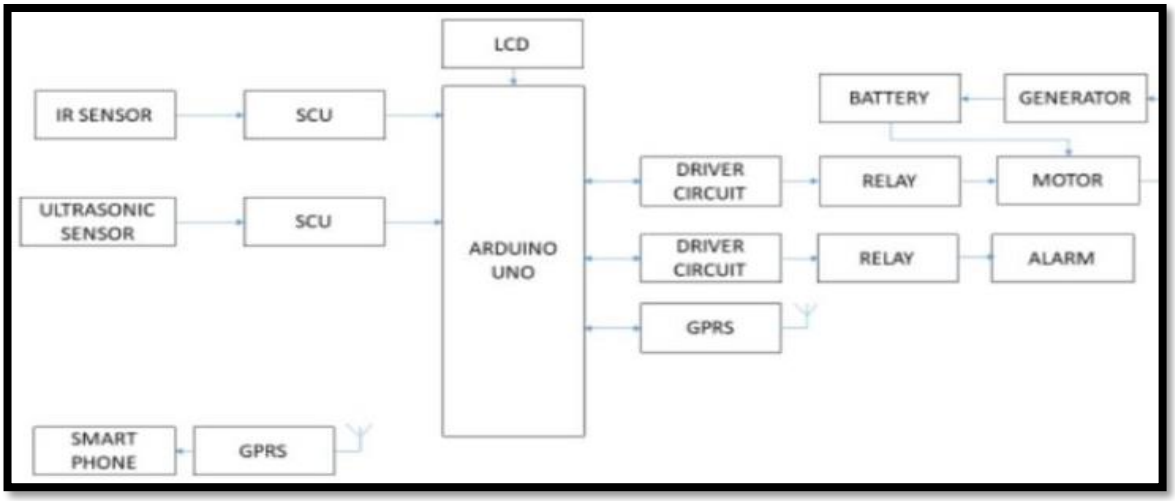


Figure 5-15:Block diagram of IOT based fault control in railway track system.

5.2.3 Management through energy harvesting concept

Sustainable wireless sensor networks (WSNs) are being widely used nowadays due to two key driving technologies behind them i.e. energy harvesting and energy management. Energy harvesting from environmental energy sources such as solar, wind, thermal, mechanical and so forth are introduced from the perspective of energy supply to the WSN, while energy management of WSN such as the design of MAC protocol, design of routing protocol, and dynamic power management technology are presented from the perspective of energy conservation within the WSN itself. To better understand them in details for optimizing the sustainable WSN performance, in this paper, a review of these two enabling technologies are performed. More depth research into their combined efforts for sustainable WSN is presented and then illustrated with a case study. One of the most commonly referred energy harvesting source, i.e. solar energy, and its energy management which includes a new energy forecast model of wireless sensor nodes and a new model of energy distribution in WSNs using data collection protocol is investigated and demonstrated.

Solar energy harvesting:

For earth, solar energy or light energy is a kind of inexhaustible and clean energy. The basic principle of optical collection is to absorb a large number of photons by the use of photovoltaic materials. If there is enough number of photons to activate the electronic optical pool, electricity can be obtained through appropriate structural design. Because power that can be

harvested is greatly depending on the light intensity, optical components are usually placed in an environment with good lighting condition in order to obtain more power. Optical components can be connected in serials to generate the required voltage. As manufacturing cost of optoelectronic components is declining, the selection of solar energy as energy source for wireless sensor networks has become a reasonable technical solution.

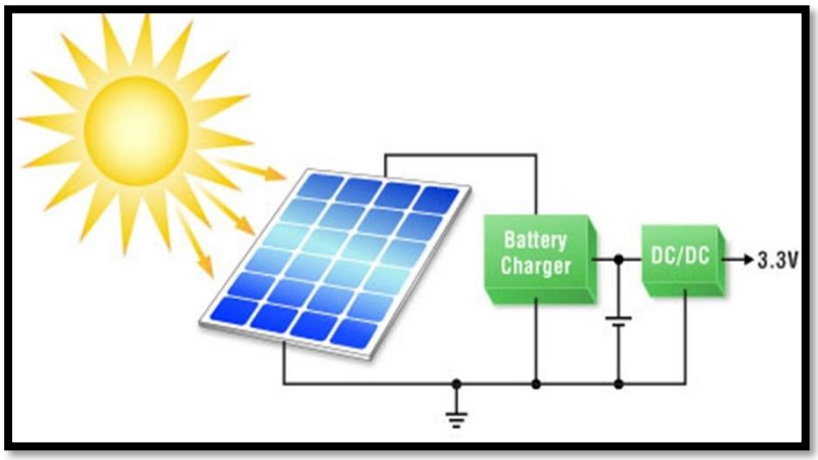


Figure 5-16:solar energy harvesting

The only disadvantage of solar energy is that it is only available during day time (for outdoor environment) or office hour (for indoor environment). A battery is needed to ensure the sensors to be operated all around the clock and the efficiency can be low on cloudy days when sun exposure is very low.

Wind energy harvesting

Like any of the commonly available renewable energy sources, wind energy harvesting has been widely researched for high power applications where large wind turbine-generators (WTGs) are used for supplying power to remote loads and grid-connected applications. Although very few research works are reported in the literature on small-scale wind energy harvesting, some efforts to generate power at a very small-scale have been made recently.

The main disadvantage regarding wind power is unreliability Factor, as the strength of the wind is not constant and Unpredictable, hence it does not produce the same amount of Electricity all the time. In addition, since it involves moving Mechanical part, it can be noisy.

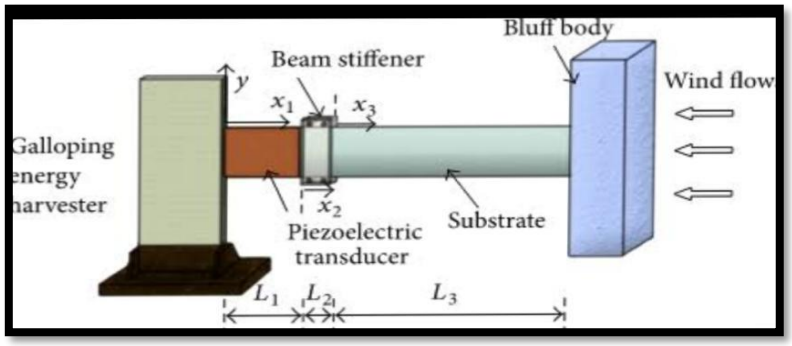


Figure 5-17: wind energy harvesting

Thermal energy harvesting

Research on thermoelectric technology began in 1940's, reached its peak in 1960's. And this technology was successfully used on the spacecraft. Temperature difference generator is featured with characteristics such as small, light weight, no vibration, no noise, less maintenance and can work for long hours under harsh environment. It is suitable to act as low power less than 5W and usually mounted in a variety of unmanned surveillance sensors, tiny short-range communication devices, and medical instrumentation. At present, the relevant products have been widely used. German scientists have invented a new type of battery using the temperature of human body to produce electricity, which can provide long-term "power" for portable miniature electronic devices and eliminates the trouble of charging or replacing batteries. For example, temperature

difference which equal to 5 ć between human skin and clothes can be took advantage of and provide sufficient energy for a common watch. Some examples of the thermal energy harvesting systems are presented in Figure

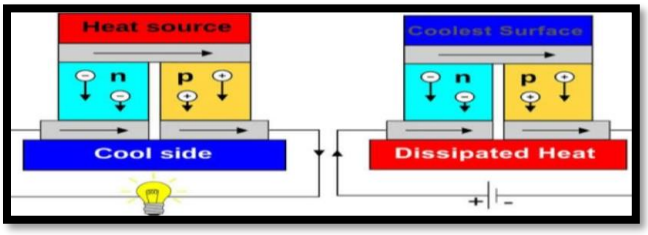


Figure 5-18: Thermal energy harvesting

5.2.4 Moisture Monitoring System

The many type of moisture monitoring system the two type of important moisture monitoring system.

1) Soil Moisture monitoring system

Over the last few years there has been a lot of interest in SMM. This is in part due to the increasing cost of water and the associate's need to make mistakes in water productivity. This is also a result of on farm irrigation upgrade and irrigation supply system modernization. Irrigators who are experiencing these mistakes are searching. They have many controls full water on their farm and good position use tools that help them match irrigations with plants.

Monitoring the soil moisture generally done by manual observation of researchers in agriculture area. It is obviously take a long time, especially when monitoring the declining level of soil moisture. This practice is less efficient especially when examining the level of soil moisture contained plants in it. For that we need a solution to improve efficiency in terms of use of time and in terms of facilitating the monitoring of soil moisture conditions. Our proposed system to monitor soil moisture uses Librium Wasp mote as a microcontroller. The process of sending data from the sensor to the Internet network and then to the database server took about 10-15 seconds. This was influenced by the process of taking data from the board and also the delay when the sensor connected to the available network. The results of system testing showed that the system can work in a way if researchers leave the soil with high humidity then researchers want to monitor soil moisture at a certain moisture level, then the researchers simply set the level of humidity that wants to be maintained by the application system. If the soil moisture content is equal or less than the point set on the system, the system provided notification immediately.

Figure 5-19 Soil Moisture monitoring system

2) Plant Moisture monitoring system:

We live in a world where everything can be controlled and operated automatically. Plant monitoring is an important part of agriculture in our country as they used to grow plants under controlled climatic conditions for optimum produce. Automating aplant monitoring and controlling of the climatic parameters which directly or indirectly govern the plant growth and hence they produce yields. Automation is a process for controlling industrial machinery and processes, thereby

replacing human operations. In this paper, plant watering and monitoring system technology will provide feedback to the user through smart phones or laptops. The automated system will reduce the need of man power hence reducing the error. For large scale areas, it is quite impossible for a farmer to monitor the efficiency of the system by implementing this technology, the farmer can easily monitor the system using their smart devices.

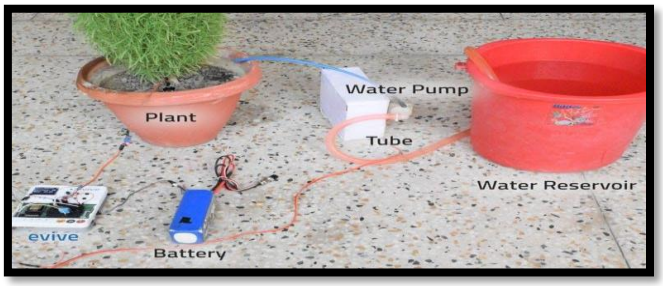


Figure 5-20 Plant Moisture monitoring system

Related work

We have studied many previous works done in this field by different researchers. Use of technology in the field of agriculture plays an important role in increasing the production as well as in reducing the manpower efforts. Research for improving agricultural production by utilizing different controllers like PIC microcontroller,8051 controller, ARM 7, also monitoring done by different communication technology like ZigBee, Wireless sensor network(WSN),even using GSM. In , the paper demonstrates the integration of all the hardware parts related to agriculture. Soil moisture sensor is used for detecting dryness of soil and according to the value detected by sensor watering will be done to the plant. Efficient use of all the hardware whichever is used for developing the system. Paper describes how to connect hardware devices to a third-party cloud service provider via processing language. Also the soil moisture is used here to detect dryness of soil. For storage purpose cloud is used so there is the issue of security. Real time data is used for further processing. In paper , the aim of the paper is to maintain the nature of plants by continuously monitoring the parameters leading to the increased life of plants. The system is designed by connecting different parameters of the soil like humidity, temperature, moisture to the cloud and it is successfully controlled remotely through a mobile application. The paper ,deals with a simple, easy to install, microcontroller-based circuit to monitor and record the value of temperature, humidity, soil moisture and sunlight of the natural environment that are continuously modified and controlled in order to optimize them to achieve maximum plant growth and yield.

5.2.5 Home Automation using IoT / Any other methodology

Introduction

The home animation is control of home device form a central control point automation is today s facts where more things are being completed every day automatically. Usually the basic tasks of turning on or off certain device and beyond, either remotely or in close proximity. The concept of the RF-based system is to use the underlying wireless data network such as IEEE 802.11 (Wi-Fi). The popularity of wireless networks at home has increased in recent years, and the advanced computer technology has made the personal digital device to commonly have the capability to communicate through the wireless network. Hence, it is suitable to use RF-based location denervation system to estimate location of the personal digital device in a home environment with high data rate transmission, supporting multimedia application may be feasible in WLAN. One if the possible application is wireless network for home automation. Imagine a private home equipped with motion light temperature and other sensor actuators for opining the door dimming lights with a remote control as complex as setting up a network of items in your home .

Temperature control using PIC16F877

The system is composed of a 300W heater resistance, a temperature sensor, a measurement amplifier, a controller, a digital/analog converter, a pulse width modulator, a TRIAC triggering circuit and a 220V AC fan. It is shown in the figure.

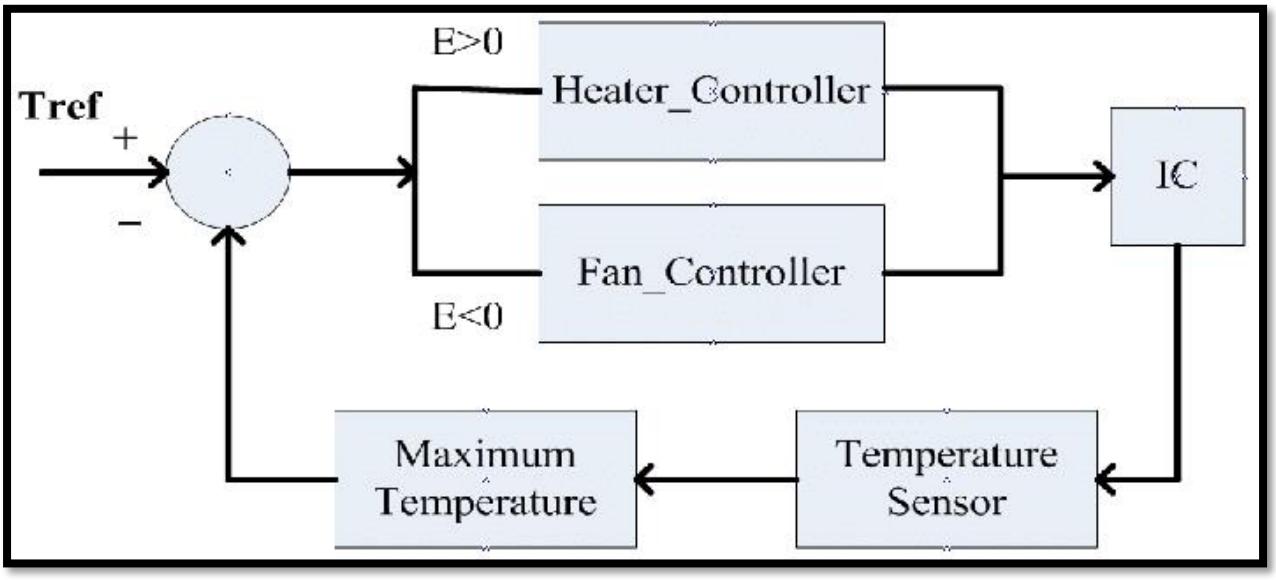


Figure 5-21:Temperature control

Gas leakage system

The gas leakage alarm circuit is shown in figure 2. It operates on a 9V PP3 battery. Zenger diode ZD1 is used to convert 9V into 5V DC to drive the gas sensor module. A preset in the module is used to set the threshold. Interfacing with the sensor module is done through a 4-pin SIP header. Whenever there is LPG concentration of 1000 ppm in the area, the OUT pin of the sensor module goes high. This signal drives timer IC 555, which is wired as an actable multivariate. The multivariate basically works as a tone generator.

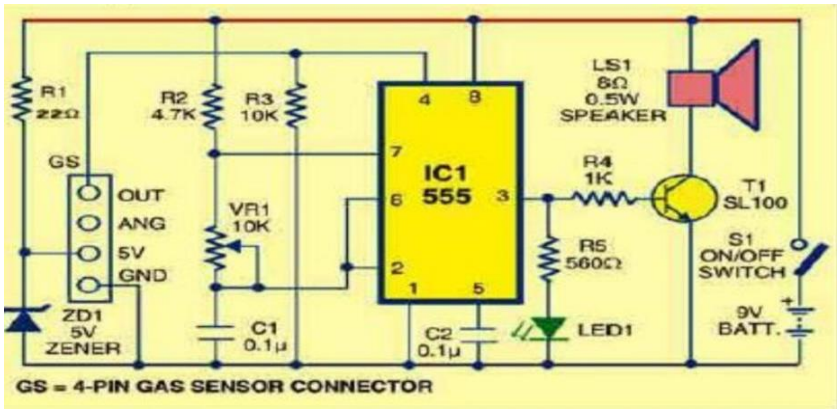


Figure 5-22:Gas leakage alarm circuit

Role of Iot in Home Automation

. The IoT based Home Automation will enable the user to use a Home Automation System based on Internet of Things (IoT). The modern homes are automated through the internet and the home appliances are controlled. The user commands over the internet will be obtained by the Wi-Fi modems. The Microcontroller has an interface with this modem. The system status is displayed through the LCD display, along with the system data. This is a typical IoT based Home Automation system, for controlling all your home appliances. The smart home market is taking off

as IoT device prices come down and the general public comes to understand the benefits of these products. And from smart homes, the next logical step is smart cities, which would take the IoT to the next level. And yet, smart homes are just one small part of our daily lives that the Internet of Things will renovate in the coming years.

The beauty of the Home Automation system lies in the fact that the settings are manageable from your smart phones and other remote-control devices. Smart home IoTdevices can help reduce costs and conserve energy. The Home Automation segment includes smart lighting, smart TVs and other appliances.

5.2.6 PC Based Electrical Load Control

Introduction

In today's world .there is high a demand for PC based control system because of its various advantages s over manual control system, PC based control systems are highly reliable , accurate and time saving systems, they provide number of features like quick data storage , data transfer and data security which help industries to work in efficient manner In this paper, a PC based system which will control various devices like Motor, Light, and Fan etc. Designed a GUI (Graphical User Interface) on the PC and which helps to give command to the system. Microcontroller is used in order to receive commands from PC and accordingly control the devices connected to it. In this way this system is completely controlled by PC.

With advancement of technology things are becoming simpler and easier for us. Automated systems are being preferred over manual system. PC based control systems are highly reliable, accurate and time saving systems. They provide number of features like quick data storage, transfer data and data securities which helps in industries to work in sufficient manner. A microcontroller based controller is designed to control a number of electrical equipment. To control and monitor connected equipment through the PC. Keywords – Microcontroller 8051, Computer, RS-232 cable, MAX-232, Relay and home equipment.

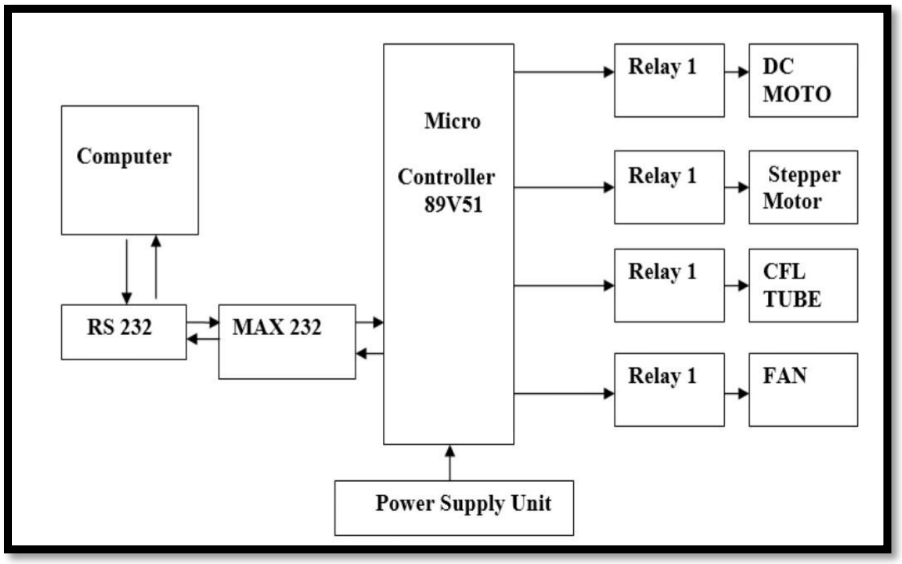


Figure 5-23: Power supply unit

POWER SUPPLY

There are many types of power supply. Most are designed to convert high voltage AC mains electricity to a suitable DC voltage supply for electronic circuits and other devices. 5 Volt DC power supply require for operation of microcontroller.

COMPUTER

Computer is used in order to give commands to the system with the help of RS 232 protocol commands through Graphical User Interface.

RS 232 PROTOCOL

It has been used in order to do serial communication with the help of MAX 232 as level converter.

MICRO-CONTROLLER (8051)

This is the most important segment of the project. The controller is responsible for detection and polling of the peripherals status. It is responsible for making and prioritizing all the devices attached to it. In this project, P89V51RD2 microcontroller is used. The P89V51RD2 is a low-power, high-performance CMOS 4-bit microcontroller with 64K bytes of in-system programmable Flash memory. It has got 32 I/O lines two data pointers, two 16-bit timer/counters, six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and a clock circuitry.

RELAY

A relay is an electrically operated switch. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.

WORKING OF THE SYSTEM

When the power is ON initially, all IC's & relays get resets. Once any Button is pressed by user through computer control device window (GUI), computer will send command to Microcontroller with the help of standard serial communication protocol (RS 232). And through microcontroller relay operation take place & according that home appliance works. The developed model is connected to four appliances fan, motor, lamp and CFL. By giving appropriate command individual appliances are turned on and off simultaneously. All the devices can work at a time.

5.2.7 Electrical Parameters Measurements

Introduction

Nowadays, the measurement of electrical quantities is an essential part of almost any measurement. It can be realized as a measurement, whose results indicate directly a value of measured electric quantities, such as voltage, current, resistance, etc., or a measurement, where measurement of electrical quantities is only an internal function of an electronic measurement system measuring any other physical quantity.

In this work, a fundamental overview of measurement of electrical quantities is given, including units of their measurement. Electrical quantities are of various properties and have different characteristics. They also differ in the frequency range and spectral content from dc up to tens of GHz and the level range from nano and micro units up to Mega and Giga units. No single instrument meets all these requirements even for only one quantity, and therefore the measurement of electrical quantities requires a wide variety of techniques and instrumentations to perform a required measurement. The measurement is unimaginable without sound knowledge of the quantities, measurement units and the theory of electrical circuits.

Basic Electrical Parameters

The basic electrical quantities are electrical current and voltage, electrical charge, resistance, capacitance, inductance and electric power. Electricity is a flow of free electrons carrying negative electric charge from a place of their excess (the place with negative charge) to a place of their deficiency (the place with positive charge) .

Parameter	Measuring Unit	Relationship
Voltage	volt (V or E)	$E = I \times R$
Current	amp (I)	$I = \frac{E}{R}$
Resistance	ohm (R or Ω)	$R = \frac{E}{I}$
Conductance	mho (G or ℧)	$G = \frac{I}{R} = \frac{I}{E}$
Power	watt (W)	$P = I \times E$ or $P = I^2R$
Inductance	henry (L or H)	$V_L = -L\left(\frac{\Delta I}{\Delta t}\right)$
Capacitance	farad (C)	$C = \frac{Q}{E}$ (Q = charge)

Figure 5-24: Basic Electrical Parameters

1. Electric Current and Charge

According to the convention, the positive direction of electric current is opposite, i.e. the positive direction of electric current is from the place with a positive charge to the place with a negative charge. The symbol for electric current is I (or i, if the current is time varying), and the basic unit of measure is ampere (symbol A) after André-Marie Ampère. The ampere is one of seven basic units according to the international convention (SI), and its definition is: "the ampere is that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 meter apart in vacuum, would produce between these conductors a force equal to 2 x 10–7 newton per meter of length". Although ampere is the basic SI units, its definition is not convenient for metrological applications and construction of calibrators. In practice ampere is maintained via Ohm's Law from the units of electromotive force and resistance, the volt and the ohm (see below), since the latter two can be tied to physical phenomena that are relatively easy to reproduce, the Josephson junction and the quantum Hall effect, respectively.

2. Electric Voltage

Electric voltage is a difference of potential between two places with different charges. Voltage provides the ability to move charges and hence do a work, and therefore voltage is also sometimes called electromotive force (EMF). The symbol for voltage is V or sometimes U (v or u , if the voltage is time varying quantity) and the measurement unit of is volt (V) after Alessandro Volta. The SI definition is: "The volt is the potential difference between two points of a conducting wire carrying a constant current of 1 ampere, when the power dissipated between these points is equal to 1 watt". Electric voltage and current are manifestations of electric charge movement, and they can be considered "active" quantities. They can carry information in electronic circuits and systems or they can be considered only an expression of supplied and consumed electrical energy. Measurement methods and instrumentation as well as measured parameters differ depending on where and why the voltage and current are measured.

3. Resistance, Capacitance, Inductance and Impedance

Resistance (symbol R) is a very important electrical quantity that indicates how much voltage is necessary to create a certain amount of current in a component. The relation among voltage, current and resistance is given by the Ohm's law:

$$R=V/I$$

Resistance is measured in ohms (symbol Ω) after Georg Simon Ohm. The SI definition of ohm is: "the ohm is the electric resistance between two points of a conductor when a constant potential difference of 1 volt, applied to these points, produces in the conductor a current of 1 ampere, the conductor not being the seat of any electromotive force".

Capacitance expresses the ability to accumulate electrical energy in the form of electric field. Capacitance is the basic required property of a capacitor. The simplest capacitor consists of two isolated conductive plates. The general relation among current i and voltage v across the capacitor and capacitance C is given by:

$$C=Q/V$$

The unit of capacitance measurement is farad (symbol F) after Michael Faraday. The SI definition is: "the farad is the capacitance of a capacitor between the plates of which there appears a potential difference of 1 volt when it is charged by a quantity of electricity of 1 coulomb".

Inductance is the ability to accumulate electrical energy in the form of magnetic field. Inductance is the fundamental property of an inductor. The simplest inductor is a coiled wire optionally equipped with a core. The general relation among current i and voltage v across the inductor and inductance L is given by:

$$V=L\ di/dt$$

The unit of inductance measurement is henry (symbol H) after Joseph Henry. The SI definition is: "the henry is the inductance of a closed circuit in which an electromotive force of 1 volt is produced when the electric current in the circuit varies uniformly at the rate of 1 ampere per second".

Chapter 6. Swatchh Bharat Abhiyan (Clean India)

6.1 Swatchhta needed in allocated village -Existing Situation with photograph

Garbage Littering: there is absence of not only garbage disposal system, but also garbage collection system. The waste generated from each home is burned near by the house itself in the empty space available. Since, the incineration is still being utilized in the village, all the drawbacks of the method of disposal comes into picture as well. One of the main side effect is air pollution. Along with it, land pollution also arises. Since, agriculture is still practiced and that too as a major occupation, taking care of the fertile land is not only voluntary out of concern; but it becomes a necessity too.

Figure 6-1: Garbage of village

Garbage collection system: Recently vankal village is using tractor as a collecting system for garbage from all the houses as far as tractor can reach any house. After the garbage is collected we are now aiming we can use that garbage in two different ways 1) for using as fertilizer 2) after incineration of watse in land for growing crops.

Use of waste:

we have discussed with the village heads like sarpanch and talati about how to use the waste of cow dunk and other solid waste which they can reuse it. We told them about the problem they creating for themselves without proper disposal of waste or without using it back if it is reusable for them.
For this we have one of our design for use of cow waste in biogas plant which in return will provide energy as well as reduction of waste from village.

6.2 Guidelines - Implementation in allocated village with Photograph

- Dust bins should be allocated to each and every house.
- The awareness regarding cleanliness and hygiene should be developed.
- Seminars can be conducted regarding environment friendliness.
- People should not be allowed to burn the waste outside their house.
- Of course, for this, waste collection system should be implemented.
- Any barren land can be utilised for the incineration process to burn the waste collectively.
- This piece of land may be infertile waste lands.
- The location of the site of disposal should be enough far away from the community settlement so as to not disturb them.
- In village area a vehicle collecting both type of garbage should be implemented for easy disposal.

- The villagers should be made acquainted with the scientific composting method.

6.3 Activities Done by Students for allocated village with Photograph

- In this phase, we spread awareness by visiting each house of the village and discussing with them importance of hygiene. We also included the importance of waste collection and disposal.
- After lockdown over, we visited the village again and we give training were conducted to train ground level motivate with proper social distancing and mask wearing in the village.
- We explain them about how to use the waste of cow dunk and other solid waste which they can reuse it.
- We told them about the problem they creating for themselves without proper disposal of waste or without using it back if it is reusable for them.
- We have done a small campaign about swachhta and covid-19 to spread awareness.

Chapter 7. Village condition due to Covid-19

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

To prevent the spread of COVID-19:

- Clean your hands often. Use soap and water, or an alcohol-based hand rub.
- Maintain a safe distance from anyone who is coughing or sneezing.
- Wear a mask when physical distancing is not possible.
- Don’t touch your eyes, nose or mouth.
- Cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze.
- Stay home if you feel unwell.
- If you have a fever, cough and difficulty breathing, seek medical attention.

Figure 7-1: village during corona

7.2 Activities Done by Students for allocated village Clean with Photograph

- Due to corona we had not much interact with the villagers to avoid corona so we had maintained social distancing so that’s why we didn’t do much work for corona safety.
- We have taken door to door awareness with the village people because of the covid-19 guidelines to prevent the spreading of corona virus.
- We have notice the behavior of the villagers towards us and it was not quit good because they were afraid of us because we were outsiders from the village.
- Due to waste thrown in village here and there, unhygienic condition was also there so we told them how to get over with this waste using dustbin at every 500m

7.3 Any other steps taken by the students / villagers

- In this phase, we spread awareness by visiting each house of the village and discussing with them importance of hygiene.
- We have done a small campaign about swachhta and covid-19 to spread awareness.
- we have notice that due to lockdown in school’s students of village were not able to study properly because they don’t have any proper instrument for online teaching classes.
- We have given them the advice how they can teach student in classroom without breaking any corona guidelines and suggest them to take 10 students in each class from same standard and take alternate lecture for them.

- Due to corona, people were afraid of us somehow and not giving us the proper information and was not ready to take photograph with us that's why we don't have photo of us with villagers.
- We have gather information about village corona patient and it was quite a relief that there is no any corona patient till now in vankal village or nearby village.
- We don't have photos because they were afraid of us that maybe we are infected and don't help us in more work to do.

Chapter 8. Sustainable Design Planning Proposal (Prototype Design)- Part- I

8.1 Design Proposals

8.1.1 Sustainable Design (Bio gas plant)

Bio gas plant

There is no availability of gas people are used the wood material for the cooking in the kitchen so we can give the design individual bio-gas plan each home.

- Biogas is a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen.
- Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage green waste or food waste.

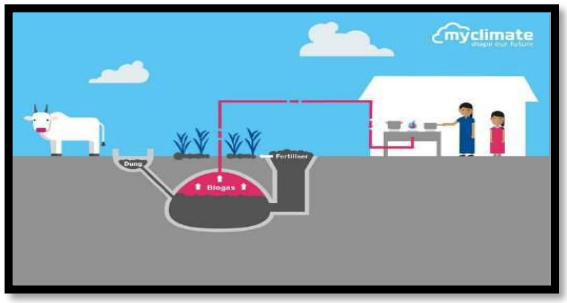


Figure 8-1:Plan of Bio gas plant

Design criteria:

- The biogas plant is made of F.R.P. Material which is resistant to water, sunlight and electricity, if it is take care of well, can be used for up to 25 years.
- Everyday 10 kg cow dung along with 15 liters of water is put in the mixing tank.
- The cow dung is brought from cowsheds from nearby areas, where owners want to dispose it anyway.
- The mixture is fermented inside the fermentation tank by the anaerobic bacteria.
- The mixture is then converted into slurry through which methane gas and co2 gas are released. They also put kitchen waste into the tank for producing biogas which used for cooking.

Figure 8-2: Construction of Bio Gas Plant

- The amount of biogas produced can be used for feeding 4-5 members of the family and 10- 15kg manure is released from the plant everyday which is utilized in their backyard.
- The initial cost for setting up a biogas plant is somewhere between Rs.25000 and one can recover the cost by saving one.
- Government gives subsidy for biogas, For general category = 9,000 Rs
- For scheduled cast/category = 11,000 Rs
- The biogas production is best way to use natural recourses which is non polluting and also use for making organic manure because of that we can use it in agriculture to reduce

the harmful effects of chemical and pesticides.

- The biogas is used not only or cooking but also used as electrical purpose by converting the gas into electricity in invertors.
- It is a cheaper technology, helps to reduce the greenhouse gases and also helps to reduce waste generated.

Figure 8-3:Bio gas plant

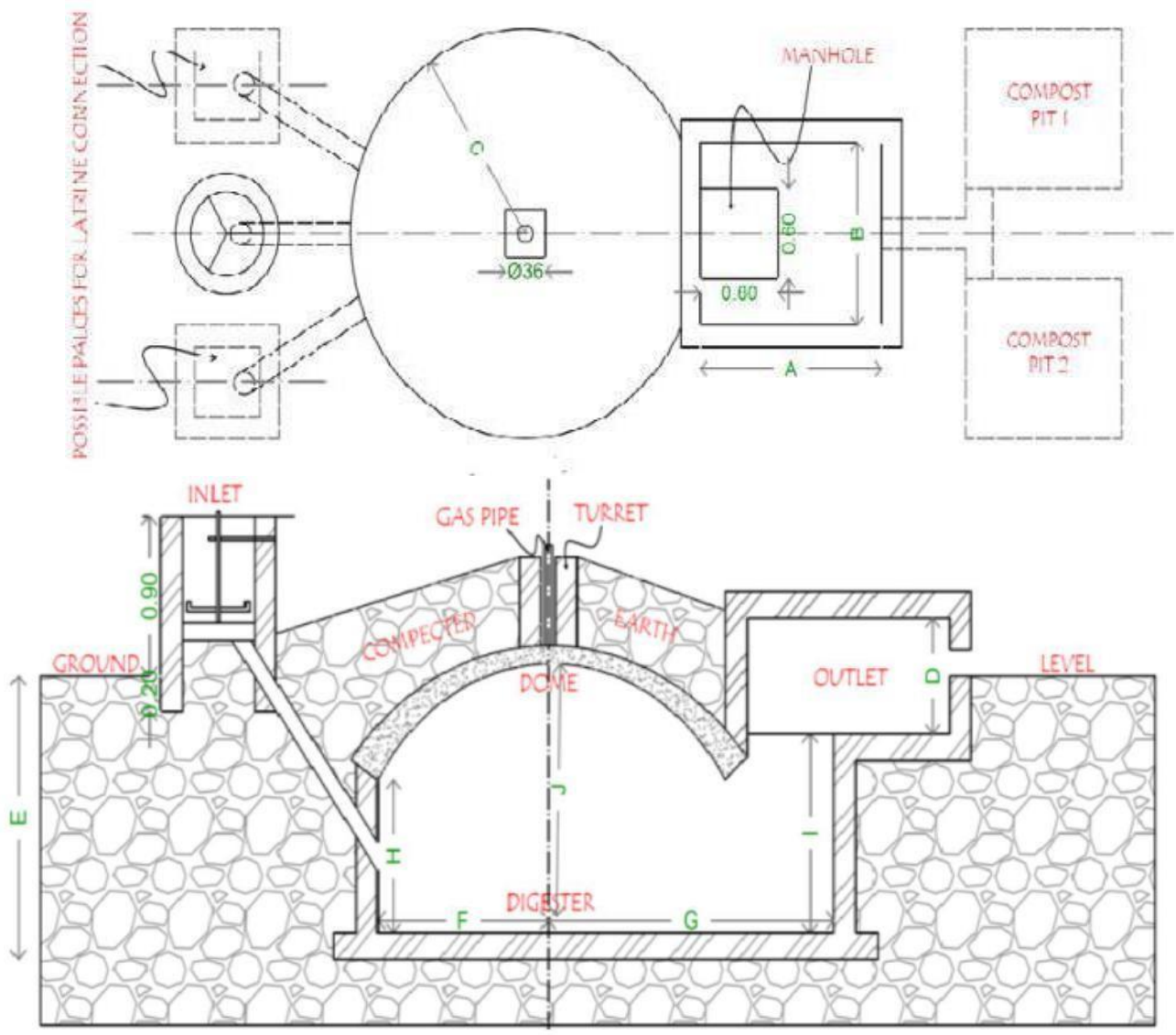


Figure 8-4: Biogas plant plan and section view

Table 8-1: Plant size of biogas plant

component	PLANT SIZE					
	2 m3	4m3	6m3	10m3	15m3	20m3
A	70	140	150	180	248	264
B	60	120	120	125	125	176
C	67.5	135	151	183	205	233
D	25	50	60	68	84	86
E	77	154	155	168	180	203
F	51	102	122	154	175	199
G	97.5	195	211	243	265	293
H	43	86	92	94	115	115
I	56	112	116	124	132	137
J	75.5	151	160	171	193	203

Costing:

Table 8-2:Estimation of $2M^3$ Biogas plant

NO.	ITEM DISCRIPTION	NO.	L (m)	B (m)	H (m)	QUANTITY
1	excavation for foundation up to full depth including sorting out and stacking of useful material up to 30 m. lead in loose per soft soil depth = 0.675m height = 0.77 m V1 = π/4 * d^2* h = .275 excavation for foundation of man hole V2 = L*H*D* =.06*0.6*.56 =0.201		0.6 0.6	0.675 0.6	0.77 0.56	0.275m3 0.201m3
2	Providing and laying C.C. (1:4:8) for foundation block For dome πr^2h For man hole		 0.6	R= 0.675 0.6	0.15 0.15	 0.201m3 0.214m3

3	**2nd class brick work using black brick** V = π/4 * d^2* h - inside hollow wall = π/4*0.677^2 * 0.43 - π/4*0.675^2 * 0.43 Masonry for man hole Length of long wall = 0.60+0.230 = 0.830 Length of short wall=same as long wall		1.06	0.23	0.43	0.236m3 0.20m3
	1nd class brick work for outlet chamber		0.6	0.23	0.43	0.05m3
	Length of long wall = 0.702	2	0.932	0.23	0.4	0.171m3
	Length of short wall = 0.602	1	0.372	0.23	0.4	0.068m3
	Inlet tank cylindrical wall brick D1 = 0.623m	2				
	D2= 0.37m V = π/4 * d^2* h - inside hollow wall	2				0.117m3
4	**R.C.C domical roof slab** V= πh (c^2/8 +$h^{2/}$/6) C=0.675 h= 0.321					0.0747m3
5	Providing 20 mm thick cement plastering in CM (1:3) on inner face of wall #NAME?	2	-	D=1.35	0.43	3.64m2
	Providing 20 mm thick cement plastering in CM (1:3) on manhole Providing 20 mm thick cement plastering Inlet tank	3	0.6	D=1.35	-	2.43m2
						3.57m2

Table 8-3: Abstract Sheet

SR. NO,	ITEM DESCRIPTION	QTY	RATE	PER	AMOUNT
1.	Excavation for foundation	0.476	85	Cu. m.	40.46
2.	Providing and laying c.c. (1:4:8)	415	7800	Cu. m.	3237.00
3.	2nd class Brick Masonry	0.902	3500	Cu. m.	3157.00
4.	R.C.C. Domical roof slab	0.747	7800	Cu. m.	582.00
5.	20mm thick plastering	9.64	100	Sq. m.	964.48
				Total material cost	7980.46
				Add 1.5% water charges	119.70
				Sanitary fittings	3000
				Labour charge	2300
				TOTAL COST	**14,000/-**

8.1.2 Physical design (Bus station)

Bus Station.

Why Bus Station?

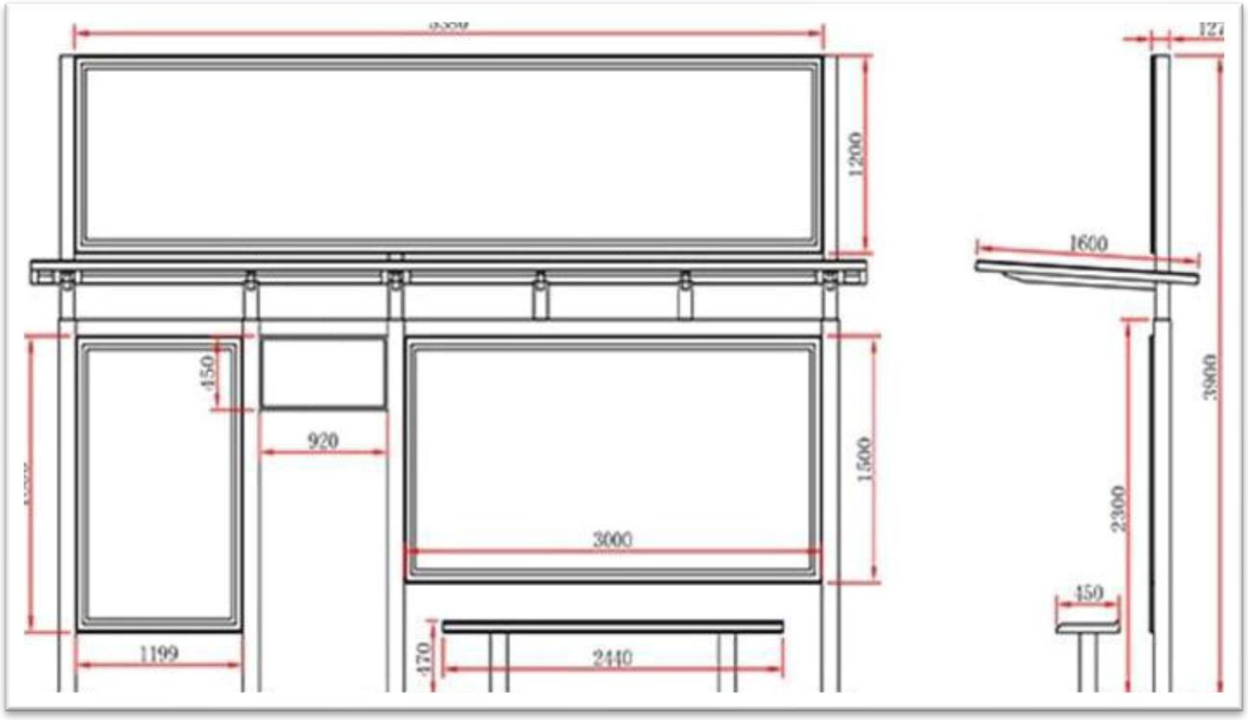
- Developing bus station it is very use-full for bus controller system as well as villager and who is coming to village and going to village. Bus station is use-full for bus stopping and resting for villagers and at that place 1 or 2 shop can be developed so that they can also earn by coming and going of people from the village.
- Also we suggest to provide solar grid power panel on the top of the bus stand attached with lights around the bus stop, so during the night time it provides better visibility and gives safety to the villagers.

A good bus stop

- **Accessibility:** The stop must be accessible to the passengers, whether they are disabled or not. If you can't get to the stop, or can't board the bus from the stop it might as well not exist.
- **Passenger Facilities:** The stop should have the appropriate facilities for the passengers. These include such things as Benches, Information Signs, Shelters, and Garbage Cans. Not every stop has to have these, but they do help.
- **Visibility:** Stops should be visible to the driver of the bus. If it is not, the passengers are likely to be bypassed. This also includes not only the sign being visible, but the passenger being

visible. At night, this can include the need for lighting. Passengers get passed by occasionally due to not being visible to the driver.

- **Convenience:** The stop should be placed in a location that makes it convenient for the passengers' origin or destination. Having to walk too far to get either to or from the stop discourages the passengers.
- **Spacing:** The distance between stops also helps or hurts stops. Placing stops too far apart makes them inconvenient to use.Placing them too close together can make the drivers and passengers irritated by having the bus stop too often.
- **Safety:** Stops have to be safe for both the passenger and the bus that has to stop there.



Front View Right Side view

Figure 8-5: Front view and right side view

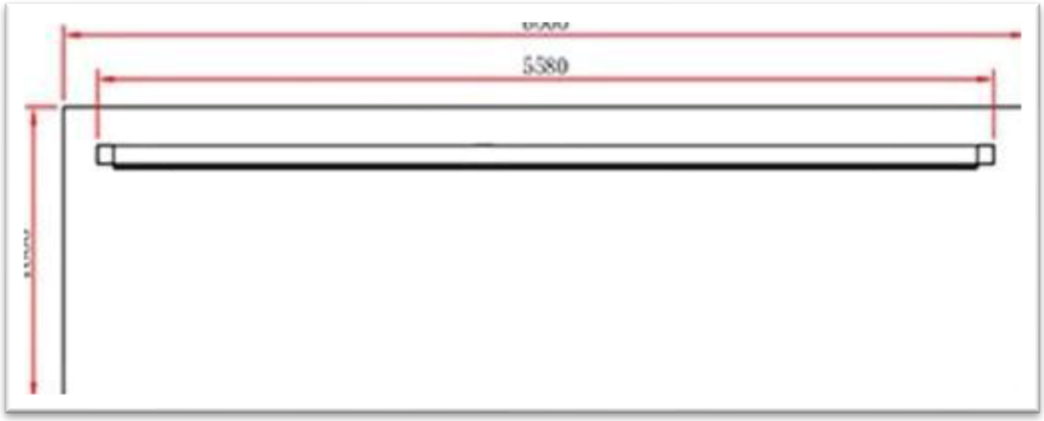


Figure 8-6: Top View

Table 8-4: Costing of bus station

Sr. no.	Item Description	Unit price	QTY.	Amount (Rs.)
1.	SS Grade 304 Column, SS Grade 304 Rafter, SS Grade 304 Purlin, Roof sheet - Polycarbonate Sheet, SS Grade 304 Frame for Advertisement Board, SS Sheet for Advertisement Board, Acrylic Sheet for Route Board, SS Grade 304 Connectors for Advertisement Board.	15000	1	15000
2.	5KW, Single phase, Rooftop On grid Solar System	10000	1	10000
3.	Power cables, DC combiner & DC distribution box, Earthing of Solar system	12000	1	12000
4.	Bi-directional, Import/ Export KWh Metering system	18000	1	18000
5.	AC Distribution Box	18000	1	18000
				Total- 73000/-

8.1.3 Social design (Public toilet)

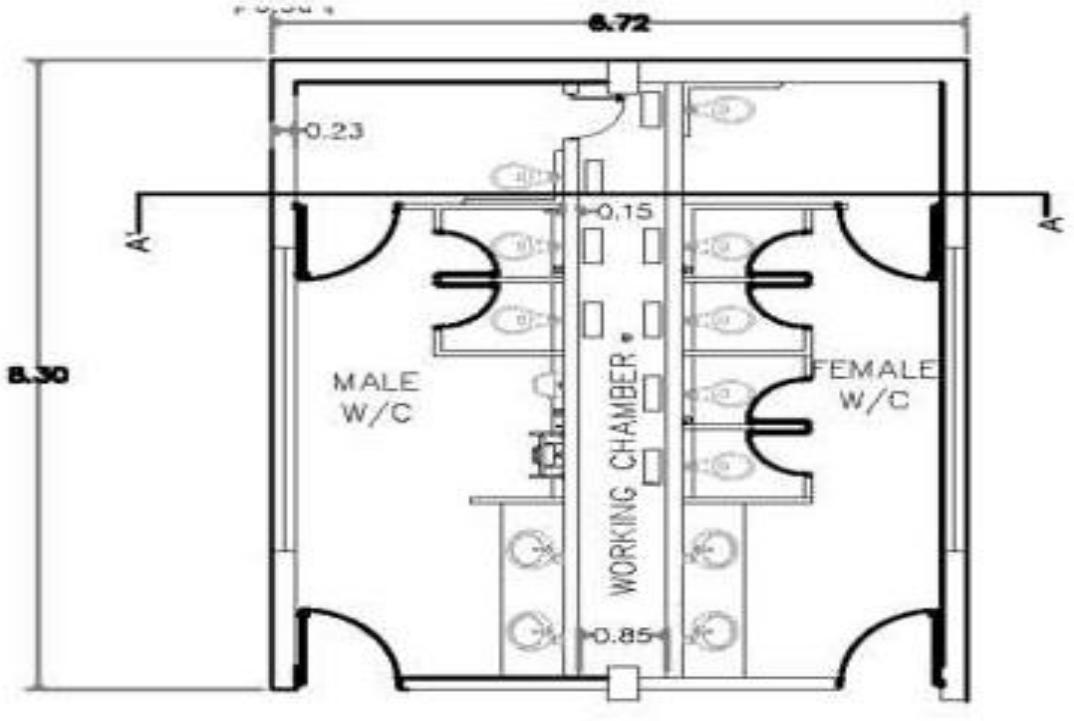


Figure 8-7: Public toilet plan view

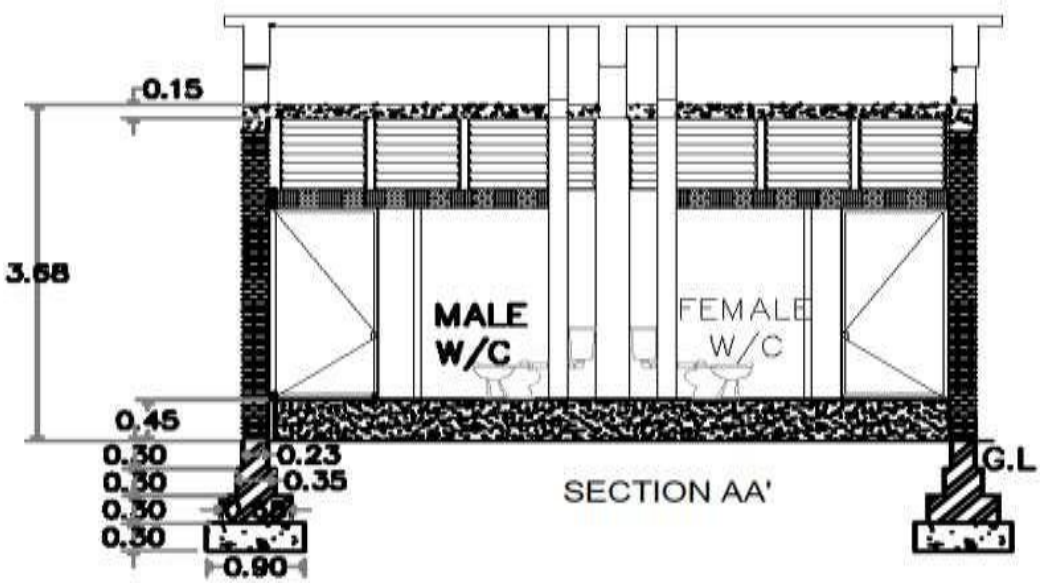


Figure 8-8: Public toilet section view

Table 8-5: Public toilet measurement sheet

	Item description	No.	Lenth L(m)	width(m)	Hieght(m)	Quantity	Total
1	Excavation for foundation	1	46.48	0.9	1.2	50.112 m3	50.112 m3
2	Foundation concrete used in p.c.c(1:3:6)	1	46.48	0.9	0.3	12.52m 3	12.52m 3
3	Brick masonaryused in cement mortar(1:4) for foundation upto plinth						
	For 0.65m offset	1	47.44	0.65	0.3	9.25m3	
		1	48.6	0.35	0.3	5.103m 3	22.819 m3
	For 0.23m offset	1	49.08	0.23	0.75	8.466m 3	
4	Earth filling						
	male w/c	1	20.38		0.45	9.171m 3	
	female w/c	1	20.38		0.45	9.171m 3	21.34m 3
	W/c working chamber	1	6.664		0.45	2.99m3	
5	Brick work upto slab level	1	49.08	0.23	3.08	34.76m 3	
	Deduction D v1 v2	 4 6 2	 1.01 0.74 4	 0.23 0.23 0.23	 2.1 0.78 0.78	1.951m 3 0.79m3 1.43m3	30.59m 3
	Total deduction					4.17m3	
6	R.C.C Slab	1	8.07	6.53	0.15	7.9m3	7.9m3
7	Providing fixing shutter doors, vendors including frame						
	1)door 2)ventilator V1 V2	4 6 2	1.01 0.74 4		2.1 0.78 0.78	8.48m2 3.46m2 6.24m2	18.18m 2

Item number	Item description	Quantity	Rate in Rs.	per	Amaount in Rs.
1	Excavation work	50.112	120	m3	6013.4
2	Foundation concrete	12.52	827	m3	10354
3	RCC work total	7.9	300	m3	2370
4	steel	536.76	45	kg	26854.2
5	2st class brick work upto slab	30.39	800	m3	24472
6	Earth filling	21.34	45	m3	958.5
7	brick masonary up to plinth	23.21	800	m3	18568
8	Glazzed tiles	40.768	120	Sq feet	60000
9	Plasters	124.88	40	Sq feet	5000
					Total cost = 199590

Table 8-6: Abstract sheet of public toilet

8.1.4 Socio-Cultural design (Soak Pit)

Magic Pit or Soak Pit

Magic pit is covered porous walled chamber that allows water slowly soak into the ground. Magic pit can offer a cost efficient opportunity for partial treatment of waste water or storm water and relatively safe way of discharging it into the environment and there with recharging groundwater bodies. As waste water percolates through the soil from a magic pit, small particles are filtered out by the soil matrix and organics are digested by micro-organisms. Sub-soil layers are water permeable in order to avoid fast saturation. Magic pit is best suited for soil having good absorptive properties; clay, hard packed or rocky soil is not appropriate. It should be located at safe distance from drinking water source (30m at least). It odourless and not visible because of that it do not cause any problem

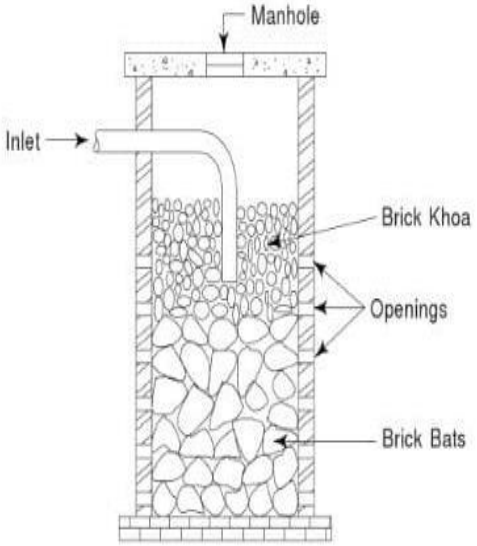


Figure 8-9: Soak pit Design

regarding with health. A magic pit should be last between 3-5 years without maintenance but after that it needs to clean. When the performance of the magic pit deteriorates, the material inside the magic pit can be excavated and refilled. For future access, a removable lid should be used to seal the pit until it needs to be maintained.

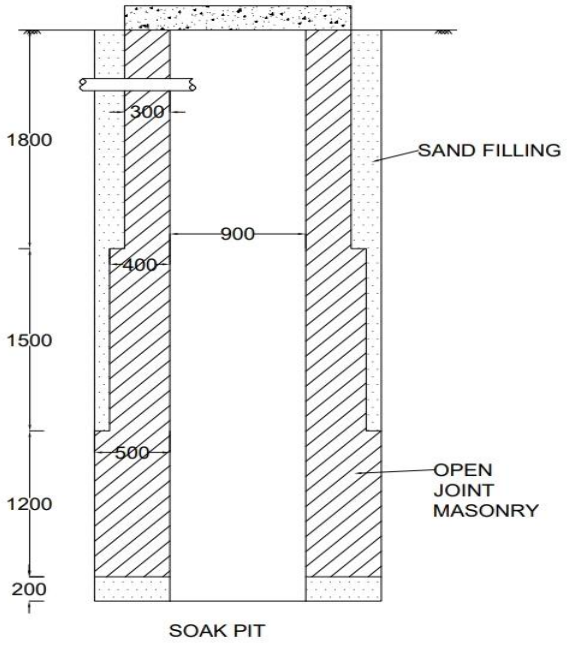


Figure 8-10: soak pit dimensions

Table 8-7: soak pit estimate

SOAK PIT			
ITEM NO.	**ITEM DESCRIPTION**	**NO. L(m) B(m) H(m)**	**QUANTITY**
1)	**BRICK MASONRY FOR OPEN JOINTED WALLS** FIRST STEP: d= 0.9 m D= 0.9 + 2x0.5 = 1.9 m	∏/4 X(1.9^2- 0.9^2)X 1.2	2.64 m^3
	SECOND STEP: d= 0.9 m D= 0.9 + 2x0.4 = 1.7 m	∏/4 X(1.7^2- 0.9^2)X 1.5	2.45 m^3
	THIRD STEP: d= 0.9 m D= 0.9 + 2x0.3 = 1.5 m	∏/4 X(1.5^2- 0.9^2)X 1.8	2.04 m^3

		TOTAL	7.13 m^3
2)	**SAND FILLING IN THE GAP NEAR THE WALL** LOWER STEP: d= 0.9 + 2x0.4 = 1.7 m D= 0.9 + 2x0.5 = 1.9 m	∏/4 X(1.9²- 1.7²)X 1.5	0.85 m^3
	UPPER STEP: D= 1.9 m d= 0.9 + 2x0.3 = 1.5 m	∏/4 X(1.9²- 1.5²)X 1.8	1.92 m^3
		TOTAL	2.77 m^3
3)	**QUANTITY OF BRICKS FOR OPEN JOINTED WALLS** **ACTUAL SIZE OF BRICK:** 19 cm x 9 cm x 9 cm NO OF BRICKS FOR 1 m^3 1/(0.19X.09X0.09) 650 NOS TOTAL NO. OF BRICKS = 650 X 7.13		4635 NOS.

Table 8-8: Abstract sheet of soak pit

No	Item	Quantity	Rate	Per Item	Amount
1.	Bricks	4635 Nos	6	1	27,810
2.	Sand	2.77 m^3	950	m^3	2631.5
3.	cement	14 bags	350	bag	4900
		TOTAL COST			**35,341.5**

8.1.5 Smart Village Design (Skill Development Centre)

Skill Development Centre

Programs

- Skill Development
- Skill enhancement
- Encourage Entrepreneurship
- Soft Skills
- Supporting Teach India Movement

Goals of skill development centre in village

- The main goal is to create opportunities, space and scope for the development of the talents
  of the Indian youth and to develop more of those sectors which have already been put under
  skill development for the last so many years and also to identify new sectors for skill development.
- The emphasis is to skill the youths in such a way so that they get employment and also improve entrepreneurship.
- Provides training, support and guidance to farmers.
- To provide skills to women so that they become self-dependent.
- To aware villagers regarding new development schemes for their betterment.
- To initiate start-ups in village.

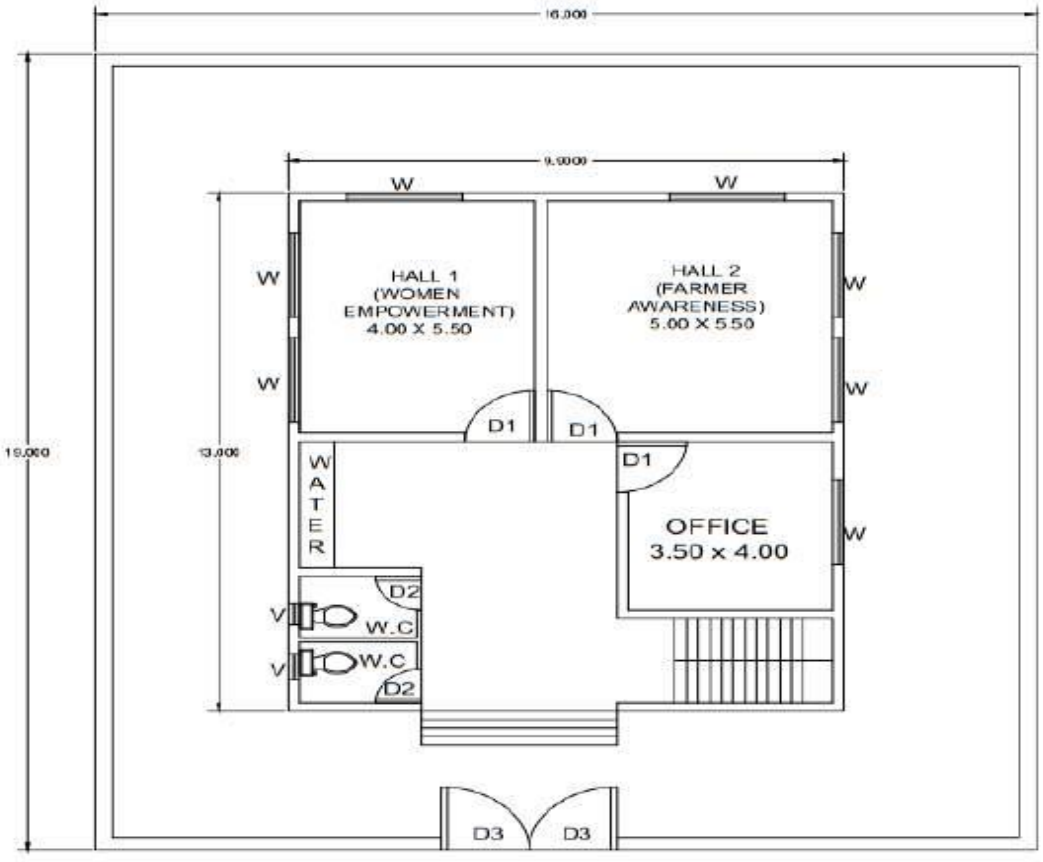
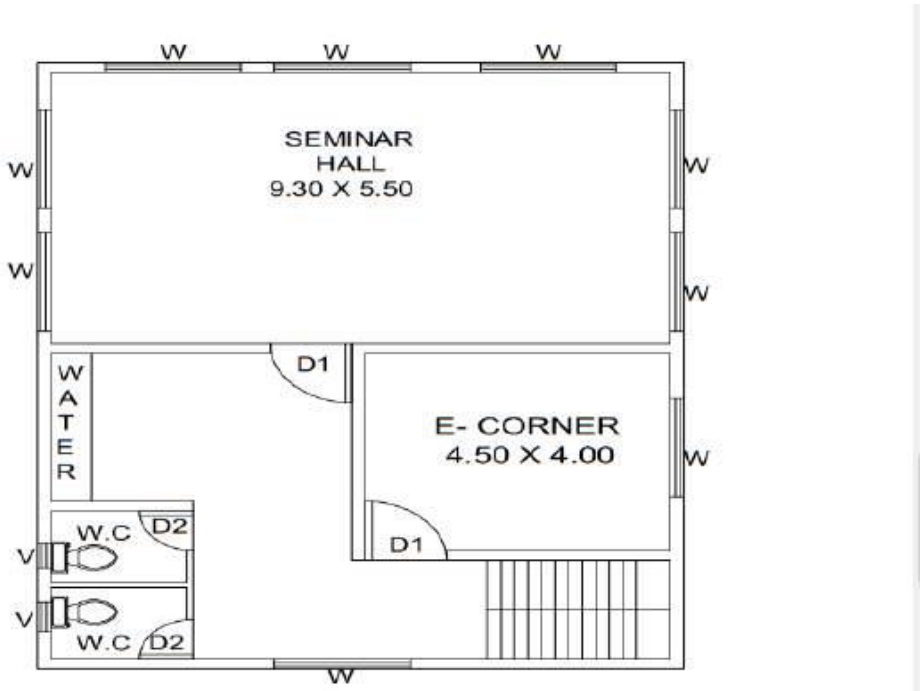


Figure 8-11: Plan of the Ground floor of Skill Development Centre



SCHEDULE		
DESCRIPTION	DENOTE	SIZE(m)
DOOR	D1	1.20 x 2.10
DOOR	D2	0.80 x 2.10
DOOR	D3	1.50 x 1.50
WINDOW	W	2.00 x 1.50
VENTILATION	V	0.60 x 0.60
W.C	W.C	1.50 x 2.00

Figure 8-12: Plan of the First floor of Skill Development Centre

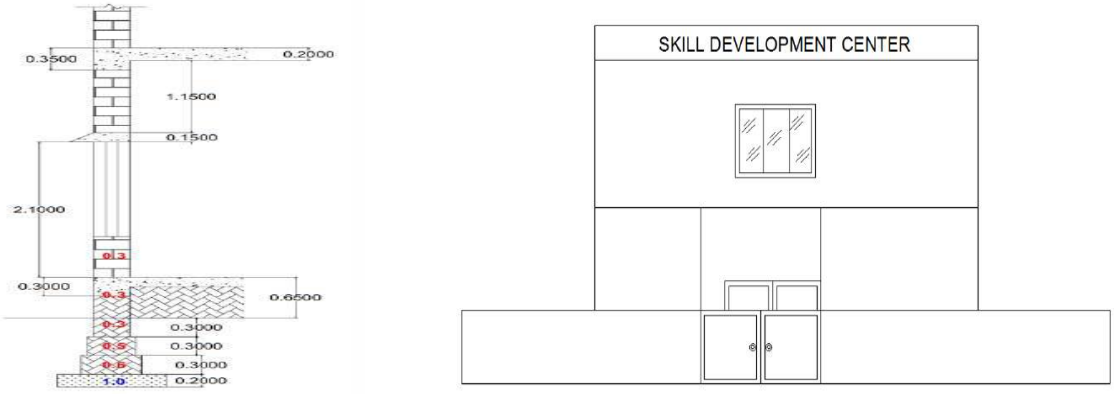


Figure 8-13: Section of footing and Elevation of Skill Development Center

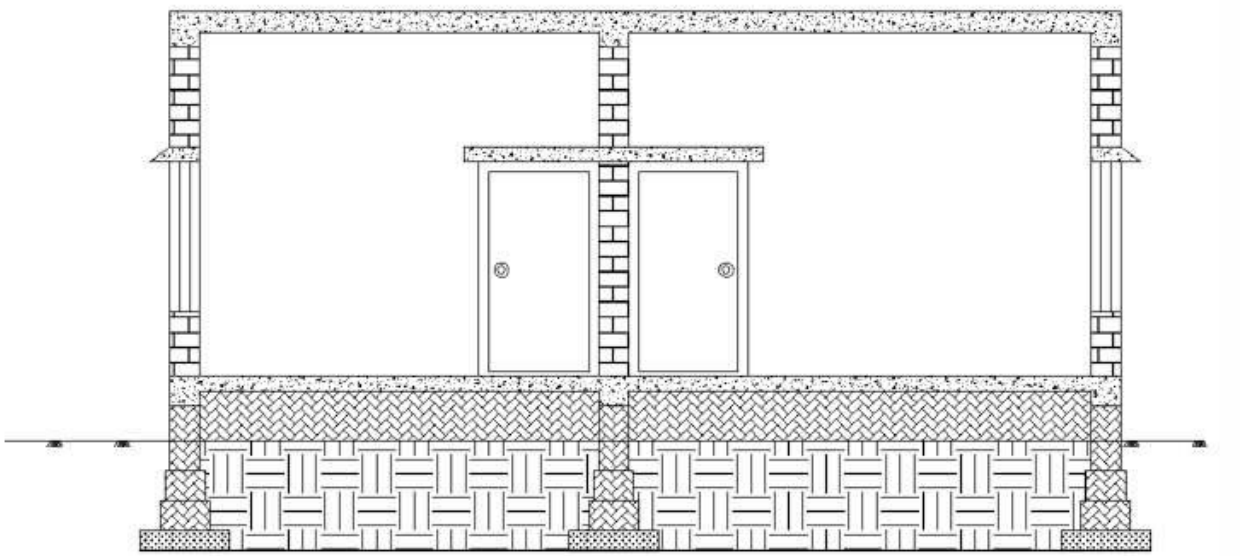


Figure 8-14:Elevation Section of AA'

Table 8-9: Measurement sheet od Skill Development Centre

SR. NO.	DESCRIPTION	NO.	L (M)	B (M)	H (M)	QUANTITY
1	**Excavation in Foundation**					
	Compound Wall	1	68.8	1	1.1	75.68
	Internal Wall	1	67.4	1	1.1	74.14
	Total					**150.00 m3**
2	**Plain cement concrete (P.C.C) in Foundation (1:4:8)**					
	Compound Wall	1	68.8	1	0.2	13.76
	Internal Wall	1	67.4	1	0.2	13.48
	Total					**27.24 m3**
3	**Brickwork in Foundation up to Plinth level**					
	Compound Wall					
	First step	1	68.8	0.6	0.3	12.4
	Second step	1	68.8	0.5	0.3	10.32

	Third step	1	68.8	0.3	0.3	6.19
						28.90 m3
	Internal Wall					
	First step	1	67.4	0.6	0.3	12.13
	Second step	1	67.4	0.5	0.3	10.11
	Third step	1	67.4	0.3	0.85	17.18
						39.50 m3
	Steps:					
	First	1	3.5	0.9	0.15	0.472
	Second	1	3.5	0.6	0.15	0.315
	Third	1	3.5	0.3	0.15	0.157
						0.945 m3
	Total					**69.345 m3**
4	**Brickwork in superstructure in cement mortar 1:6**					
	Compound Wall	1	68.8	0.3	1.5	30.96
	G.F. Wall	1	69.5	0.3	3.5	72.98
	F.F. Wall	1	64.85	0.3	3.5	68.1
						172.05 m3
	Deduction for Door/Ventilation:					
	D1	5	1.2	0.3	2.1	3.78
	D3	1	3	0.3	1.5	1.35
	W	16	2	0.3	1.5	14.5
	V	4	0.6	0.3	0.6	0.432
						(-) 19.962 m3
	Total					**152.10 m3**
5	**RCC Work**					
	Slab	2	9.9	13	0.2	51.48

		1	9.9	13	0.1	12.87
	Beam	6	9.9	0.3	0.15	2.673
		3	13	0.3	0.15	1.755
		3	9.9	0.3	0.2	1.782
		3	13	0.3	0.2	2.34
	Lintel					2
	Stair					10
	Total					**85.00 m3**
6	**2 cm thick marble flooring**					
		2	9	12		216
	Total area					**216.00 m2**
7	**Smooth plaster on inside walls and ceiling in cm (1:3)**					
	All Compound Wall					**101.40 m2**
	All Inside of the wall (G.F. + F.F)					**278.35 m2 + 267.40 m2**
	All Outside of the wall					**320.60 m2**
	Ceiling					**225.10 m2**
	Deduction for Door/Ventilation:					
	D1	10	1.2		2.1	25.2
	D3	2	3		1.5	9
	W	32	2		1.5	96
	V	8	0.6		0.6	2.88
						(-) 133.10 m2
	Total					**1060.00 m2**
8	**Earth filling in Excavation**					
	Total excavation for walls					150.00 m^3

	Brickwork up to G.L.					(-)69.34 m^3
	PCC					(-)27.24 m^3
	Total					**53.42 m^3**

Table 8- 10: Abstract Sheet of Skill Development Centre

SR. NO.	PARTICULARS	QUANTITY	UNIT	RATE	PER	AMOUNT
1	**Excavation in Foundation**	150	m^3	85	m^3	12650
2	**Plain cement concrete (P.C.C) in Foundation (1:4:8)**	27.24	m^3	3000	m^3	81720
3	**Brickwork in Foundation up to Plinth level**	69.345	m^3	3200	m^3	221870.4
4	**Brickwork in superstructure in cement mortar 1:6**	152.1	m^3	3500	m^3	532350
5	**RCC Work**	85	m^3	8800	m^3	748000
6	**2 cm thick marble flooring**	216	m^2	500	m^2	108000
7	**Smooth plaster on inside walls and ceiling in cm (1:3)**	1060	m^2	150	m^2	159000

8	**Earth filling in Excavation**	53.42	m3	50	m3	2671
	Total					**18,66,261.40 Rs.**
	Add 5% contingencies					**93,313.07 RS.**
	Grand Total					**19,59,574.47 Rs.**
					say	**19,60,000.00 Rs.**

8.1.6 Heritage Village Design (Village gate)

Village gate

Village gate represents the village. It can be considered as the heritage structure for the village

- To identify the village
- To provide beauty at the entrance
- To determine the location of the village

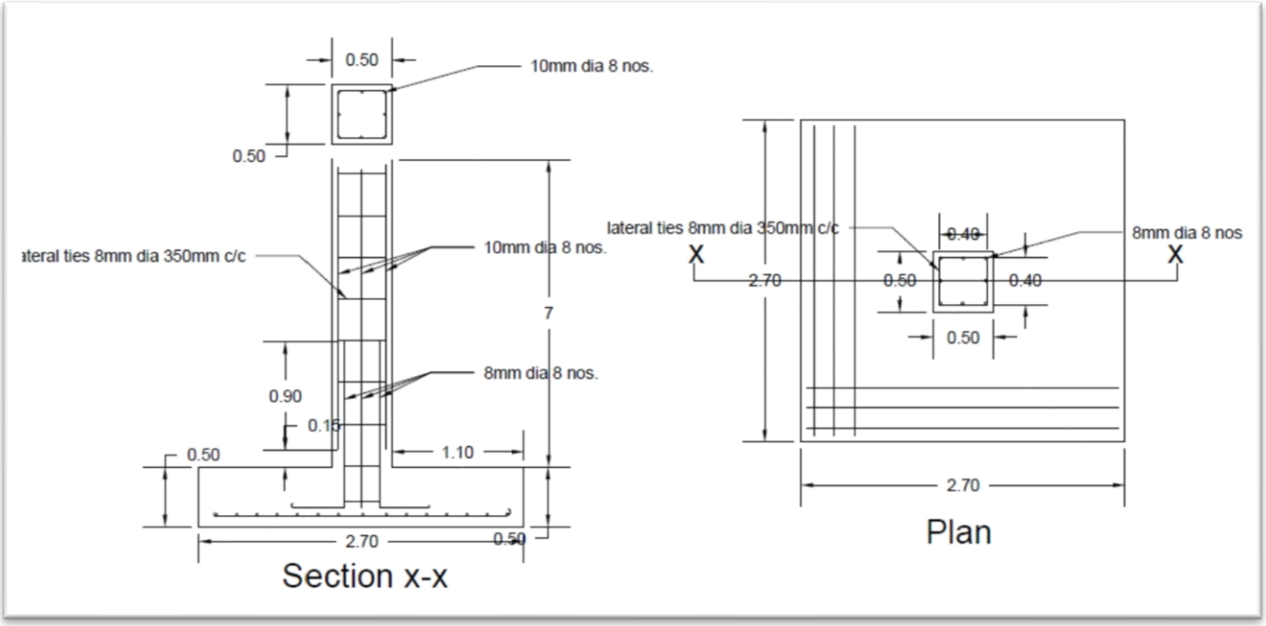


Figure 8-15: Section and plan view

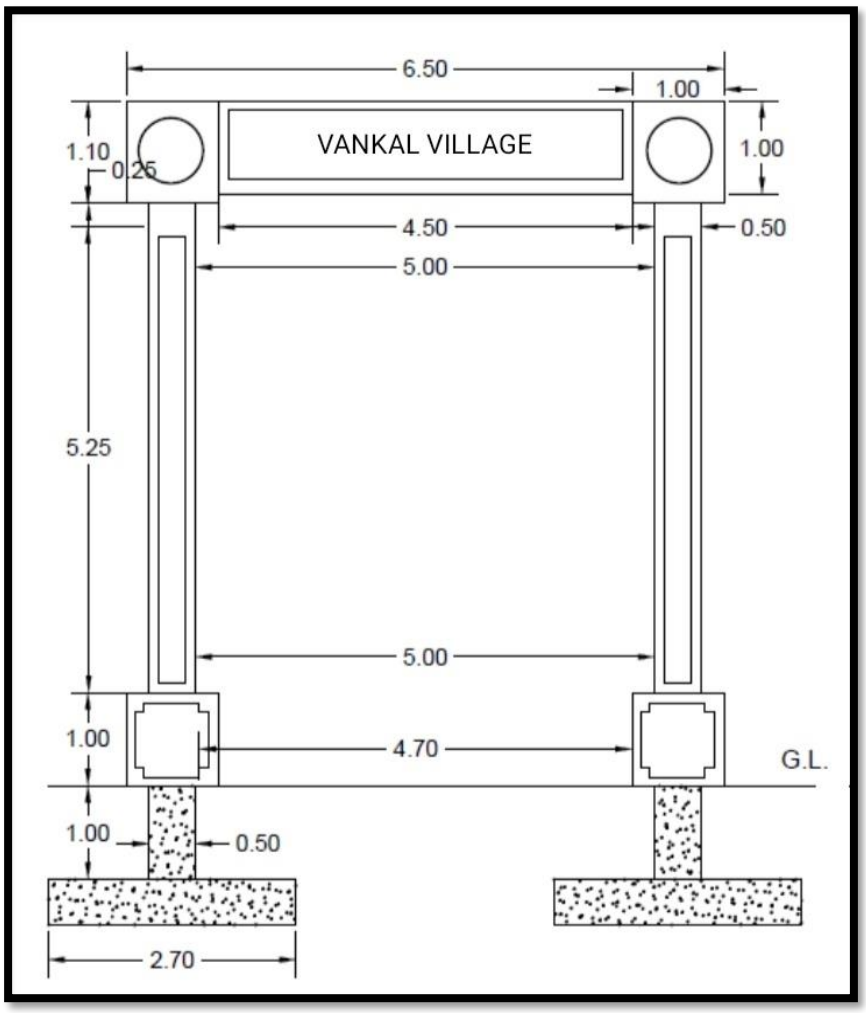


Figure 8-16: village gate front view

Table 8-11: Estimate of a beam of gate

Estimate of a beam of gate(span=4.51m):						
Item No.	**Description of Item**	**No.**	**L(m)**	**B(m)**	**H(m)**	**Quantity**
-1	Quantity of concrete: L=6.5m B=1m H=1m	1	6.5	1	1	6.5m^3
-2	Formwork: Bottom sides	1 2 2	4.51 6.5 1	1 - -	- 1 1	4.51m^2 13m^2 2 m^2
					Total	19.51m^2
-3	Weight of steel in kg:					

	A type: L=6.5-(2×0.05)+(2×9×0.01) =6.58m No. of bars=2 B type: L=6.5-(2×0.05)+(2×9×0.012) =6.616m No. of bars=2 C type: A=1-(2×0.025)-(2×0.008) =0.934m B=1-(2×0.025)-(2×0.008) =0.934m L=2(A+B)+24D =2(0.934+0.934)+24(0.008)	2 2	6.58 6.62		@0.62kg/m @0.89kg/m	8.16kg 11.78kg
	=3.93m Nos.=(6.5÷0.3)+1=22.67 Say 23	23	3.93		@0.4kg/m	36.156kg
					Total	56.096kg

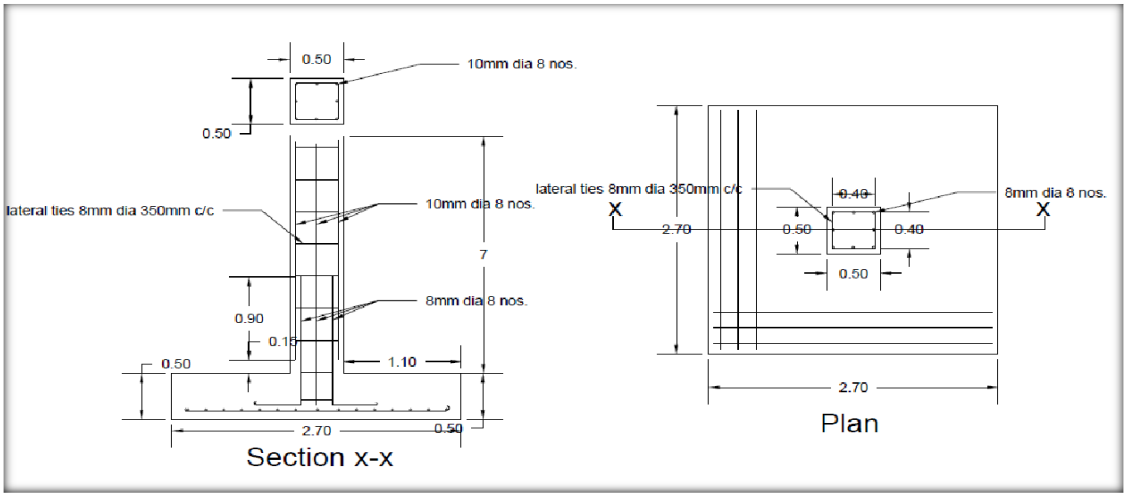


Figure 8-17: Reinforcement details in column and footing of gate

Table 8-12:Estimate of column + footing of gate

Estimate of column + footing of gate:						
Sr. No.	**Description of Item**	**No.**	**L(m)**	**B(m)**	**H(m)**	**Quantity**
-1	Excavation for foundation: H=7+0.5+0.5=8m	1	2.7	2.7	8	58.32m^3
-2	R.C.C.(1:2:4): Footing Column	1 1	2.7 0.5	2.7 0.5	0.5 7.5	3.645m^3 1.875m^3
					Total	5.52 m^3
-3	Filling of foundation trench: =58.32-5.52=52.8m^3					52.8m^3
-4	Steel for column and footing: Vertical bars of column: L=5.95+(9×0.01)=6.04m Dowel bars: L=0.9+0.15+0.5+0.5+(9×0.008)-0.05-(2×0.016)	8	6.04		@0.62kg/m	30kg
	=2.04m	8	2.04		@0.4kg/m	6.53kg
	Lateral ties for column: A=0.5-(2×0.025)-(2×0.008) =0.434m B=0.5-(2×0.025)-(2×0.008) =0.434m L=2(A+B)+24D =2(0.434+0.434)+0.192 =1.928m No. of ties=(7.5-0.05-(2×0.016))÷0.35 =21.19 Say 22	22	1.928		@0.4kg/m	17kg
	Footing bars:					

	L=2.7-(2×0.05)+(2×9×0.016) =2.888m No.=(2.7-(2×0.05))÷0.17 =15.29 Say 16	32	2.888		@1.58kg/m	146kg
					Total	199.53kg
-5	Formwork for column and footing:					14m^2
	Column:	4	0.5	-	7	5.4m^2
	Footing:	4	2.7	-	0.5	
					Total	19.4m^2

Table 8-13: Abstract sheet of village gate

Sr. No.	Description of Item	Quantity	Rate Rs.	Per	Amount Rs.
1	Cement	35	350	Bag	12250
2	Brick	375	5	brick	1875
3	Sand	2.44m^3	600	m3	1464
4	Aggregate	4.89m^3	650	m3	3178.5
5	Placing of concrete	5.52m^3	125	m3	690
6	Centering,Shuttering	19.4m^2	100	m2	1940
7	16mm dia bar	146kg	50	kg	7300
8	10mm dia bar	30kg	35	kg	1050
9	8mm dia bar	23.53kg	50	kg	1176.5
10	Charges for cutting ,bending,placing	199.53kg	113.76	kg	22698.5
11	Excavation for foundation	58.32m^3	700	m3	40824
12	Filling of foundation trench	52.8m^3	250	m3	13200
				Total	107647
Add 5% contingencies					5382.32
Contractor profit(10%)					10764.7
Total					123793.503

There are 2 column. So, cost=2×123793.503

=Rs.247587.006

Total cost = cost of beam + cost of 2 column and footing

=36435.475+247587.006

=Rs.2,84,022.5

Say Rs.2,90,000/-

8.1.7 Electrical Design 1

SOLAR STREET LIGHTING SYSTEM WITH LED

Solar street light takes energy from the sun and converts these energies into electrical energy so due to this process lights glow.

Today, Energy-efficient lighting is an important factor for sustainable development and energy strategies. Indeed, Lighting consumes about 20 percent of the electricity formation. Also, renewable energy utilization development permits the reduction of CO2 emission and contributes to the decrease of fossil energy dependency. In the past few years developing energy-efficient street-lighting with light-emitting diodes (LEDs) has gained an enormous interest. LED luminaires also have the potential of increasing illumination uniformity and glare reduction, which improves both the eye comfort and the visual discrimination ability of car drivers. Traditional street lighting technologies, such as high-pressure sodium or mercury, emit light in all directions, and consequently the light distribution is difficult to control. This is why a common street luminaire usually has defects such as glare, non-uniform light pattern, upward reflected light, light pollution, and waste of energy. The association of a solar energy to High efficiency lighting technology as LEDs (Light Emitting Diodes) is the focus of this article and contributes tithe development of a clean energy (Solar) and green lighting technology (LEDs). In comparing LEDs to other lamps technologies, we can say that LEDs are the Greenest lighting choice.

Figure 8-18: Solar Street Lighting

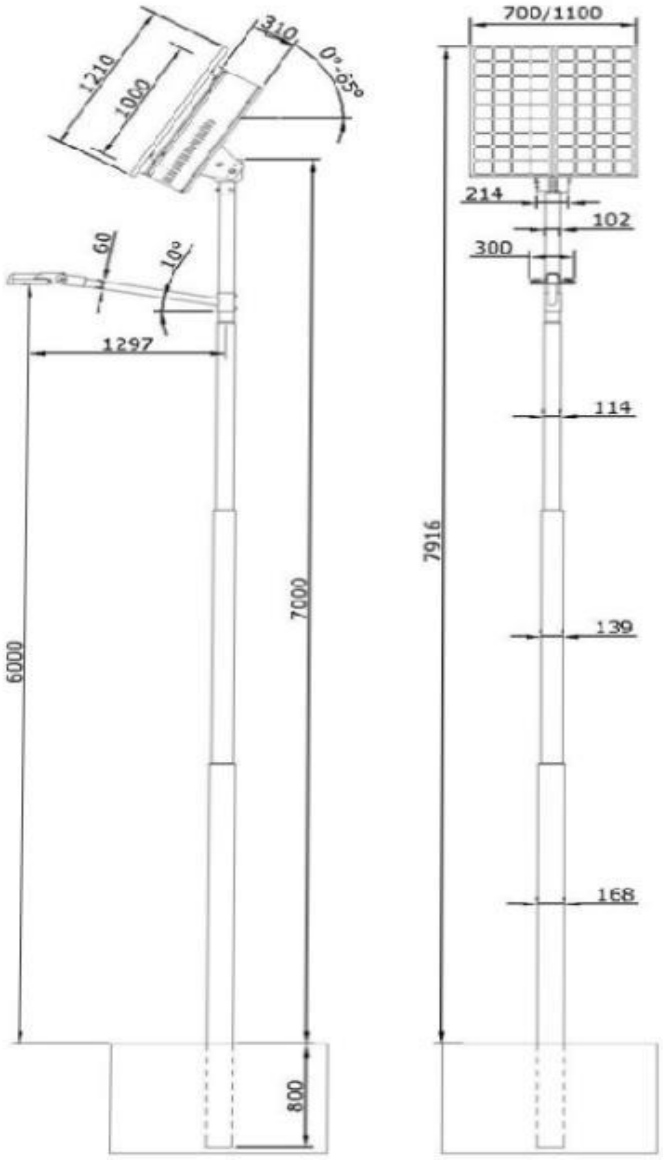


Figure 8-19: Solar Street Light design

Table 8-14: Estimate of Solar Street Light design

S.N	Name of the component	Technical Specification	Quantity	Cost (NPR)	Remarks	
1	Solar PV Panel	140 Wp	1	14,000	Non Item	VAT
2	Battery (12 v)	100 Ah Tubular Gel @C10	1	28,000	Non Item	VAT
3	Charge Controller With Dusk to Down Function, three stage dimming function	Size as required by panel	1	3,500	Non Item	VAT

4	Lamp (LED)	40 Watt	1	12,000	Non Item	VAT
5	Single Arm Galvanized Pole	9 m	1	27,120	Vatable Item	
6	Interconnecting Wires & Other Accessories (Nut-Bolt, Earthing)			1700	Vatable Item	
7	Installation/ Transportation Charge			10000	Vatable Item	
8	After Sales Service			5000	Vatable Item	
		Total cost including GST		**1,01,320**		

Electrical Energy Audit in Gram panchayat

Figure 8-20 Gram Panchayat Office

What is an Electrical Energy Audit?
An Energy audit is a procedure that will identify how energy is being used in your facilities and helps identify practical and cost-effective measures that will reduce energy use, lower operating cost and help reduce greenhouse gas emission.

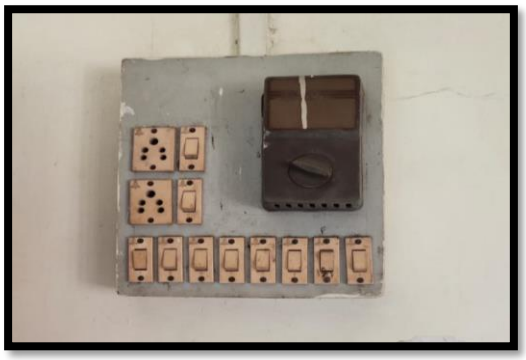


Figure 8-21 Resistance Type Regulator

Figure 8-22 Analog Electrical Mete

It includes the study of:

- Systematic and deep study of production of energy.
- Total cost calculation in production of energy.
- It emphasizes where and in how much % age energy I utilized in any equipment.
- How to increase the efficient use of energy by reducing the cost of production.

The type of Energy Audit:

- Walk-through Audit
- Targeted Energy Audit
- Standard Energy Audit
- Detailed Audit

Intended Learning objective of study:

- To identify the number of appliances
- To identify the watt consumed by each appliance in the house
- Replacing the high consuming appliance from the house
- To reduce the cost of bill payment

Survey Electrical Energy Audit:

We visited Vankal village and we did an electrical audit of the gram panchayat. We observed there that there were 10 fans,11 tube lights ,4 rooms,1 water filter, 3 laptops etc. they used analog electrical meters.

Objective appliances for study

- Fan
- Tube light
- Laptop

Instrument:

1) To measure small current and voltage range we used a galvanometer.
2) To measure large numbers of voltage we used voltmeter.
3) To measure the large number of current ranges we used ammeter.

Data Analysis:

The average energy consumption of gram panchayat is about 400KWH per month for major loads like fans, tube lights, water filter, laptop.

Below table is calculation of energy consuming table.

Table 8-15: Calculation Power Rating

	Instrument name	No. of instrument	Power rating(kw)	Usage per day(hour)	Energy consumption per day	Energy consumption months	
1	Fan	10	.065	8	5.2	156	
2	Tube light	11	.02	8	1.76	52.8	

Total energy consumption (kwh)	208.8	

Total unit = 208.8 (1KWH = 1UNIT)
1 unit = 8 rupees in one-month light bill is (208.8 * 8 =1670.4)

Energy saving proposal without investment

- While auditing it is observed that the doors and windows are kept close even in day time. So, open them in the daytime to allow sufficient sunlight into the home. It prevents more usage of lightning.
- The walls of the house are painted with dark colors. For next time use light and highly reflecting colors on walls for better reflection of internal lightning.
- It is noticed that the switches of equipment are made ON when they are not in use so have a look on switches and plugs if they are not in use put them off.
- Make your kids play outdoor games rather than computer games and mobile games. It helps in saving energy and being healthy.

Energy saving proposal without investment

The tube light must be changed into the LED bulb. The tube light consumes a 20Watt power rating. One month of tube light's light bill is 422.4 rupees. And the Led bulb consumes 8watt power rating. Then we calculate the light bill of one month of Led bulb is 168.96 rupees.
We can clearly see that here tube light is more consuming power as compared to LED bulbs. So, we should use an LED bulb.

1) Analog electrical meter changed into the Digital electric meter.
   We saw there are analog electric meters analog meter is consuming more power as compared to digital meter. Digital meters use less space as compared to analog electric meters.
2) The resistance type regulator changed into the electronic regulator used in a fan**.**
   Resistance regulators are used in normal fan speed and the electronic regulators are used as controlling the speed. Resistance regulators consume more power as compared to electronic regulators.

Conclusions

- Study concluded that after changing the appliances and the working hours for the use of the appliance we were reducing the units of the electricity bills and cost of the electricity.
- After energy auditing, recommend changing a few appliances and install some important instruments for more reliable saving and efficiency in the electricity bills to relieve the burden.
- It was observed that some changes in the load table after changing the appliances in the respective years.
- In a complete energy audit, we observed that by changing appliances and equipment and reducing the working hours of the appliances we can surely decrease the bills and improve the efficiency of any facility either it is house, office, industry etc.

8.1.8 Electrical Design 2

Design of tube well for irrigation

Figure 8-23: Well

Tube Well consists of galvanized iron pipe sunk into water bearing strata of coarse sand with strainer of the required length placed in the water bearing strata. For construction of small dia. Tube well in soft soil bore of bigger diameter than the tube well pipe is made by sinking casting pipe with cutter at its end, to the required depth. During boring samples of soil of different nature as they come out are collected and the thickness of different layer is noted & a soil chart is prepared showing the different strata.

When the proper water bearing strata is reached the strainer is lowered & then the tube well pipe is lowered gradually with proper jointing & the casing pipe is gradually withdrawn & removed. The Sinking of casing pipe may be done either by percussion boring or by rotary boring. Percussion boring is used when soil is soft as clay, loam, sand etc. For hard soil special types of cutters are used to cut & drill hole.CoarseCoarse sand is usually inserted all round the strainer before the casing pipe is lifted. For ordinary tube well hand pump is fitted to draw water. When the sub-soil water level is at greater depth deep well hand pump is used and the pump plunger is fitted in a gun metal or brass cylinder near the sub-soil water level with a long rod. depth deep well hand pump is used and the pump plunger is fitted in a gun metal or brass cylinder near the sub-soil water level with a long rod.

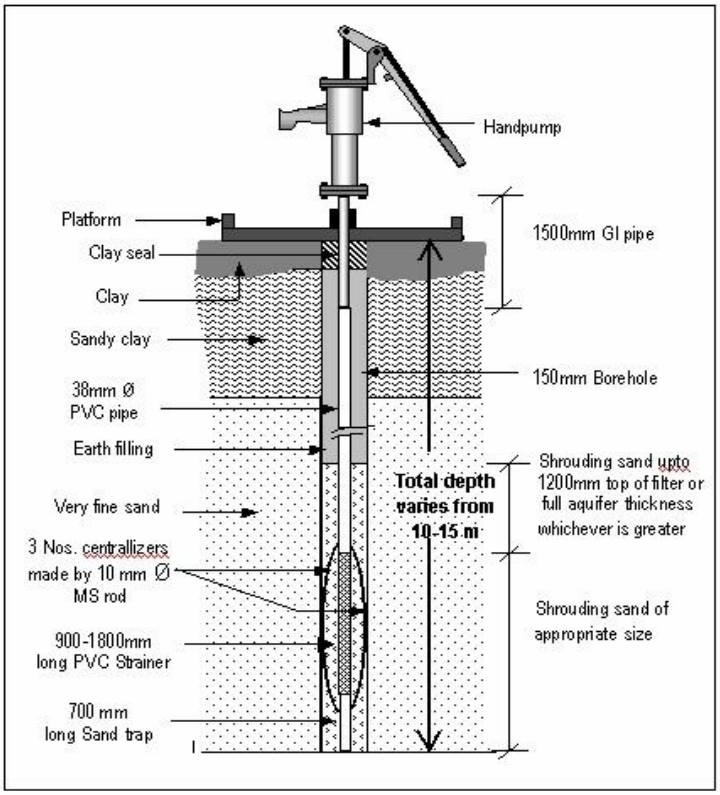


Figure 8-24: Design of tube well

Table 8-16: Estimate of tube well

Bill of Quantities & Cost					
Name of Work: Tube Well					
Item No.	**Particulars of Items**	**Quantity**	**Rate**	**Per**	**Amount**
1	50 mm dia. Galvanised iron (G.I) pipe	92	12	Rm	1104
2	70 mm dia. G.I . Housing pipe	7	24	Rm	168
3	50 mm dia. Strainer 3 nos. 1.50 m each	4	54	Nos	216
4	74 mm dia. Gum metal cylinder with valve & plunger	1	100	Nos	100
5	Head pump with extra length of 16 mm dia. Connecting rod	1	50	Nos	50
6	Bail plug	1	8	Nos	8
7	Soakets 4 nos. extra	4	2.5	Nos	10
8	Transport of materials to site of work	1	20	Job	20
9	Sinking - Boring with 70 mm dia. Casing pipe including water arrangements, lowering the 50 mm dia. Tube well pipe & strainer including jointing & withdrawing of casing pipe				
	(i) 0 to 20 metre	20	8	Rm	160
	(ii) Below 20 m to 35 m	14	12	Rm	168
	(iii) Below 35 m to 50 m	16	15.5	Rm	248
	(iv) Below 50 m to 65 m	15	20	Rm	300
	(v) Below 65 m to 80 m	14	24	Rm	336

	(vi) Below 80 m to 95 m	13	28.5	Rm	370.5
	(vii) Below 95 m to 100 m	6	33	Rm	198
10	Inserting coarse sand surrounding the strainer including supply of sand	1	20	Job	20
11	Fixing & erecting hand pum in position including holding down bolts	1	11	Job	11
12	Cement concrete platform & foundation surface finished smooth	1	32	Job	32
13	Cement concrete drain 3 metre long finished smooth	3	10	Rm	30
14	Pumping out water till clear water is obtained	1	14	Job	14
Total					3564
Add 3% Contingency:					107
Add 2% Work charged Establishment:					72
Total Amount					**3743**

8.1.9 Electrical Design 3

Drip irrigation:

Irrigation Essentially Means the Water of Land to Make It Ready for Agricultural Purposes. To Maintain The Moisture Of Soil For Healthy Crop Growth, Fields Have To Be Watered Regularly. The Supply of Water to Crops at Different Intervals Is Called Irrigation. The Time and Frequency of Irrigation Vary from Crop to Crop, Soil to Soil and Season to Season. In the Summer, The Frequency of Watering is higher.

Drip Irrigation is a Type of Micro Irrigation System That has the Potential to Save Water and Nutrients by Allowing Water to Drip Slowly to the Roots of Plants, either from above The Soil Surface or Buried below the Surface. The Goal is to Place Water Directly into the Root Zone and Minimize Evaporation. Drip Irrigation Systems Distribute Water Through A Network Of valve, Pipes, Tubing, And embitter Depending on How Well Designed, Installed, Maintained, And

Figure 8- 25: Drip Irrigation

Operated It is, A Drip Irrigation System Can Be More Efficient Than Other Types of Irrigation Systems, Such As Surface Irrigation Or Sprinkler Irrigation.

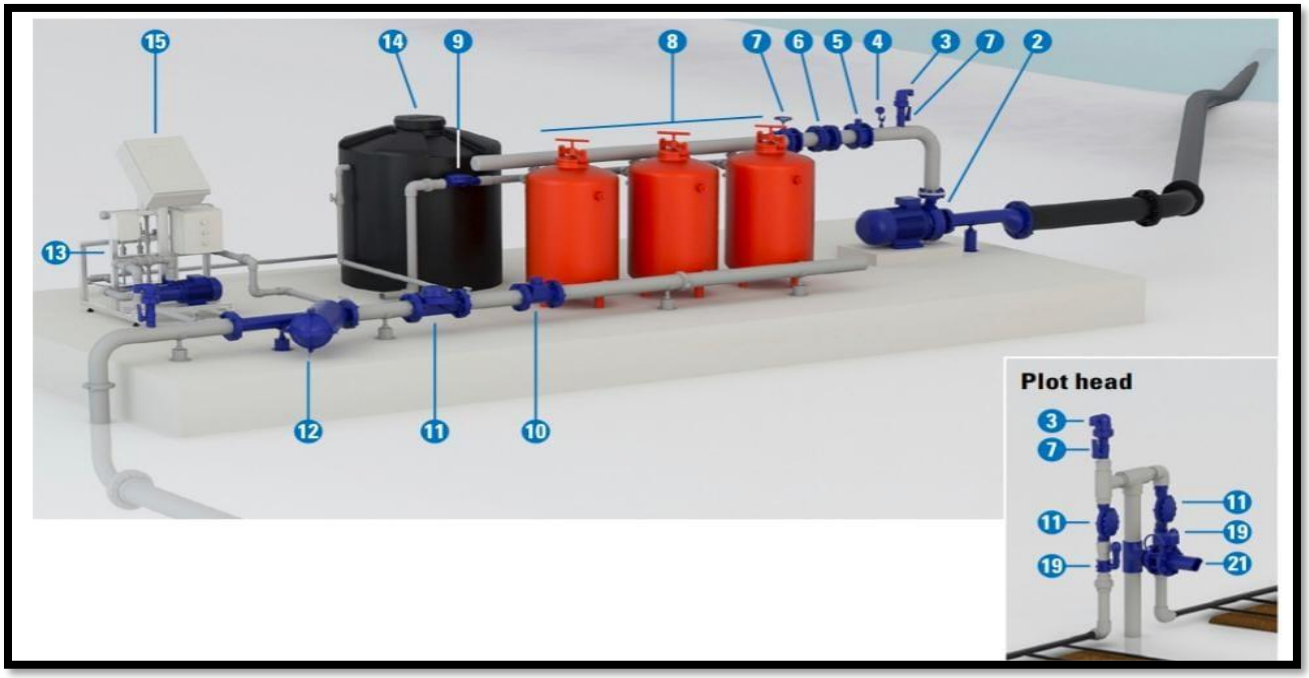


Figure 8-26: structure of the drip irrigation system

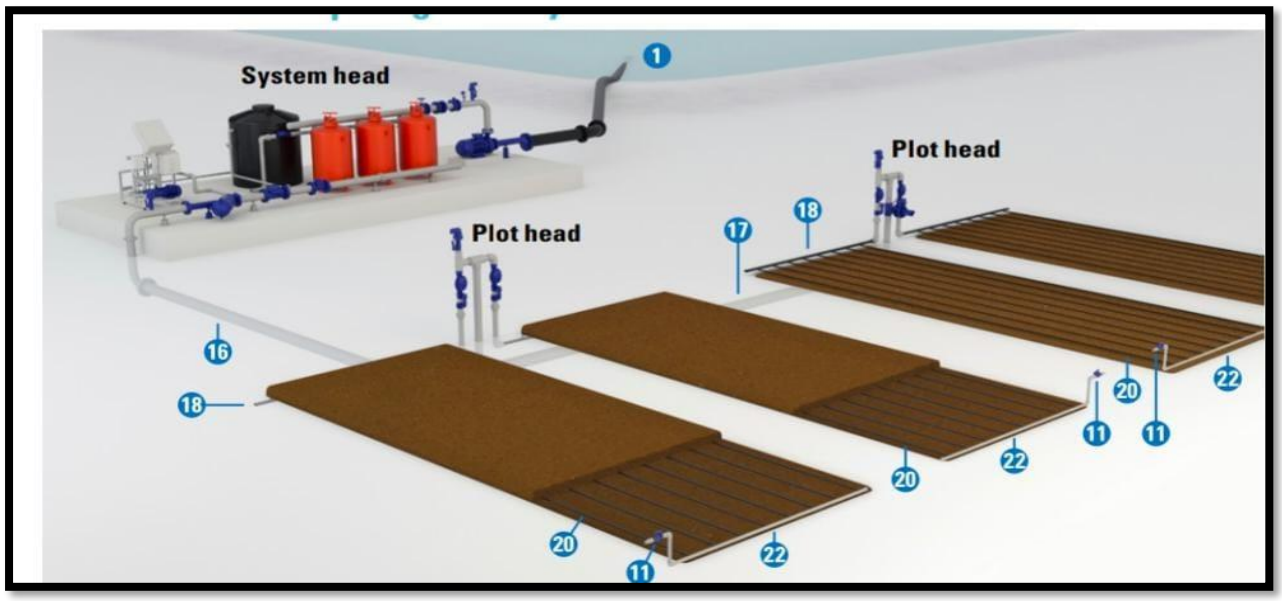


Figure 8-27: system head

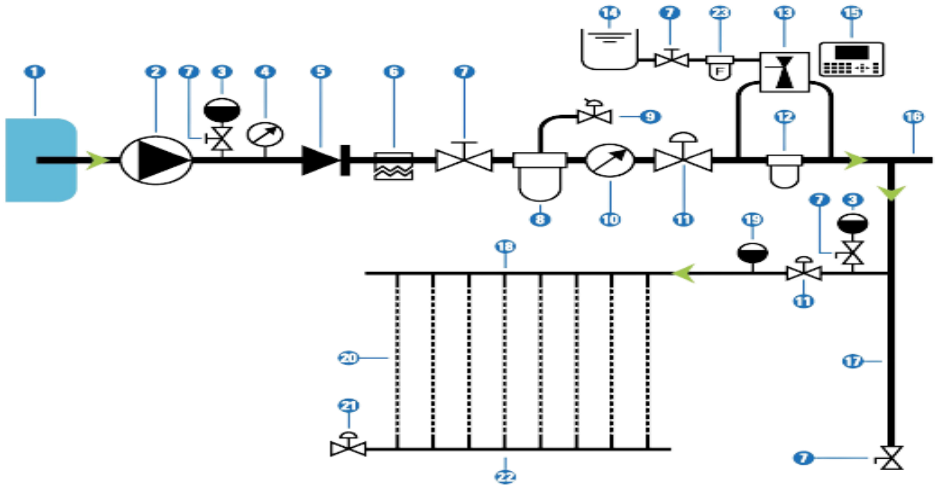


Figure 8-28: Flowchart design

1. Water Source
2. Pumping Station
3. Air Valve
4. Pressure Gauge
5. Check Valve
6. Shock Absorber
7. Manual Valve
8. Main Filtration Unit
9. Main Filtration Automatic Drainage Valve
10. Water Meter
11. Hydraulic Valve
12. Secondary Filtration Unit
13. Dosing Unit
14. Fertilizer Tank
15. Irrigation Controller
16. Main Line
17. Sub Main Line
18. Distribution Line
19. Kinetic Valve
20. Dripper line
21. Flushing Valve
22. Flushing Manifold
23. Fertilizer Filter

Table 8-17: Estimate of drip irrigation design

PARTICULARS	COST	PER CENT.
Main pipe line	6670.08	7.92
Sub main pipe line	4741.98	5.63
HEADER	5287.34	6.28
Drippers/inline lateral pipes	53536.00	63.34
Filters	6024.93	7.16
Control valves.	2675.40	3.18

Flush valve.	255093	0.26
Pressure gauge	273018	0.32
Start nipple	69.6	0.08
End nipple	63.6	0.08
Joiners	69.6	0.08
Others.	4477059	5.32
Total capital investment	**84114.96**	100.0

8.2 Reason for Students Recommending this Design

- **Biogas plant:** Animal waste as well as other waste will be used so cleanliness will be maintained as well as it will be used as natural fertilizer and energy supply.
- **Bus stand:** To travel easily.
- **Public toilet:** To maintain swactha in village. to avoid old open ground culture system and to support to use toilet
- **Soak pit:** to maintain cleanliness in the village
- **Skill Development Centre:** To enhance various types of skill.
- **Heritage Design:** Village Gate To identify the location.

8.3 About designs Suggestions / Benefit of the villagers

The main aim of the project is to provide urban amenities in rural area and maintaining the rural soul. This will help in developing villages in a sustainable manner, reduce migration from villages and prevent the cities from the urban pressure.

Basic physical infrastructure likes water supply, transport, Waste water Drainage facilities should be the priority focus and be provided. Vermicompost Plant for waste management system and their equipment should be regular maintenance.

If new path of technology is implemented in village the following benefits are come for villagers.

- Village becomes clean.
- Benefit to better agriculture.
- Diseases reduce.
- Quality of life will become better.
- Literacy rate increase because of increase in knowledge source.
- If we use solar street lights, we can save both money and energy because solar street lights glow using solar energy and free energy comes from the sun.
- If we use digital transactions, then payment will happen very quickly and will save our time. We have not to depend on other for cash

Chapter 9. Proposing designs for Future Development of the Village for the PART-II Design

Vocational training center

It is very useful for growth of children in early age. In vocational center so many cultural and social activities are organized and by that it is easy for children to find their area of interest in vacation time of their school and at weekends.

Septic tank

It is a underground chamber through which domestic waste water flows for basic treatment.

Common Service Centres

CSC are physical facilities for delivering Government of India e-Services to rural and remote locations where availability of computers and Internet was negligible or mostly absent. They are multiple-services-single-point model for providing facilities for multiple transactions at a single geographical location.

Public library

Public library is a library that is accessible by the general public and is usually founded from public sources, such as taxes. It is operated by librarians and library paraprofessionals, who are also civil servants. Public libraries exist in many countries across the world and are often considered an essential part of having an educated and literate population.

Plastic roads

Plastic roads are made entirely of plastic or of composites of plastic with other materials. Plastic roads are different from standard roads in the respect that standard roads are made from asphalt concrete, which consists of mineral aggregates and asphalt.

Rainwater harvesting

RWH is the collection and storage of rain, rather than allowing it to run off. Rainwater is collected from a roof-like surface and redirected to a tank, cistern, deep pit (well, shaft, or borehole), aquifer, or a reservoir with percolation, so that it seeps down and restores the ground water.

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

The project was initiated with the orientation session and from there, we got to know about ideal village, its infrastructure facilities, etc.

After we took visit of the selected village Vankal. we came to know that the village has sufficient water supply facilities. Not only that, the village also has electric power supply without power outages.

We also noticed some weak points of the village like waste management as they are dumping and burning it creating waste again, not storing rain water depending only on pond and small lake and so on.

We tried to stop these weaknesses of the village from manifesting themselves into threats.

For that, we provided designs and proposals of vermicompost, rain water harvesting, pond development etc.

Now, water conservation is evidently a necessity prevailing at almost all of the places.
Hence, we also gave design proposal of rain water harvesting system.
One of the most appreciated act by our Hon. P.M. Narendra Modi
This emphasizes the importance of cleanliness. We designed vermin-composting owing to the same and are also planning to provide a proposal of waste disposal system in the village in the upcoming semester.
Other few areas we decided to focus are drainage, transportation network, maintenance, etc for the next part of this project.

Chapter 11. References refereed for this project

- https://www.google.com/search?q=GTU+guidelines+and+briefings&rlz=1C1CHBF_enIN863IN863&oq=GTU+guidelines+and+briefings&aqs=chrome..69i57j33i160.484j0j7&sourceid=chrome&ie=UTF-8
- http://data.conferenceworld.in/ICSTM7/Nashik%20Proceeding.pdf
- https://www.centreforcities.org/reader/delivering-change-putting-city-centres-heart-localeconomy/city-centre-case-studies/#case-study-8-manchester-metroshuttle
- http://www.vyojana.gtu.ac.in/
- https://practicalactionpublishing.com/article/2588/sustainability-of-rural-sanitation-marketingin-vietnam-findings-from-a-new-case-study
- https://ijesc.org/upload/5fb259d8eb2753b4d0ea2dcd3290b357.A%20Case%20Study%20on%20Sewage%20Treatment%20Plant%20(STP),%20Delawas,%20Jaipur.pdf
- https://scholarsmine.mst.edu/cgi/viewcontent.cgi?article=2251&context=icchge
- URDPFI norms

Chapter 12. Annexure attachment

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

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

Name of Village:	Ena
Name of Taluka:	Palsana
Name of District:	Surat
Name of Institute:	Dr. S & S.S Ghandhy Government Engineering
Nodal Officer Name & Contact Detail:	Prof. Darshan I. Mehta Prof. Darshini N. Shukla
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Sarpanch - Meghnaben Ahir
Date of Survey:	8-10-20

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001				
ii)	2011	3777	1895	1882	888

2. **Geographical Detail:**

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	622
	Forest Area (In hect.)	—
	Agricultural Land Area (In hect.)	—
	Residential Area (In hect.)	—
	Other Area (In hect.)	—
	Water bodies	—
	Nearest Town with Distance:	6 KM

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3. Occupational Details:

Name of Three Major Occupation groups in Village	1. Full time worker 2. Part time worker 3.

4. Physical Infrastructure Facilities:

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

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

	Electrification in Government Buildings/ Schools/ Hospitals	yes			
	Renewable Energy Source Facilities (Y/ N)	yes			
	LED Facilities	yes			
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	1			
	Location Condition	Good			
	Community Toilet (With bath/ without bath facilities)	No			
	Solid & liquid waste Disposal system available	yes			
	Any facility for Waste collection from road	~~yes~~ No			
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Tubewell			
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Pucca 100%			

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:	1 0	✓		
	Private Clinic/Private Hospital/ Nursing Home	1	✓		
	If any of the above Facility is not available in village than approx. distance from village: ....5....kms.				
Suggestions if any:					
L.	**Education Facilities:**				
	Aaganwadi/ Play group				
	Primary School	1			
	Secondary school	1			
	Higher sec. School	1			
	ITI college/ vocational Training Center	0			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	0			
	If any of the above Facility is not available in village than approx. distance from village: ....5....kms.				
Suggestions if any:					
M.	**Socio- Culture Facilities**				
	Community Hall (With or without TV) Location:	1 yes	✓		

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	Condition:	Good			
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	yes Good	✓		
	Public Garden Location: Condition:	yes Good	✓		
	Village Pond Location: Condition:	No			
	Recreation Center Location: Condition:	yes Good	✓		
	Cinema/ Video Hall Location: Condition:	No			
	Assembly Polling Station Location: Condition:	yes Good	✓		
	Birth & Death Registration Office Location: Condition:	yes Good	✓		
If any of the above Facility is not available in village than approx. distance from village: ....5...kms.					
Suggestions if any:					
N.	**Other Facilities**				
	Post-office	yes			
	Telecommunication Network/ STD booth	No			

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

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

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

7. **Data Collection From Village**

Village Base Map Available: Hard Copy/Soft Copy	yes

Recent Projects going on for Development of Village	No
Any NGO working for village development	NO

8. **Additional Information/ Requirement:**

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

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

J A Patel

સરપંચ
એના-ગોદીયા ગૃપ ગામ પંચાયત
તા. પલસાણા, જિ. સુરત

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

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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:	Bardoli
Name of Village:	Baben
Name of Institute:	Dr. S.S. Ghandhy Government Engineering College.
Nodal Officer Name & Contact Detail:	Prof Darshni N. Shukla 9909811375
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Mrs. Fatguniben B. Patel. સરપંચ ગ્રામ પંચાયત બાબેન તા. બારડોલી, જી. સુરત.
Date of Survey:	

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	8377	4576	3801	1599
2.	2011	15,610	8642	6968	5278.

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	1634 hector
2.	Forest Area (In hect.)	–
3.	Agricultural Land Area (In hect.)	406 hector.
4.	Residential Area (In hect.)	
5.	Other Area (In hect.)	
6.	Distance to the nearest railway station (in kilometers):	

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7.	Name of Nearest Town with Distance:	Bardoli 1 Km.
8.	Distance to the nearest bus station (in kilometers):	Within village
9.	Whether village is connected to all road for the any facility or town or City?	yes

III. OCCUPATIONAL DETAILS:

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

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

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

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Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:			
	Underground Sump	Capacity:			
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1 2 B. OPEN WITH OUTLET C. OPEN WITHOUT OUTLET	yes yes			
Suggestions if any:					
D.	**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 Kms.
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	yes			1 km Baodoli
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	yes			Baben
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	yes.			
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	yes			24 hours.

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	Power supply for Domestic Use	yes			24 hours
	Power supply for Agricultural Use	yes			fixed hours
	Power supply for Commercial Use	yes			24 hours
	Road/ Street Lights	yes			
	Electrification in Government Buildings/ Schools/ Hospitals	yes			
	Renewable Energy Source Facilities (Y/ N)	yes			solar street light
	LED Facilities	yes			
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	yes			2 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			
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL. OTHER (SPECIFY)	yes all available.			
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Pucca			Minor base has Kutchha

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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	yes yes.			Sub center Private clinic / hospital
	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				
	Primary School	yes	yes		1.
	Secondary school	No			
	Higher sec. School	No			
	ITI college/ vocational Training Center	No			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities				
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				

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Suggestions if any:

L.	Socio- Culture Facilities	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)		4 km baodoli		No
	Public Library (With daily newspaper supply: Y/N)				No
	Public Garden			yes	
	Village Pond			yes	
	Recreation Center				No
	Cinema/ Video Hall				No
	Assembly Polling Station		Panchayat office	yes	
	Birth & Death Registration		Panchayat office	yes	

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		Baodoli		No
	Telecommunication Network/ STD booth				No
	General Market			yes	
	Shops (Public Distribution System)			yes	
	Panchayat Building			yes	
	Pharmacy/Medical Shop			yes	
	Bank & ATM Facility			yes	
	Agriculture Co-operative Society		APMC	yes	
	Milk Co-operative Soc.			No	
	Small Scale Industries			No	
	Internet Cafes/ Common Service Center/Wi Fi		Private Wi fi	yes	
	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)	PMAY, BP, 14 Fe. 15 Fe.		etc.	

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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	yes			Solar Street light
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	yes		
2.	Recent Projects going on for Development of Village				
3.	Any NGO working for village development	2	yes		
4.	Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS CYCLONE DROUGHT LANDSLIDES AVALANCHE OTHER (SPECIFY)				

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks

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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	All facility available	
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?		

IX. Smart Village / Heritage Details

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

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

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

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

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Techno Economic Survey

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

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

Name of District:	Surat
Name of Taluka:	Mangrol
Name of Village:	Vankal
Name of Institute:	Dr. S&S.S. Ghandhy Government Engineering.
Nodal Officer Name & Contact Detail:	Prof. Darshan S. Mehta Prof. Darshni N. Shukla.
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Sarpanch = Bhagatbhai Vasava Talati = Satishbhai Gamit
Date of Survey:	8-10-20

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001				
2.	2011	6390	3213	3177	1410

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	1080 hect
2.	Forest Area (In hect.)	864 0
3.	Agricultural Land Area (In hect.)	864
4.	Residential Area (In hect.)	25
5.	Other Area (In hect.)	–
6.	Distance to the nearest railway station (in kilometers):	35 KM

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7.	Name of Nearest Town with Distance:	Kosamba 35 km
8.	Distance to the nearest bus station (in kilometers):	Within village.
9.	Whether village is connected to all road for the any facility or town or City?	yes.

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1. Farmer 2. Labour 3. Animal farming

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

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
1.	**PIPED WATER** Piped Into Dwelling Piped To Yard/Plot Public Tap/Standpipe Tube Well Or Bore Well	1410 hasab	✓		
2.	**DUG WELL** Protected Well Un Protected Well	NO			
3.	**WATER FROM SPRING** Protected Spring Unprotected Spring	No			
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/** Irrigation Channel Bottled Water Hand Pump	NO			

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	Other(Specify)**Lake/ Pond**	yes	✓		
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	1,10,000 l	4	
	Underground Sump	Capacity:	1,10,000 l	7	
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1	30 %			
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Bitumous			
	Main road	11			
	Internal streets	11			
	Nearest NH/SH/MDR/ODR Dist. in kms.	SH=0 KM			
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	Kosamba 35 KM	NO		
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	yes.			
	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)	DGVCL 24 hrs.	✓		

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	Power supply for Domestic Use	24 hrs	✓		
	Power supply for Agricultural Use	8 hrs	✓		
	Power supply for Commercial Use	0			
	Road/ Street Lights	yes	✓		
	Electrification in Government Buildings/ Schools/ Hospitals	24 hrs	✓		
	Renewable Energy Source Facilities (Y/ N)	NO			
	LED Facilities	~~No~~ yes.			
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	2			
	Location Condition	Bad			
	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)	Tube well Boring			
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Both			

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	8	✓		
	Sub-Centre	0			
	PHC	1	✓		
	BLOCK PHC	0			
	CHC/RH	0			
	District/ Govt. Hospital	0			
	Govt. Dispensary	0			
	Private Clinic	8			
	Private Hospital/	0			
	Nursing Home	0			
	AYUSH Health Facility	0			
	sonography /ultrasound facility	0			
	If any of the above Facility is not available in village than approx. distance from village: ..35...kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group				
	Primary School	4			
	Secondary school	1			
	Higher sec. School	1			
	ITI college/ vocational Training Center	0			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	3			

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	If any of the above Facility is not available in village than approx. distance from village: ..35....kms.				
Suggestions if any:					
L.	**Socio- Culture Facilities**	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	Good		✓	
	Public Library (With daily newspaper supply: Y/N)				✓
	Public Garden				✓
	Village Pond	Good		✓	
	Recreation Center	Good		✓	
	Cinema/ Video Hall				✓
	Assembly Polling Station	Good		✓	
	Birth & Death Registration Office	Good		✓	
If any of the above Facility is not available in village than approx. distance from village: ..35....kms.					
Suggestions if any:					
M.	**Other Facilities**	Condition	Location	Available (YES)	Available (NO)
	Post-office	Good		✓	
	Telecommunication Network/ STD booth				✓
	General Market	Good		✓	
	Shops (Public Distribution System)				✓
	Panchayat Building	Good		✓	
	Pharmacy/Medical Shop	Good		✓	
	Bank & ATM Facility	Good		✓	
	Agriculture Co-operative Society	Good		✓	
	Milk Co-operative Soc.	Good		✓	
	Small Scale Industries				✓
	Internet Cafes/ Common Service Center/Wi Fi				✓
	Youth Club				✓
	Mahila Mandal	Good		✓	

	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)				

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	—			
3.	Any Other	—			

VII. DATA COLLECTION FROM VILLAGE

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Village Base Map Available: Hard Copy/Soft Copy	yes			
2.	Recent Projects going on for Development of Village	Nanapanch			
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.			

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VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

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

IX. Smart Village / Heritage Details

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

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

For Any Administration queries/ Difficulties:
GTU VY Section
Contact No – 079-23267588
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તા. માંગરોળ, જી. સુરત.

12.4 Gap Analysis of the Allocated Village

Table 12-1: Gap analysis

Gap Analysis				
Facilities	**Planning Commission/UDPFI Norms**	**Vankal**		
		Population		**3621**
		Existing	**Required as per Norms**	**Gap**
Education				
Anganwadi	Each Village	8	3	
Primary School	Each Village	4	3	
Secondary School	Per 7,500 population	1	1	
Higher Secondary School	Per 15,000 Population	1	1	
College	Per 125,000 Population	3	1	
Tech. Training Institute	Per 100000 Population	1	1	
Agriculture Research Centre	Per 100000 Population	0	1	**-1**
Skill development centre		0	1	**-1**
Health Facility				
Govt/Panchyat Dispensary or Sub PHC or Health Centre	Each Village	7	1	
PHC & CHC	Per 20,000 population	1	1	
Child Welfare and Maternity Home	Per 10,000 population	1	1	
Multi specialist Hospital	Per 100000 Population	0	1	**-1**
Public Latrines	1 for 50 families (if toilet is not there in home, specially for slum pockets & kutcha house)	**0**	**0**	**-1**
Physical Infrastructure Facilities				
Transportation		**Adequate**	**Inadequate**	
Pucca Village Approach Road	Each village	Adequate		
Bus/Auto Stand provision	All Villages connected by PT (ST Bus or Auto)	Adequate	Inadequate	
Drinking Water (Minimum 70 lpcd)		**Adequate**	**Inadequate**	
Over Head Tank	1/3 of Total Demand	Adequate		
U/G Sump	2/3 of Total Demand	Adequate	inadequate	

Drainage Network		**Adequate**	**Inadequate**	
open			Inadequate	
cover			inadequate	
Waste Management System			**Inadequate**	
Socio- Cultural Infrastructure Facilities				
Community Hall	Per 10000 Population	1	1	
community hall cum Public Library	Per 15000 Population	0	1	**-1**
Cremation Ground	Per 20,000 population	2	1	
Post Office	Per 10,000 population	1	1	
Gram Panchayat Building	Each individual/group panchayat	1	1	
APMC	Per 100000 Population	1	1	
Fire Station	Per 100000 Population	0	1	**-1**
Public Garden	Per village	0	1	**-1**
Police post	Per 40,000Population	1	1	
Shopping Mall		0	1	**-1**

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

Table 12-2: Summary Details of All the Villages Designs in Table form

Vankal village	**Part-I**	
	Civil	Bio gas plant Bus station Public toilet Soak pit Skill development Centre. Village Gate.
	Electrical	Solar street light Tube well Drip irrigation.
	Part-II	
	Civil	Vocational Training Center Septic Tank Common Service Center Library Plastic Road Rain Water Harvesting
	Electrical	Solar Panels CCTV System Automatic Solar Street Light
Kosadi village	**Part-I**	
	Civil	Public toilet Rainwater harvesting Subcentre Public library Public garden Village gate
	Part-II	
	Civil	ATM Pharmacy Bank Skill Development Center Renovation of Community Hall Renovation of Anganwadi

12.6 Drawings

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

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


પ્રાથમિક આરોગ્ય કેન્દ્ર વંકલ

12.8 Village interaction with Sarpanch report with the Photograph

Village Interaction with Sarpanch Letter

Vishwakarma Yojna Phase VIII

Vankal village, Mangrol Taluka, Surat District.

Village code: 394430

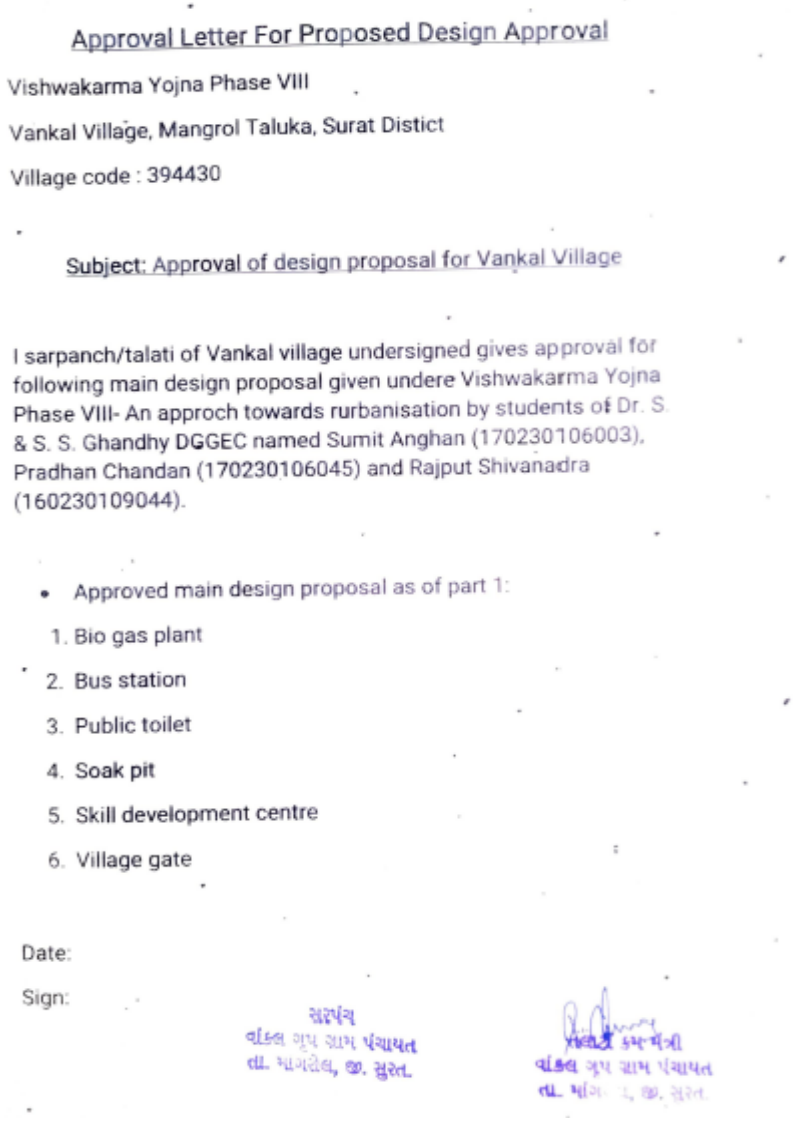
Subject: Village Interaction form with Sarpanch of Vankal Village

I Sarpanch of Vankal Village undersigned gives approval of doing village interaction activity under Vishwakarma Phase VIII an approach towards rurbanization by students of Dr. S. & S. S. Ghandhy DGGEC named Surat Anghan (170230106003), Pradhan Chandan (170230106045) and Rajput Shivendra (160230109044).

Date:

Sign:

12.9 Sarpanch letter giving information about the village development



Approval Letter For Proposed Design Approval

Vishwakarma Yojna Phase VIII

Vankal Village, Mangrol Taluka, Surat Distict

Village code : 394430

Subject: Approval of design proposal for Vankal Village

I sarpanch/talati of Vankal village undersigned gives approval for following main design proposal given undere Vishwakarma Yojna Phase VIII- An approch towards rurbanisation by students of Dr. S. & S. S. Ghandhy DGGEC named Sumit Anghan (170230106003), Pradhan Chandan (170230106045) and Rajput Shivanadra (160230109044).

- Approved main design proposal as of part 1:

1. Bio gas plant
2. Bus station
3. Public toilet
4. Soak pit
5. Skill development centre
6. Village gate

Date:

Sign:

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તા. માંગરોળ, જી. સુરત.

વંકલ ગ્રુપ ગ્રામ પંચાયત

12.10 Comprehensive report preparation as per format

Comprehensive report preparation contains the design of all proposed projects. It shows the plan, elevation and section of the structure. The details of the sheet is also mentioned in the design. All the instruction about the drawing is written along the details. The estimation of the projects are based on the designs below. The format of design as per Vishwakarma yogna project. These designs will be useful to get the plan for construction and renovations of the mentioned structures. All the design of part-1 are comphrensed into final comphrensive report with both designs of part 1 & 2 in chapter 21

Chapter 13. Design Planning Proposals Part- II

13.1 Design Proposals

13.1.1 Civil Design 1 - Vocational training center

Vocational training center

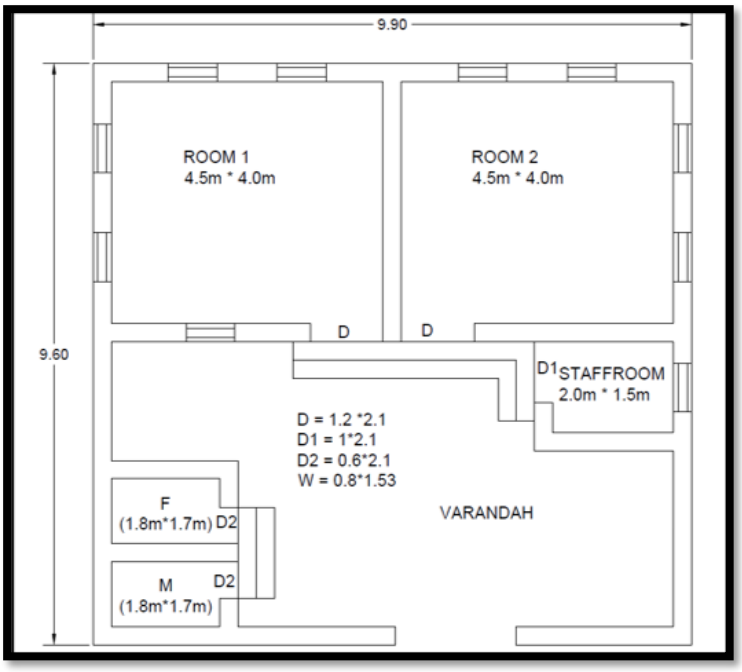

Figure 13-1: Vocational training center as social design

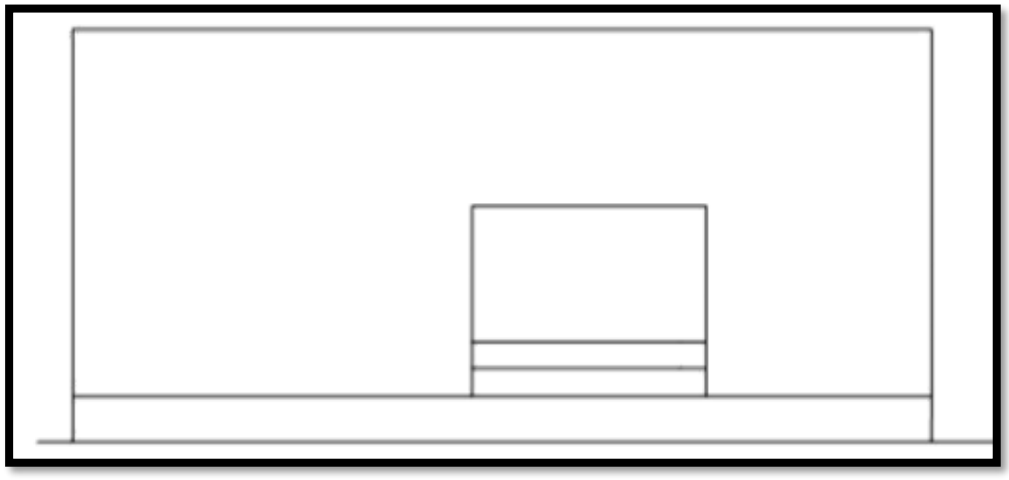

Figure 13-2: Elevation of vocational training center

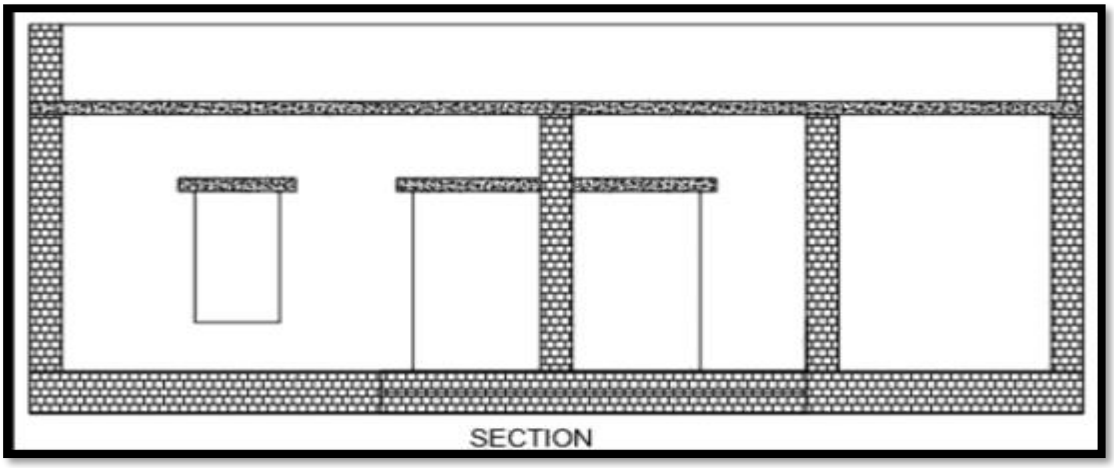

Figure 13-3: section of vocational training center

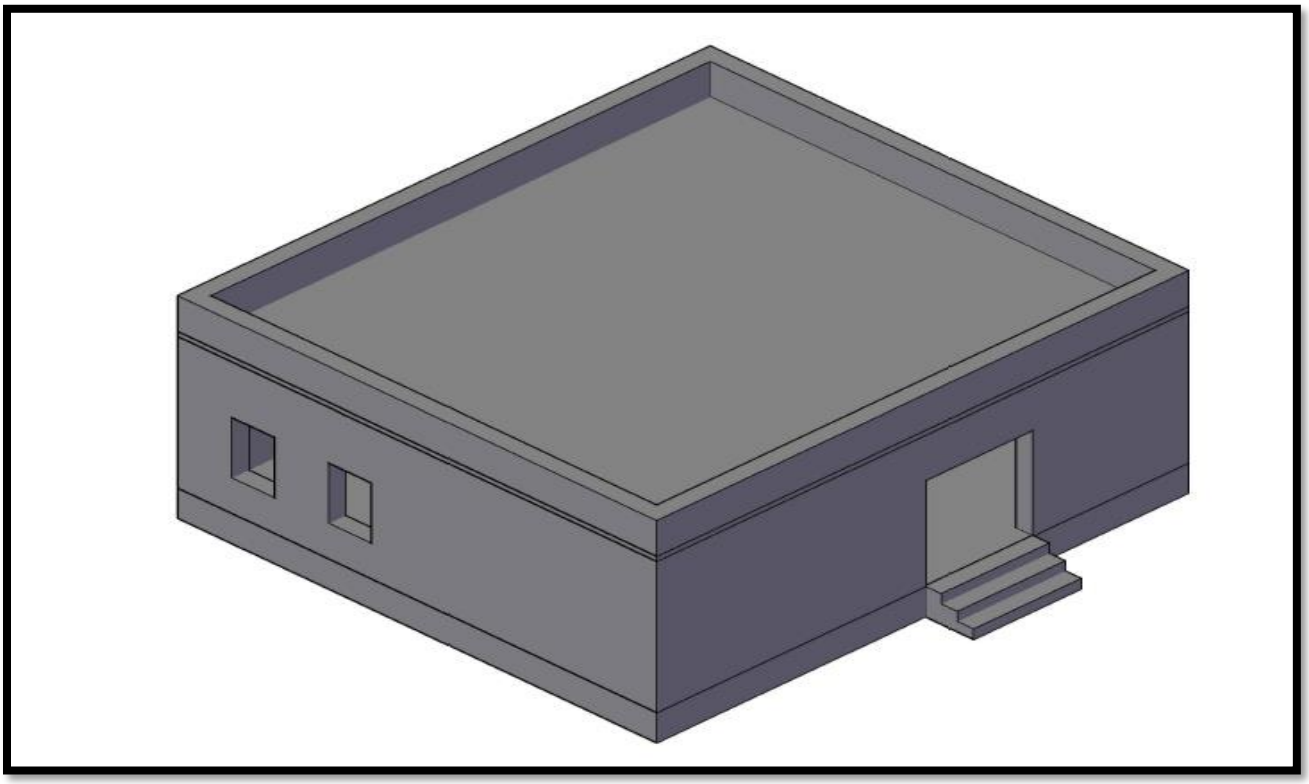

Figure 13-4: 3D Vocational training center

Why Vocational training center?

As there are so many schools and anganwadi, lots of children are going there in school days but in vacation days we suggest a "Vocational training center" in patal village. It is very useful for growth of children in early age. And vocational center so many cultural and social activities are organized and by that it is easy for children to find their area of interest.

Table 13-1: Measurement sheet of vocational training centre

Sr. No	Item Description	Length (m)	Width (m)	Height (m)	Quantity (cu. m)	Total Quantity
1	Excavation for foundation in Soft ordinary soil. Total length = 62.34 – 0.5 x 10 x 0.9	57.84	0.9	1.1	57.26	57.26
2	Providing and laying Foundation concrete (P.C.C.) (1:4:8) at Foundation.	57.84	0.9	0.3	15.61	15.61
3	Providing and laying Brick masonry at foundation up To G.L. 1st footing Total length= 62.34 – 0.5x10x0.6					
	2nd footing Total length= 62.34 – 0.5x10x0.5	60.34	0.6	0.3	10.86	36.56
		60.84	0.5	0.2	6.08	
	3rd footing (up to G.L.) Total length= 62.34 – 0.5x10x0.4	61.34	0.4	0.3	7.36	
	Brick masonry up to P.L.	61.34	0.4	0.5	12.26	
4	Providing refilling of the ordinary soil in foundation trenches.	Refilling = Total Excavation – (P.C.C. + Brick masonry of 1st – 3rd footing + Brick masonry upto G.L.) =57.26 – (39.91) Total refilling = 17.35 cu. m.				

5	Providing and refilling of the Yellow soil up to the Plinth level.	Refilling = (0.5 x 4x 4.5) + (0.5 x 4.5 x4) + (0.5x2x1.5) + 2(0.5x1.8x1.07) =21.42 cu. m.					
6	Providing and laying Brick masonry up to bottom of the slab. Total length = 62.34 – 0.5x10x0.3	1	60.84	0.3	3	57.75	57.75
	Deduction D D 1 D 2 W	2 1 2 10	1.21 0.6 0.8	0.3 0.3 0.3 0.3	2.1 2.1 2.1 1.53	1.512 0.63 0.756 3.672	6.57
						Total brickwork = 51.18 cu. m.	
7	Providing and Laying R.C.C. (1:2:4) work for slab	Room 1 & 2	4.6	9.9	0.15	6.831	8.64
		Staff room	2.1	2.3	0.15	0.724	
		Toilet M&F	3.04	2.4	0.15	1.09	

	R.C.C. Lintels (1:2:4) D D1 D2 W	 2 1 2 10	 1.5 1.3 0.9 1.1	 0.3 0.3 0.3 0.3	 0.15 0.15 0.15 0.15	 0.135 0.05 0.081 0.5	 0.766
	R.C.C. Chajja (1:2:4) D D1 D2 W	 2 1 2 10	 1.5 1.3 0.9 1.1	 0.6 0.6 0.6 0.6	 0.15 0.15 0.15 0.15	 0.27 0.117 0.162 0.99	 0.550

	Total R.C.C. (1:2:4) Work = 9.956 cu. m.						
8	Providing and laying Brick masonry CM (1:6) for parapet wall	1	32.57	0.3	0.9	8.79	8.79
9	Plaster Outside plaster Total length = 2(9.1) + 2(9.9) +7.2+2.4+2.3+1.8+7+1.4+2.7+2.1	1	64.9	4.55	-	295.2 Sq. m.	295.2 Sq. m.
	Deduction						
	D	2	1.2		2.1	5.04	=0.5 X
	D1	1	1		2.1	2.1	21.9
	D2	2	0.6		2.1	2.52	=10.95
	W	10	0.8	-	1.53	12.24	sq. m.
	Total outside plaster = 284.25 sq. m.						
	Inside plaster Total length = 2(2(4.5+4.0)) +2(2.0+1.5) +2(2(1.8+1.07)) + 2(4.5x4.0) +(2x1.5) +2(1.8x1.07)	1	59.48	-	3	178.44	221.29 sq. m.
	Deduction						
	D	2	1.2		2.1	5.04	=0.5 X
	D2	1	1		2.1	2.1	21.9
	D1	2	0.6		2.1	2.52	=10.95
	W	10	0.8	-	1.53	12.24	sq. m.
	Total inside plaster = 167.49 sq.m.						
10	Flooring	1	44.26				44.26 sq.m.
	Skirting		45.4				
11	59.48 - 2(2(1.8+1.07))		8				45.48 m

Table 13-2: Abstract sheet of vocational training centre

Sr. No.	Particulars	Total Qty.	Rate	Per	Amount
1	Excavation for foundation in soft ordinary soil.	57.26	110	M^3	3172.1
2	Providing and laying Foundation concrete (P.C.C.) (1:4:8) at foundation.	15.61	1500	M^3	5528.89

3	Providing and laying Brick masonry at foundation and plinth.	36.56	950	M^3	13247.48
4	Providing refilling of the ordinary soil in foundation trenches.	17.35	107	M^3	1778.57
5	Providing and refilling of the Yellow soil at Plinth level.	21.42	212	M^3	7098.87
6	Providing and laying Brick masonry up to bottom of the slab and parapet.	66.36	950	M^3	16547.45
7	Providing and Laying R.C.C. (1:2:4) work	9.95	7000	M^3	29613.78
8	Providing 12 mm thick cement plaster in C.M. (1:4)	505.54	150	M^2	16182.67
9	Providing and fixing tile flooring	44.26	650	M^2	16701.35
10	Providing and fixing 10 cm height tiles. (Skirting)	45.48	40	RM	1072.8
			Total cost in Rupees = 1,10,943.96		

13.1.2 Civil Design 2 - Septic Tank

Septic Tank

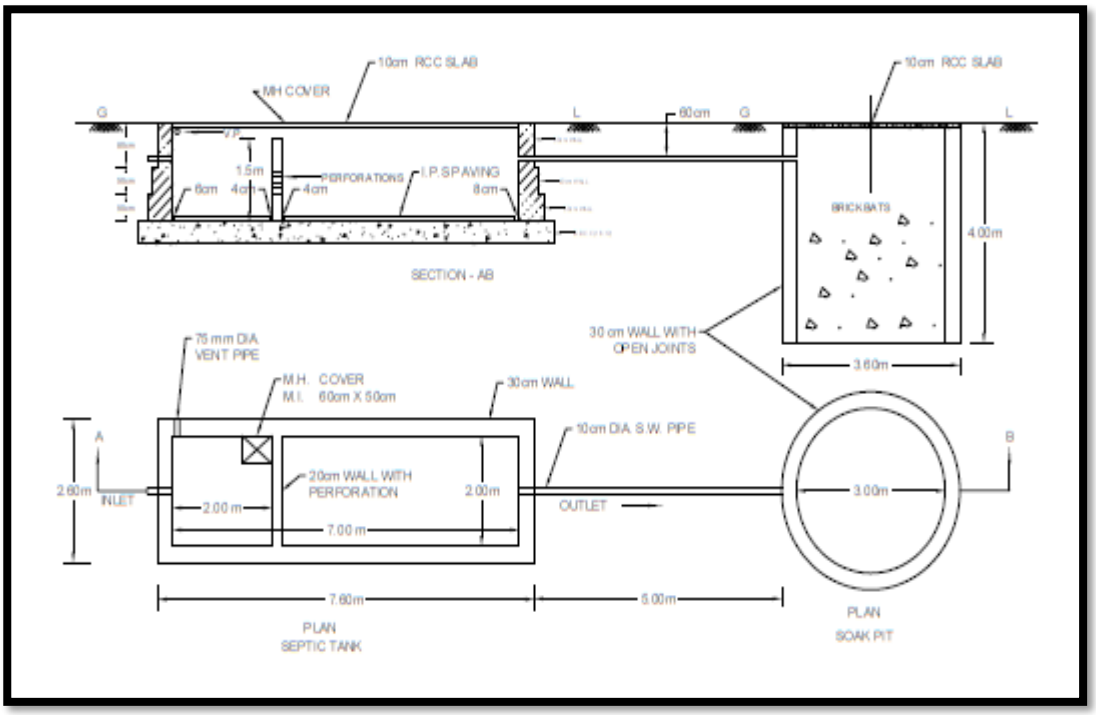

Figure 13-5: Design of septic tank

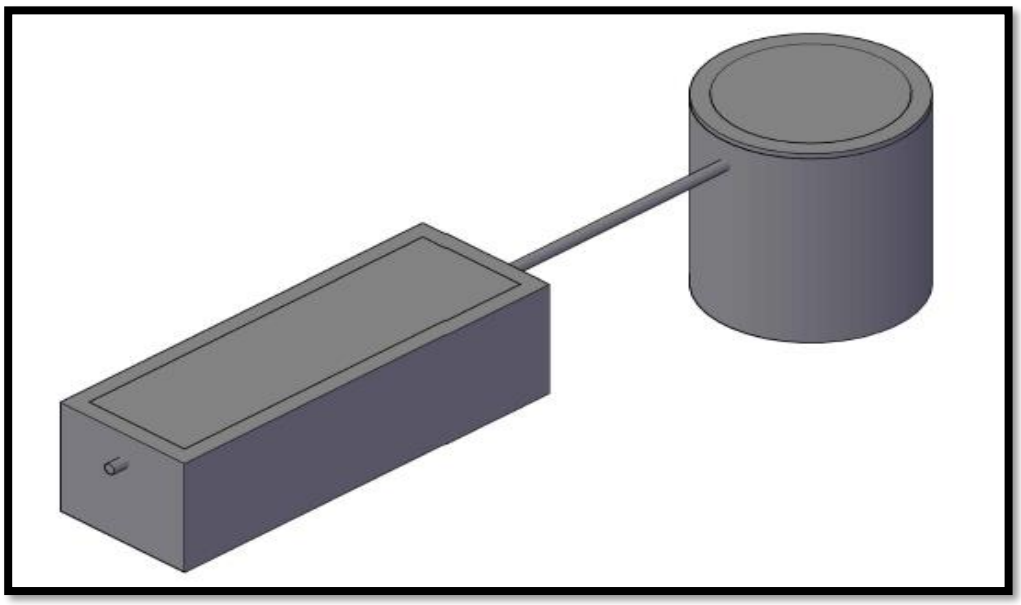

Figure 13-6: 3d septic tank

Table 13- 3: Septic tank measurement sheet

ITEM NO	ITEM DESCRIPTION	NO.	LENGTH (M)	WIDTH(M)	HEIGHT(M)	QUANTITY
1	Excavation of foundation					
	(a)up to 1.5 m depth For septic tank: L=8.40 m B=2+(2*0.5)+(2*0.2)= 3.4 m	1	8.4	3.4	1.5	42.84
	For soak pit:	1	3.14	12.96	1.5	15.27
						58.11 m3
	(b) from 1.5m to 3 m depth for septic tank: H=1.08+ 0.5 +0.4 -1.5 =0.98m	1	8.4	3.4	0.98	27.99
	For soak pit:	1	3.14	12.96	1.5	15.27
						43.26 m3
	(c) For depth more than 3.0 For soak pit: H=4.0-3.0=1.0 m	1	3.14	12.96	1	10.18
2	Foundation concreate B.B.C.C. (1:6:12) For septic tank:	1	8.4	3.4	0.4	11.42
3	For walld of septic tank: First class brick work in CM (1:6) long walls: First step : L=8.4--2*0.2=8.0 m	2	8	0.5	0.5	4

	second step: L=8.0-2*0.1=7.8m	2	7.8	0.4	0.5	3.12
	third step: L=7.8-2*0.1=7.6m H=1.08-0.1=0.98 m	2	7.6	0.3	0.98	4.47
	Short walls: First step: L=2m	2	2	0.5	0.5	1
	Second step L=2 m	2	2	0.4	0.5	0.8
	Third step: L= 2m	2	2	0.3	0.98	1.18
						14.57 m3
4	Open joints masonary of soak pit H=4.0-0.10=3.90	1	12.43		3.9	12.13
	Baffle wall of septic tank	1	2	0.2	1.5	0.6
						12.73 m3
5	Brickbats in soak pit H=4.0-0.6=3.4m	1	3.14	9	3.4	24.03
6	RCC slab (10 cm) For septic tank:	1	7.6	2.6	0.1	1.98
	For soak pit:	1	3.14	12.96	0.1	1.02
	deduction of manhole cover	1	0.5	0.6	0.1	-0.03
						2.97 m3
7	L.P.S. flooring at the bottom septic tank (a) Left part, average thickness =(6+4)/2 =5m	1	2	2		4m2
	(b) Right part average thickness (4+8)/2 =6m	1	4.8	2		9.6m2
8	12 mm thick plaster (1:4) inside the septic tank: Long walls	2	7		1.98	27.72
	H = 0.5+.05+1.08-0.1=1.98 m					

	Short walls:	2	2		1.98	7.92
	below the slab	1	7	2		14
	below the slab of soak pit	1	3.14	9		7.07
						56.71m2
	Deduction Ends of baffle wall	2		0.2	1.5	0.6
	manhole cover	1	0.5	0.6		0.3
						(-)0.90m2
9	C.I. Steps	3				3
10	Manhole cover (weight up to 0.50 quntal)	1				1
11	100 mm diameter S.W. pipe outlet pipe: L = 0.3+5+0.3=5.6 m	1	5.6			5.6
	inlet pipe: L=2.4m (assume)	1	2.4			2.4
						8 r.m
12	75 mm diameter C.I. vent pipe assume length	1	12			12 r.m

Table 13-4: Abstract sheet of septic tank

No.	ITEM	QUANTITY	RATE	PER Rs.	AMOUNT Rs.
1	Excavation For Foundation (a) up to 1.5 m	58.11	85	m3	4939.5
	(b) from 1.5 to 3.0 m depth	43.261	100	m3	4326
	(c) more than 3.0 m depth	10.18	150	m3	1527
2	Foundation concrete B.B.C.C (1:6:12)	11.42	2000		22840
3	First class brick masonary in CM (1:6) for the walls of septic tank	14.57	3200		46624
4	Open joints masonary of soak pit	12.73	1500		19095
5	Brickbats in soak pit	24.03	800		19224

6	RCC slab (including reinforcement)	2.97	8800		26136
7	L.P.S. at the bottom of the septic tank (a) average 5 cm thick	4	250	m2	1000
	(b) average 6 cm thick	9.6	300	m2	2880
8	12 mm thick plaster (1:4) inside the septic tank	55.81	150		8372
9	C.I. steps	3	300		900
10	Manhole cover size 50 cm* 60cm	1	450		450
11	100 mm dia S.W. pipe	8	130		1040
12	75 dia C.I. vent pipe	12	300		3600
		Total = 1,62,954. Rs			

13.1.3 Civil Design 3 - Common service centre

Common service centre

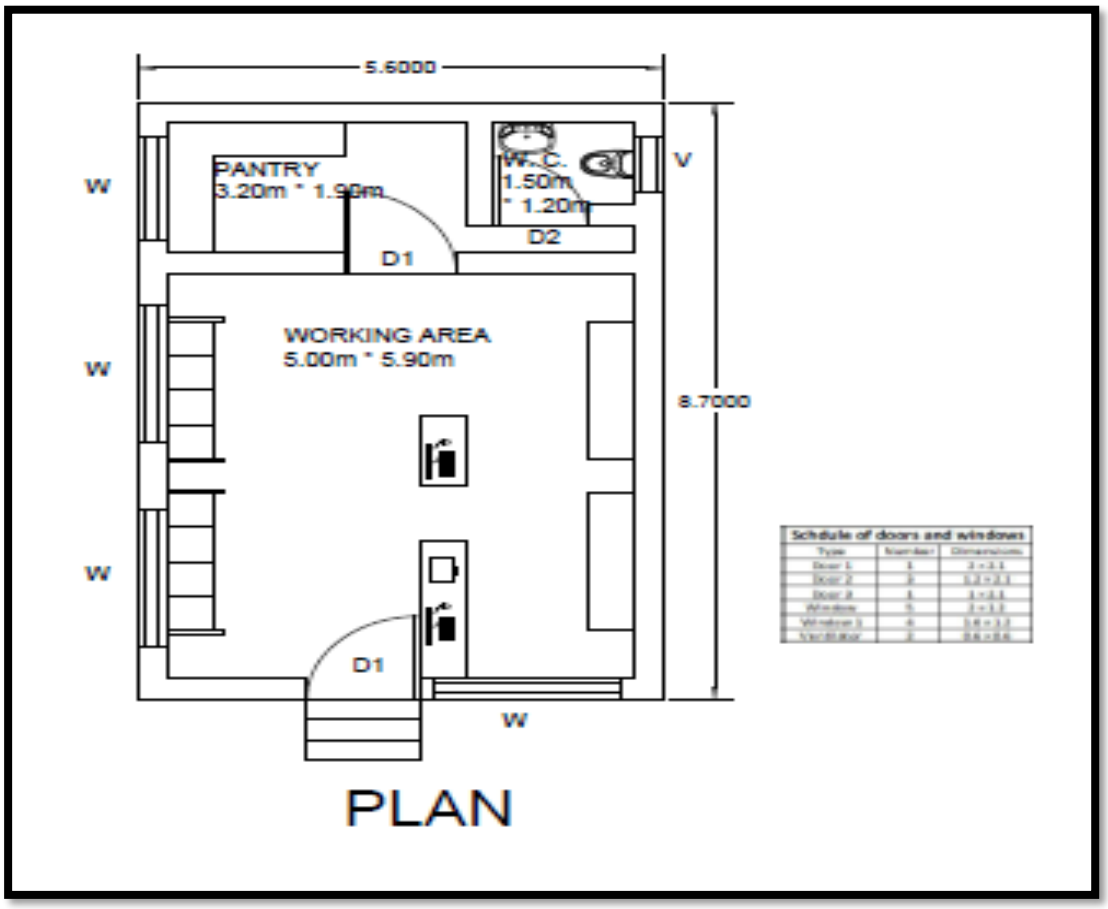

Figure 13-7: Plan view ofcommon service centre

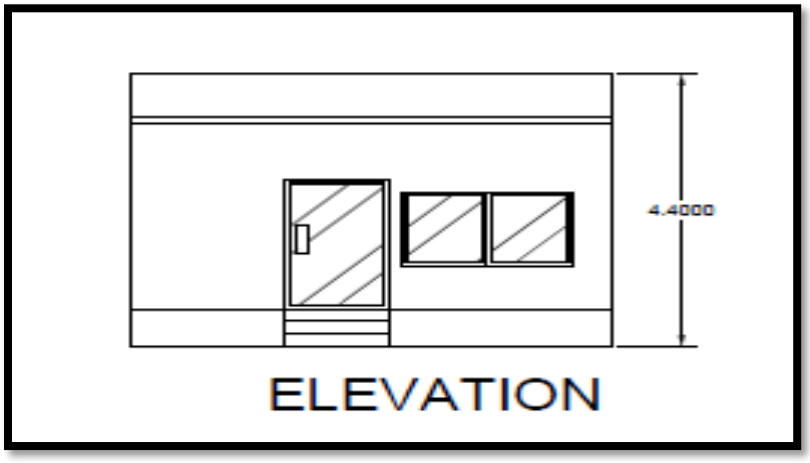

Figure 13-8: Elevation view of common service centre

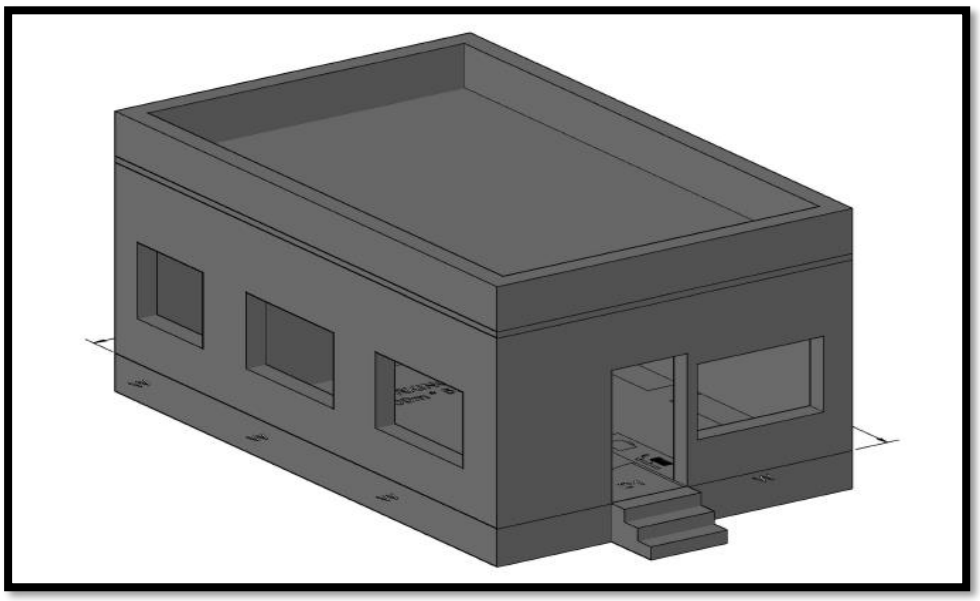

Figure 13-9: 3D common service centre

Table 13-5: Measurement sheet of csc

Measurement Sheet						
Item no.	**Description of item**	**Nos.**	**Length (m)**	**Bredth (m)**	**Height (m)**	**Qty. m^3**
1	Excavation for foundation					
		1	30.6	1.2	1.1	40.392
2	P. C. C. work					
		1	31.2	0.9	0.2	5.616
3	Brick work in foundation					
	1st step(0.6m)	1	34.8	0.6	0.3	6.264
	2nd step(0.5m)	1	35	0.5	0.3	5.25
	3rd step(0.4m)	1	35.2	0.4	0.85	11.968
	Total					23.482
4	Earth filling work in plinth					
	Working area	1	5	5.9	0.55	16.225
	Pantry	1	3.2	1.9	0.55	3.344
	W. C.	1	1.5	1.2	0.55	0.99
	Space	1	1.8	0.4	0.55	0.396

	*NOTE: Height=(0.6-0.05<DPC>=0.55)					
	Total					20.955
5	D.P.C. at plinth level					in m²
		1	35.2	0.4	-	14.08
6	Brick masonry in super structure					
		1	35.4	0.3	3	31.86
	Deduction of doors and windows					
	Door 1	2	1.2	0.3	2.1	1.512
	Door 2	1	1	0.3	2.1	0.63
	Window	4	2	0.3	1.2	2.88
	Ventilator	1	0.8	0.3	0.8	0.192
	Sum					5.214
	Lintel Quantity * Deduction					
	Door 1	2	1.5	0.3	0.15	0.135
	Door 2	1	1.3	0.3	0.15	0.0585
	Window	4	2.3	0.3	0.15	0.414
	Sum					0.6075
	Total Brickwork in Super structure					26.0385
7	R. C. C. slab					
		1	5.6	8.7	0.1	4.872
8	Brick work in parapet work					
	Horizontal wall	2	5	0.3	0.7	2.1
	Vertical wall	2	8.7	0.3	0.7	3.654
	Total Brick work in parapet wall					5.754
9	Plastring work					
	Working area					in m²
	Horizontal wall	2	5	-	3	30
	Vertical wall	2	5.9	-	3	35.4
	Pantry					
	Horizontal wall	2	3.2	-	3	19.2

	Vertical wall	2	1.9	-	3	11.4
	W. C.					
	Horizontal wall	2	1.5	-	3	9
	Vertical wall	2	1.2	-	3	7.2
	Space					
	Horizontal wall	2	1.8	-	3	10.8
	Vertical wall	0	0	-	3	0
	Sum					123
	Deduction					
	Door 1	1.5	1.2	-	2.1	3.78
	Door 2	1	1	-	2.1	2.1
	Window	4	3	-	1.2	14.4
	Ventilator	1	0.8	-	0.8	0.64
	Sum					20.92
	Total plaster work					102.08

Table 13-6: Abstract sheet of csc

Abstract Sheet					
No.	**Item description**	**Qty. in m^3 or m^2**	**Rate in Rs.**	**Per**	**Amount Rs.**
1	Excavation for foundation	40.392	350	m^3	14137.2
2	P. C. C. work	5.616	3500	m^3	19656
3	Brick work in foundation	23.482	90	m^3	2113.38
4	Earth filling work in plinth	20.955	65	m^3	1362.075
5	DPC at plinth	14.08	330	m^2	4646.4
6	Brick masonry in super structure	26.0385	90	m^3	2343.465
7	R.C.C. slab	4.872	3500	m^3	17052
8	Brick work in parapet wall	5.754	90	m^3	517.86
9	Plastering work	102.08	360	m^2	36748.8
Total					**98577.18**

13.1.4 Civil Design 4 - library

library

There is small structure of library available in the village for the students of village but after some years if there is required the more area for library if population of student is increase, we gave design of library as social design. We also give E-corner in library for the good connectivity of new technologies for the growth of people of Salaiya village.

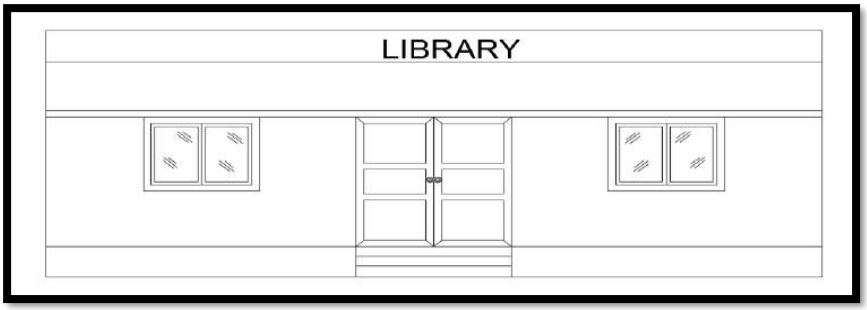

Figure 13-10: Elevation of library

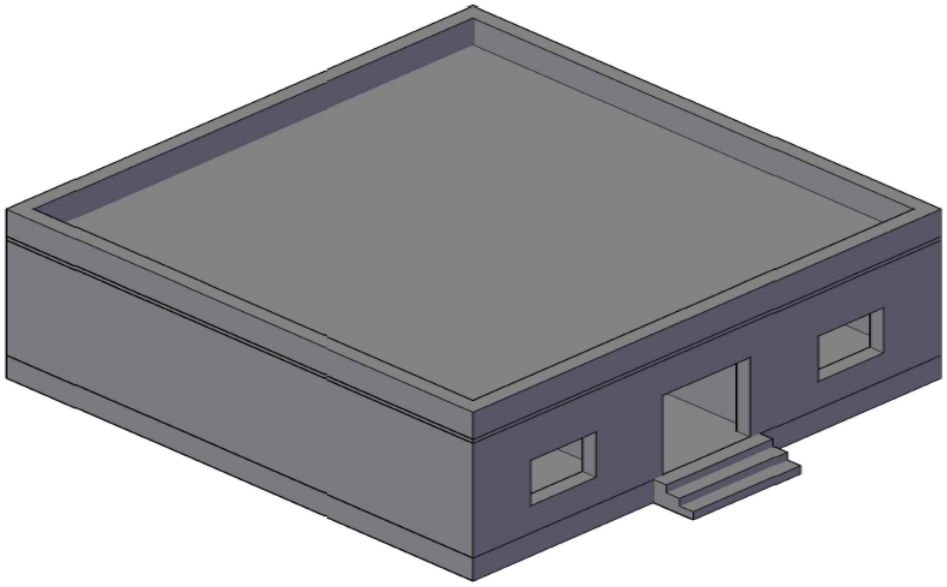

Figure 13-11: 3D library

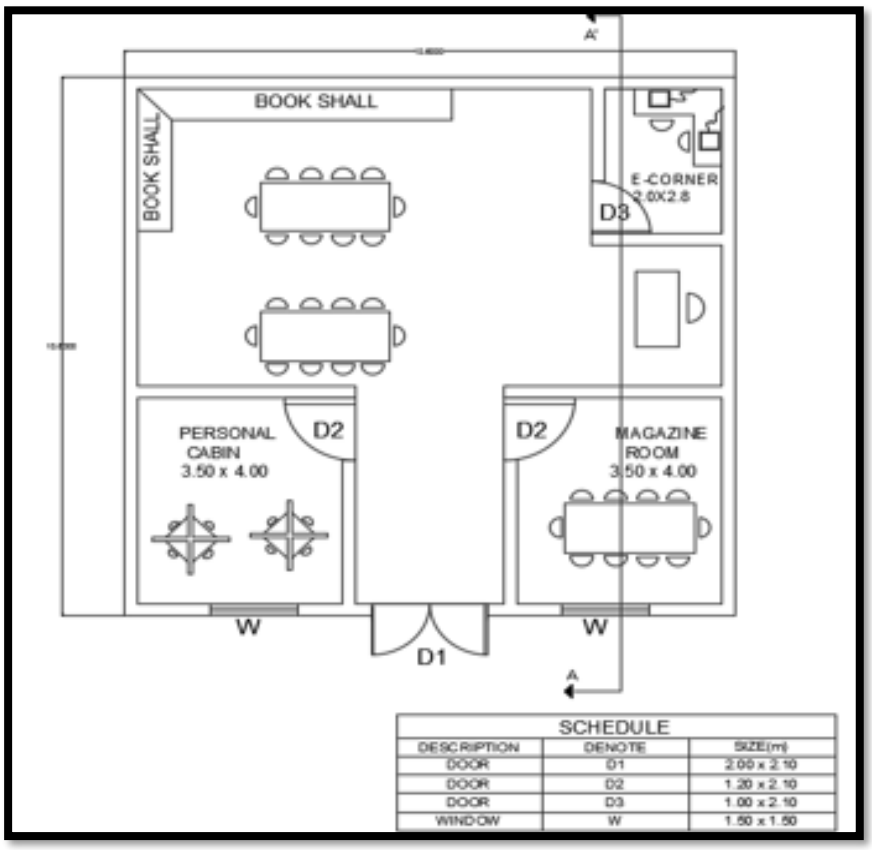

Figure 13-12: Plan of library

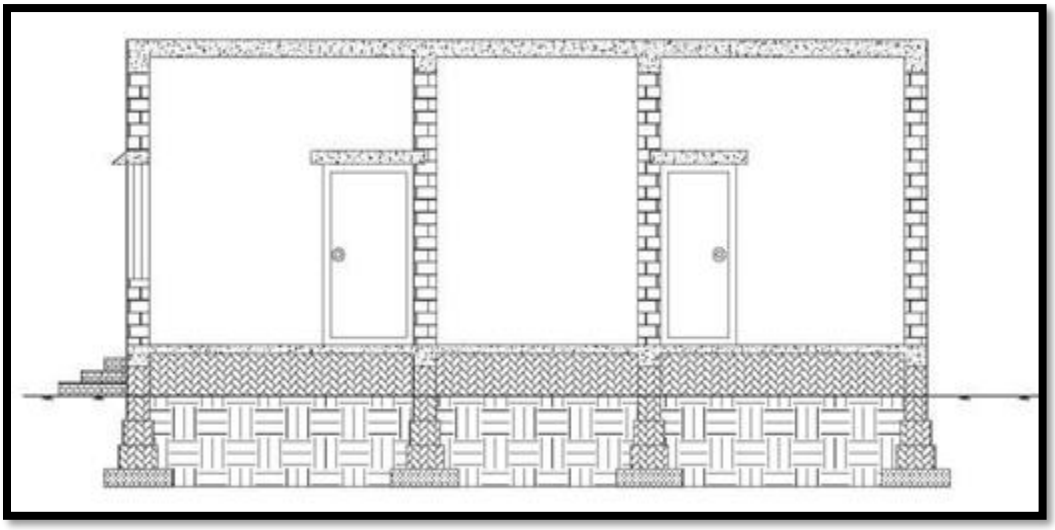

Figure 13-13: Section of Library

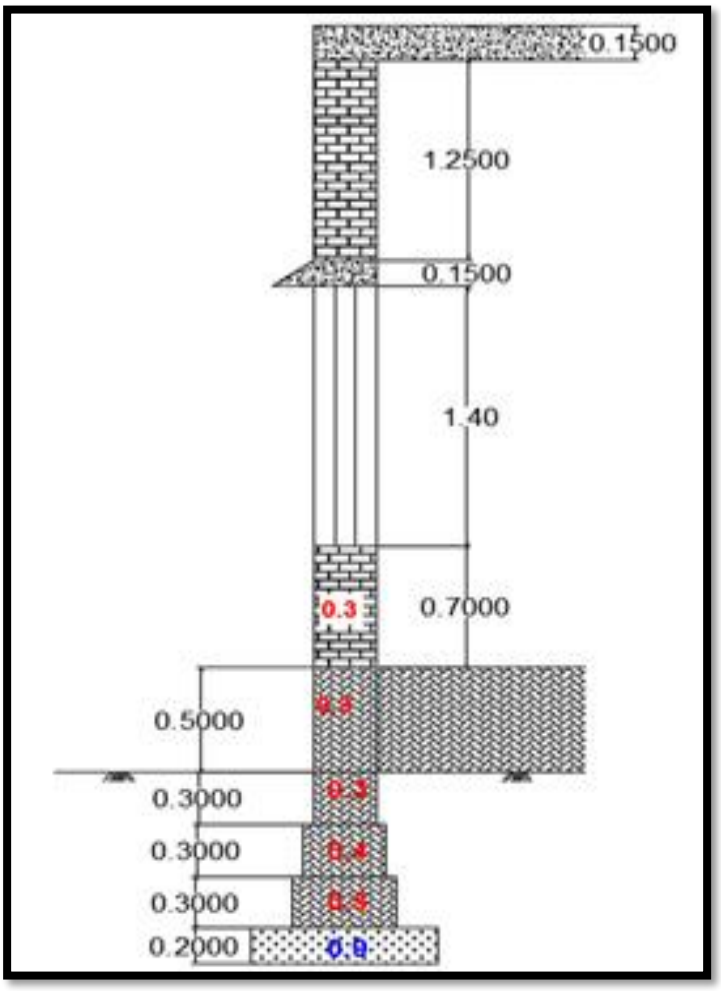

Figure 13-14: Section of footing

Table 13-7: Measurement sheet of library

SR. NO.	DESCRIPTION	NO.	L(M)	B (M)	H(M)	Qty
1	**Excavation in Foundation**					
	Total C. L=60.10 m	1	60.1	0.9	1.1	59.5
	Total					**59.5 m3**

2	**Plain cement concrete (P.C.C) in Foundation (1:4:8)**					
	PCC	1	60.1	0.9	0.2	10.81
	Total					**10.81 m3**
3	**Brickwork in Foundation up to Plinth level**					
	First step	1	60.1	0.5	0.3	9.01
	Second step	1	60.1	0.4	0.3	7.21
	Third step	1	60.1	0.3	0.8	14.42
	Steps:					
	First	1	2	0.9	0.15	0.27
	Second	1	2	0.6	0.15	0.18
	Third	1	2	0.3	0.15	0.09
	Total					**31.18 m3**
4	**Brickwork in superstructure in cement mortar 1:6**					
	Wall	1	61.9	0.3	3.5	64.99
						65.00 m3
	Deduction for Door/Ventilation:					
	D1	1	2	0.3	2.1	1.26
	D2	2	1.2	0.3	2.1	1.51
	D3	1	1	0.3	2.1	0.63

	W	2	1.5	0.3	1.5	1.35
						(-) 4.75 m3
	Total					**60.25 m3**
5	**RCC Work**					
	Slab	1	10.6	10.6	0.15	16.854
		1	10.6	10.6	0.1	11.236
	Beam	4	10.6	0.3	0.2	2.544
		4	10.6	0.3	0.15	1.908
	Lintel	1	10.6	0.3	0.15	0.65
	Total					**33.192 m3**
6	**2 cm thick marble flooring**					
	All	1	10	10		100
	Total area					**100.00 m2**
7	**Smooth plaster on inside walls and ceiling in cm (1:3)**					
	Inside					
	Wall	4	10		3.5	35
		4	3.5		3.5	49
		4	4		3.5	72
		2	2		3.5	14
		2	2.8		3.5	19.6
	Ceiling	1	10	10		100
	External					
	Wall	4	10.6		3.5	37.1

						326.70 m2
	Deduction for Door/Ventilation:					
	D1	2	2		2.1	8.4
	D2	4	1.2		2.1	10.08
	D3	2	1		2.1	4.2
	W	4	1.5		1.5	9
						(-) 31.60 m3
	Total					**295.10 m3**
8	**Earth filling in Excavation**					
	Total excavation for walls					59.50 m^3
	Brickwork up to G.L.					(-)30.10 m3
	PCC					(-)10.81 m^3
	Total					**18.59 m3**

Table 13-8: Abstract sheet of library

SR. NO.	PARTICULARS	QTY	UNIT	RATE	PER	AMOUNT
1	**Excavation in Foundation**	59.5	m3	85	m3	5057.5

2	**Plain cement concrete (P.C.C) in Foundation (1:4:8)**	10.81	m3	3000	m3	32430
3	**Brickwork in Foundation up to Plinth level**	31.8	m3	3200	m3	99776
4	**Brickwork in superstructure in cement mortar 1:6**	60.25	m3	3500	m3	210875
5	**RCC Work**	33.192	m3	8800	m3	292089.6
6	**2 cm thick marble flooring**	100	m2	500	m2	50000
7	**Smooth plaster on inside walls and ceiling in cm (1:3)**	295.1	m2	150	m2	44265
8	**Earth filling in Excavation**	18.59	m3	50	m3	929.5
	Total					**7,35,422.60 Rs.**
	Add 5% contingencies					**36,771.13 RS.**
	Grand Total					**7,72,193.73 Rs.**
					say	**7,72,500.00 Rs.**

13.1.5 Civil Design 5 - Plastic Road

Plastic Road

Current Seniors:

Safe disposal of waste plastic is a serious environmental problem. Being a non- biodegradable material, it does not decay over time and even if dumped in landfills, finds its way back in the environment through air and water erosion, can choke the drains and drainage channels, can be eaten by unsuspecting grazing animals causing them illness and death, can contaminate the construction fill, etc. The best way of disposal of waste plastic is its recycling to the maximum extent.

India generates 5.6 million metric tons of plastic waste annually, with Delhi generating the most of at municipality at 689.5 metric tons every day, according to a report from the Central Pollution Control Board (CPCB). CPCB submitted the report to the Indian Supreme Court, which said, "We are sitting on a plastic time bomb."

Advantages:

Laboratory as well as field performance studies/investigations carried out in India identifies following advantages in using waste plastic in bituminous mixes.

- Higher resistance to deformation.
- Higher resistance to water induced damages.
- Increased durability and improved fatigue life.
- Improved stability and strength.
- Disposal of waste plastic and thereby environment friendly.

Basic Process:

Waste plastic is ground and made into powder; 3 to 4 % plastics mixed with the bitumen. Plastic increases the melting point of the bitumen and makes the road retain its flexibility during winters resulting in its long life. Shredded plastic waste acts as a strong “binding agent” for tar making the asphalt last long. By mixing plastic with bitumen, the ability of the bitumen to withstand high temperature increases. The plastic waste is melted and mixed with bitumen in a particular ratio. Normally, blending takes place when temperature reaches 45.5°C but when plastic is mixed, it remains stable even at 55°C. The vigorous tests at the laboratory level proved that the bituminous concrete mixes prepared using the treatedbitumen binder fulfilled all the specified Marshall mix design criteria for surface course of road pavement. There was a substantial increase in Marshall Stability value of the BC mix, of the order of two to three times higher value in comparison with the untreated or ordinary bitumen. Another important observation was that the bituminous mixes prepared using the treated binder could withstand adverse soaking conditions under water for longer duration.

Mixing Procedure at Hot Mix Plant:

1. Plastics waste (cups, bags) made out of PE, PP and PS cut into a size between 2.36mm and 4.75mm using shredding machine, (PVC waste should be eliminated).
2. The aggregate mix is heated to 165°C (as per the HRS specification) and transferred to mixing

chamber.

3. Similarly, the bitumen is to be heated up to a maximum of 160°C (HRS Specification) to have good binding and to prevent weak bonding. (Monitoring the temperature is very important).
4. Shredded plastic is added to the hot mix. The plastic gets softened and coated over the surface of the aggregate giving an oily look in 30 - 60 sec
5. The plastics waste coated aggregate is mixed with got bitumen and the resulted mix is used for road construction. The road laying temperature is between 110°C to 140°C. The roller used is 8-ton capacity.

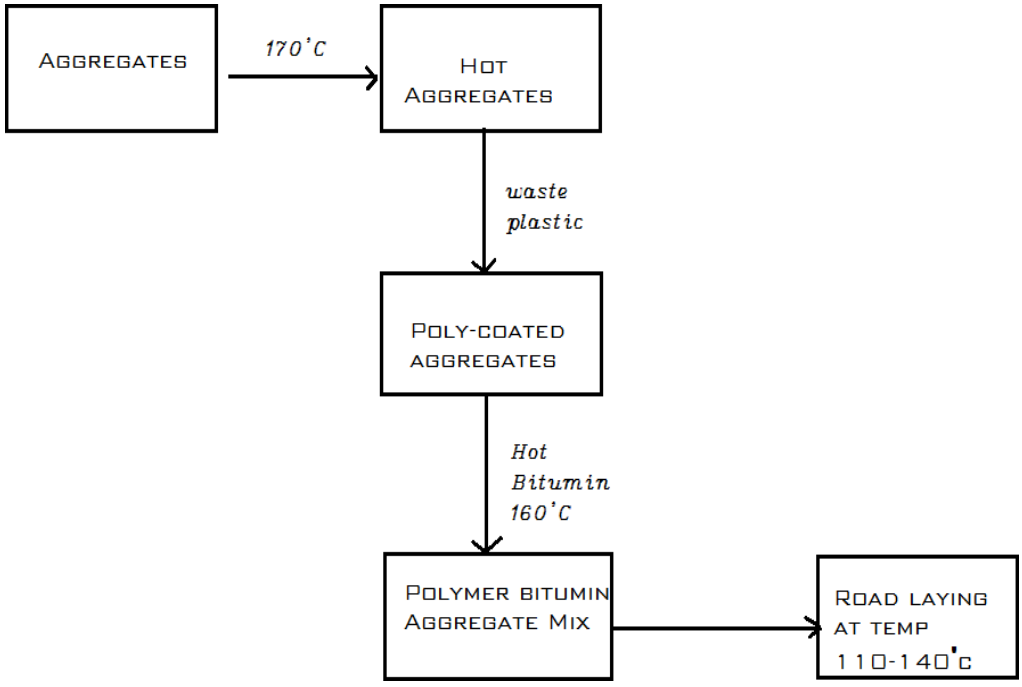

Figure 13-15: Flow Diagram of Plastic coated Bitumin Mix Road

Road Section:

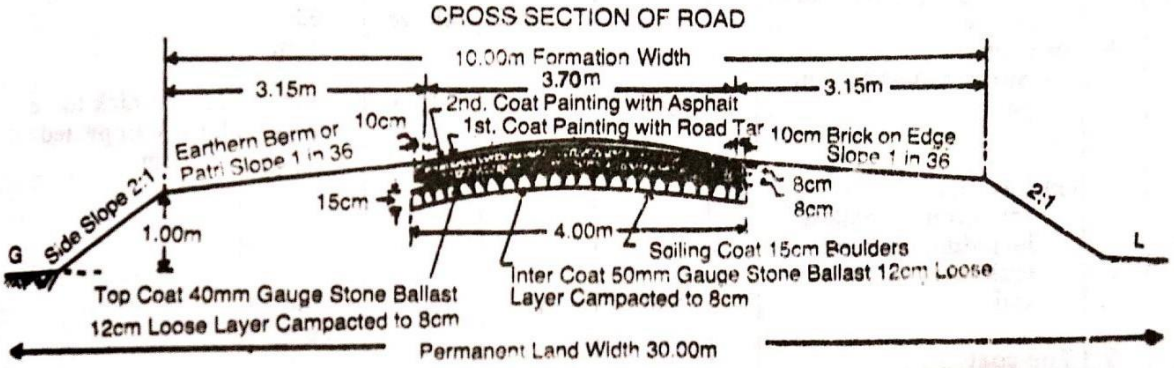

Figure 13-16: Road Section

Table 13-9: **Measurement sheet of plastic road**

Measurement Sheet								
Name of Work - Plastic Road								
Item No	**Item Description**	**Nos.**	**Length**	**Width**	**Height or Depth**	**Quantity**		**Remarks**
			m	m	m			
1	**Presentation of sub - grade** (dressing to camber)	1	1000	4		4000	Sqm	30 cm wider.
2	**Soling coat**							
	(i) Stone boulders 15 cm size	1	1000	4	0.15	600	Cum	30 cm wider.
	(ii)Laying & consolidation of boulders including blinding with local sandy soil	1	1000	4	0.15	600	Cum	
	Inter coat							

3	(i)Stone ballast 50 mm gauge	1	1000	3.7	0.12	444	Cum	12 cm thick loose layer compacted to 8 cm.
	(ii) Laying & consolidation of ballast including blinding with local sandy soil	1	1000	3.7	0.12	444	Cum	
4	**Top coat**							
	(i) Stone ballast 40 mm gauge	1	1000	3.7	0.12	444	Cum	12 cm thick loose layer
	(ii) Laying & consolidation of stone ballast including blinding with local sandy soil	1	1000	3.7	0.12	444	Cum	compacted to 8 cm.
5	**Beam or Partri dressing**	1	1Km			1	Km	
	Painting oR Black Top surfacing							
	Painting 1st coat with							
	Road Tar No.3-							
	(i) Stone grit 20mm gauge @ 1.35							

	cum% sqm	1	1000	3.7	0.0135	49.95	Cum	
6	(ii)Paint or binding Road Tar No 3 @220 kg % sqm	1	1000	3.7	2.2	8140	kg	
						8.14	tonne	
	(iii) Laying	1	1000	3.7		3700	Sqm	
	Painting 2nd coat with							
	Asphalt							
	(i) Stone grit 12 mm gauge @ 0.75 Cum % sqm	1	1000	3.75	0.0075	28.13	Cum	
7	(ii) Paint or binder Asphalt @ 120 kg % sqm	1	1000	3.7	1.2	4440	Kg	
						4.44	tonne	
	(iii) Laying	1	1000	3.7		3700	Sqm	
	Brick edging on both sides							
8	including bricks & labour	1	1 Km			1	Km	
9	**Briidges (minor) & culverts (Mic, Items)**	1	1 Km			1	Km	
10	**Km, half Km & boundry stones**	1	1 Km			1	Km	
11	**Formation Level pillars**	1	1 Km			1	Km	
	Road direction posts caution signs, etc.							

12		1	1 Km			1	Km	
13	**Traffic diversion, service road , etc.**	1	1 Km			1	Km	
14	**Arboriculture**	1	1 Km			1	Km	

Table 13-10: **Abstract sheet of plastic road**

Abstract Sheet					
Name of Work - Plastic Road					
Sr. No	**Item Description**	**Qty.**	**Rate**	**Per**	**Amount**
1	**Presentation of sub - grade**	4000	0.5	Sqm	2000
2	**Soling coat** (i) Stone boulders 15 cm size (supply)	600	100	Cum	60000
	(ii)Laying & consolidation of boulders including blinding with sandy soil	600	18	Cum	10800
3	**Inter coat** (i)Stone ballast 50 mm gauge (supply)	444	150	Cum	66600
	(ii) Laying & consolidation of ballast including blinding with sandy soil	444	20	Cum	8880
4	**Top coat**				
	(i) Stone ballast 40 mm gauge (supply)	444	155	Cum	68820
	(ii) Laying & consolidation of stone ballast including blinding with sandy soil	444	20	Cum	8880
5	**Beam or Partri dressing**	1	1500	Km	1500
	Painting oR Black Top surfacing				

	Painting 1st coat with Road Tar No.3-				
	(i) Stone grit 20mm gauge (supply)	50	220	Cum	11000
6	(ii)Paint or binding Road Tar No 3 (supply)	8.14	600	tonne	4884
	(iii) Laying	3700	0.9	Sqm	3330
	Painting 2nd coat with Asphalt				
	(i) Stone grit 12 mm gauge (supply)	28	220	Cum	6160
	(ii) Paint or binder Asphalt (supply)	4.44	600	tonne	2664
7	(iii) Laying	3700	0.45	Sqm	1665
	Brick edging on both sides				
8	including bricks & labour	1	3500	Km	3500
10	**Briidges (minor) & culverts (Mic, Items)**	1	100000	Km	100000
11	**Km, half Km & boundry stones**	1	600	Km	600
12	**Formation Level pillars**	1	500	Km	500
13	**Road direction posts caution signs, etc.**	1	300	Km	300
14	**Traffic diversion, service road , etc.**	1	500	Km	500
15	**Arboriculture**	1	3500	Km	3500
				Total	366083
				Add 3% Contingency:	10982
				Add 2% Work charged Establishment:	7322
				Total Amount	**384387**
Estimated cost comes to Rs. 384387/- per Km					

13.1.6 Civil Design 6 - RAIN WATER HARVESTING:

RAIN WATER HARVESTING:

What is Rain Water Harvesting?

Rain water harvesting is the technique applied to collect & store the rain water during the rainy season & utilize it later in dry months. It is essential to store the water as large amount of rain water fit for drinking runs off into the sea & becomes salty. As there is large water scarcity prevailing, rain water harvesting is becoming increasingly popular nowadays.

What is Roof Top Rain Water Harvesting?

Rooftop Rain Water Harvesting is the technique through which rain water is captured from the roof catchments and stored in reservoirs. Harvested rain water can be stored in sub-surface ground water reservoir by adopting artificial recharge techniques to meet the household needs through storage in tanks.

Concept : Tapping the rainwater where it falls

Site Assessment:

Site should be selected based on -

a) Availability of suitable roof catchment, i. e. any house or public buildings
b) Estimated runoff to be captured per unit area of the roof, and
c) Availability and location of construction material.

Components of Roof Top Rain Water Harvesting System

- Catchment area: For catchment of rain water, roof is the most used part of a building. Except for thatched roofs, mostly all roofs are suitable like G.I., A.C., tiles, concrete, etc. as thatched roofs can impart colour to water & the pieces may be carried away by water. In case of thatched roof, it may be covered with waterproof LDPE sheeting.
- Guttering**:** Gutter directs the rain water to the storage tank via downpipe. Provided at the edge of the roof with gentle slope towards downpipe.
- **Down Pipe:** Down pipe takes down the water from the gutter to the storage tank. Its minimum diameter as recommended by I. S. is 100 mm.
- **First flush pipe:** As debris, dirt & dust is collected during non-rainy season, the first rain water should be discarded before starting to fill the tank to prevent its contamination. For this, first flush pipe needs to be installed.

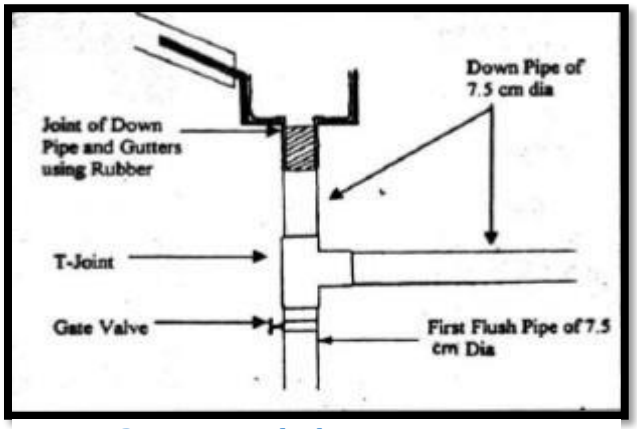

Figure 13-17: First Flush Pipe

After first rain, the valve is closed to divert the water into the storage tank.

- **Filter:** It is one of the most expensive part of the system after the storage tank. Many type of filter can be used like slow sand filter, rapid gravity filter, pop-up filter, etc. They should be efficiently operated & proper maintenance should be carried out.

Here, we are providing pop up filter.

What is Pop-up Filter?

The "Pop-up Filter has three components (rainwater receptor, flush cap and filter element). Water received in the receptor flows upwards against gravity through a filter element to filter most of the floating elements and allow water to stabilize in this filtration zone. Rainwater passing through this filter element (which is relatively cleaner), flows out through an outlet, which can be led to storage device. Filter element is mounted on a vertical stabilizer pipe with a friction fit. In the normal course, rainwater gets filtered and flows through outlet into the storage device.

Figure 13- 18: Pop up filter

No first flush system is required as it itself flushes the first rain.

Maintenance: [Ref.: http://www.kscst.org.in/rwh_files/rwh_rooftop.html

http://www.allindianpatents.com/patents/248841-popup-filter-for-filtering-rainwater]

- Flush the first rainwater by opening the flush cap on the filter for few minutes, close the flush cap after all the dirt on the roof is flushed out (small amount of rainwater from the flush cap is deliberately allowed to leak when the cap is completely closed to keep the Pop-up filter dry during the non-rainy days, please do not attempt to block the leak).
- Remove the filter cartridge gently from its place and wash it thoroughly under a running tap by gently tapping the filter element with a stick on all sides. The dirt sticking in the filter element gets released and washes off.
- Replace the clean filter element back to its place by gently inserting it in the vertical pipe. Take care not to press it too hard at the end. If pressed too hard, filter element gets locked inside the pipe and may require greater force to retrieve it back when required for cleaning and also may not Pop-up when the filter is clogged or chocked.
- The "Pop-up Filter" has a built-in safety feature it to push out the filter element from the stabilizer pipe and allow the water to flow out freely. This safety feature will avoid flooding of the rooftop because of clogged filter. The first indication of the filter getting clogged is rainwater flowing out of a vent hole provided on the top of the filter element.
- Storage Tank: The storage tank of required dimension should be constructed either above ground or underground. U/G tanks are kept 30 cm above ground.

Table 13-11: Details of Operation & Maintenance of Roof Top Rain water Harvesting system

• **Activity & Frequency**	**Materials**	**Tool required**
-Clean the system	Disinfectant	Broom, brush, bucket
Every six months		
-Clean & disinfect the reservoir	Disinfectant	Bucket
Every storm		
-Divert the foul flush		
Occasionally (as the need arises)		
- Repair the gutters roof, & piping	Depending on the type of roof: tiles, metal sheet, A.C. sheet, etc.	Hammer, saw, pliers, tin-cutter
-Repair the tap or pump	Washers, cup seals, etc.	Spanner, screwdriver
-Repair the cement Ferro reservoir	Cement, sand, gravel, metal mesh	Wire trowel, bucket, pliers
-Paint the outsides of metal reservoirs	Anticorrosive paint	Steel brush, paint brush

Design Calculation:

Data taken:

- Consider a roof of 5 * 4 m^2 for the sample calculation & roofing material – clay tiles.
- Roof area in horizontal plane = 20 m2
- Consider family consisting of 5 members

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Cl.:5.1
Page: 1

- runoff coefficient = 0.8
- (To account for infiltration, evaporation and other losses)
- Rainfall Intensity = 30 mm/hr
- Total annual rainfall = 1536 mm
- **(**Note: Data are assumed for the sample calculation considering a single house in the village which may be varied as per requirement**)**

Step 1: Determine water supply through roof:
Annual water supply in litres

= Roof area in square meters square meters (horizontal plane) * total annual rainfall in mm * efficiency factor / runoff coefficient

= 20 *1536 *0.8

= 24576 litre

Step 2: Determine quantity of water available per capita per day

= Annual water supply in litres/ (family size * days in year)

=24576 / (5*365)

=13.47 litres per capita per day

Step 3: Determine water demand per capita per day:

For drinking	5 litre
For cooking	5 litre
Total need per capita	10 litre

Step 4: Determine size of Storage tank:

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Assuming full tank at the beginning of dry season, Volume of storage tank required as per water demand V = t * n * q

Where

V = Volume of tank, in litres;

t = length of the dry season (days) excluding the period of rainy season; n =

Number of people using the tank; and

q = consumption in litres per capita per day. V = 240

* 5 * 10

= 12000 litre or 12 m3

Check with water availability from roof top

Required catchment area for completely filling the tank

=size of required tank/ (total rainfall * runoff coefficient)

= 12000 * 109 / (1536 * 0.8)

=14.75 * 106 mm2

= 14.75 m2 (minimum) < 20 m2 (available roof top area)

Step 5: Dimension of Storage tank

For U/G storage tank, at least 30 cm should be kept above G.L. Consider

1.5 m depth below G.L.

Hence, Area required = 121.5 = 8 m2 Provide 3 m

* 3 m tank with 1.5 m depth

Step 6: Size of Gutter & Width of sheet

The rainfall intensity invankal is 30 mm/hr.

Hence, the pipe diameter = 39 mm

But, minimum dia is 100 mm.

Hence, provide the dia of pipe 100 mm with 20 mesh screen & the width of sheet is 81 mm

But, minimum width is 176 mm.

[Note: To suffice the per capita water demand of 135 lpcd round the year for a family of 5 persons, with a catchment area of 25 m2, the water will be available for a period of 2 months.]

Table 13-12: Measurement Sheet of RWH

Sr.	Item	No.	L (m)	B(m)	D/H (m)	Qty
(A) Measurement for U/G Tank						
1	Providing & laying of P.C.C. (1:3:6)	1	3.91	3.91	0.1	1.53
2				Providing & laying R. C. C. (M 20 grade)		
At base	1	3.76	3.76	0.15	2.12	7.0 cu. M
At side walls	4	3.15	0.15	1.8	3.402	
At top	1	3.3	3.3	0.13	1.42	
3		Provision of TMT bars for R.C.C. work		Dia		Ut. Wt.
At base (Main & Distribution Steel)	4*16	4.76	10 mm	0.617	187.96	847.35 kg
At side walls (Main Steel)	8*27	3	10 mm	0.617	399.81	
At side walls Distribution Steel)	8*10	3.85	8 mm	0.395	121.56	
At top (Main & Distribution Steel)	2*34	3.29	10 mm	0.617	137.87	

Table 13-13: Abstract sheet of RWH

Abstract Sheet					
Sr. No.	**Description**	**Quantity**	**Per**	**Unit Cost**	**Amount**
1	providing & laying	1.53	m^3	3692	5649

	bedding in CC 1:2:4 mix using 20 mm & down size stone aggregate for bedding with 150 mm projection on all sides including providing side shuttering, openings, recesses, camfering, etc. wherever required vibrating, curing tamping continuously for specified period, providing required smooth & even surface, etc or complete as per drg & EIC directions.				
2	providing, mixing & placing RCC M20 nominal mix for tank with OPC or PPC using 20 mm & down size graded crushed aggregate including providing & fixing necessary plywood / steel shuttering, scaffolding, machine mixing, compacting by vibrators, curing, hacking the surface to receive plaster etc. complete. rate shall be exclusive of hte cost of steel reinforcement which will be paid under separate items. concrete conforming to relevant specifications of IS:456-latest ed.	7	m^3	4792	33544

3	Supply fabrication hoisting & placing in position HYSD reinforcement bars conforming to IS:1786-latest edition grade Fe415 as per	847.35	m_3	75	63,551.25
	detailed drawing & specification including cutting, bending & tying with 18 SVG binding wire. Rate shall be applicable for all heights & depths. payment shall be made as per reinforcement drawings & with theorotical weight only including sll authorized laps & hoops. unauthorized chairs, spacers & laps will not be measured & payed for.				
4	Pop- up filter	1	No.	3000	3000
Total					105744
Add 3 % contingencies					3172.33
For 1 litre water storage, 6775 Rs. is required.					**6775**
Total Cost					**115692**

13.1.7 Electrical Design 1 - Solar Panels

Solar Panels

Extracting energy from solar panels is of current interest due to a global attempt to decrease the use of limited resources, such as oil and gas, and increase the use of renewable resources; solar water and wind energy among others. This project will look closer at solar panels, starting with the product need in Sweden and the United Kingdom. It will also include a review of the development process of solar panels and their product specifications considering structure, strength, materials, efficiency and cost. To get an understanding of the product realization process of solar panels there will first be a general investigation of solar panels journey from idea to a complete product. For a more detailed view of the process a case study will be made at a manufacturer of solar panels. As a last step of the project there will be a comparison of solar panels made by different producers.

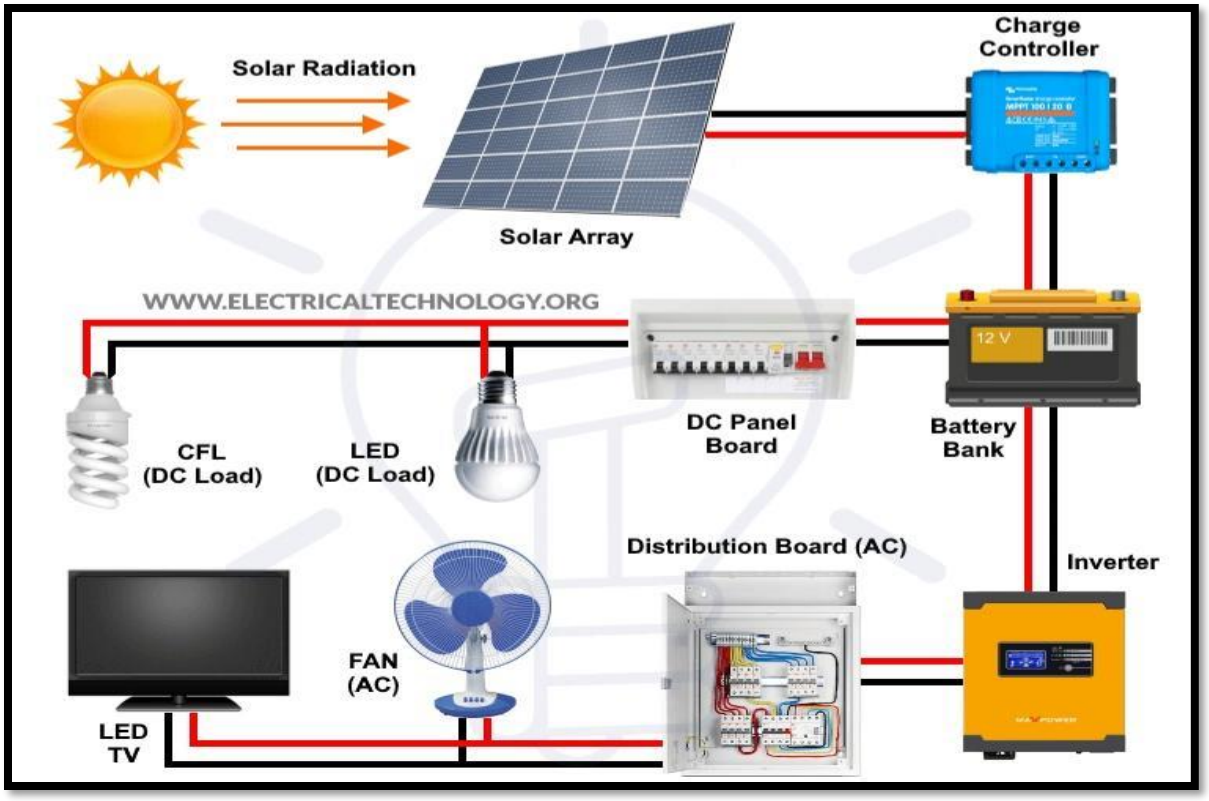

Figure 13-19: solar panels connection

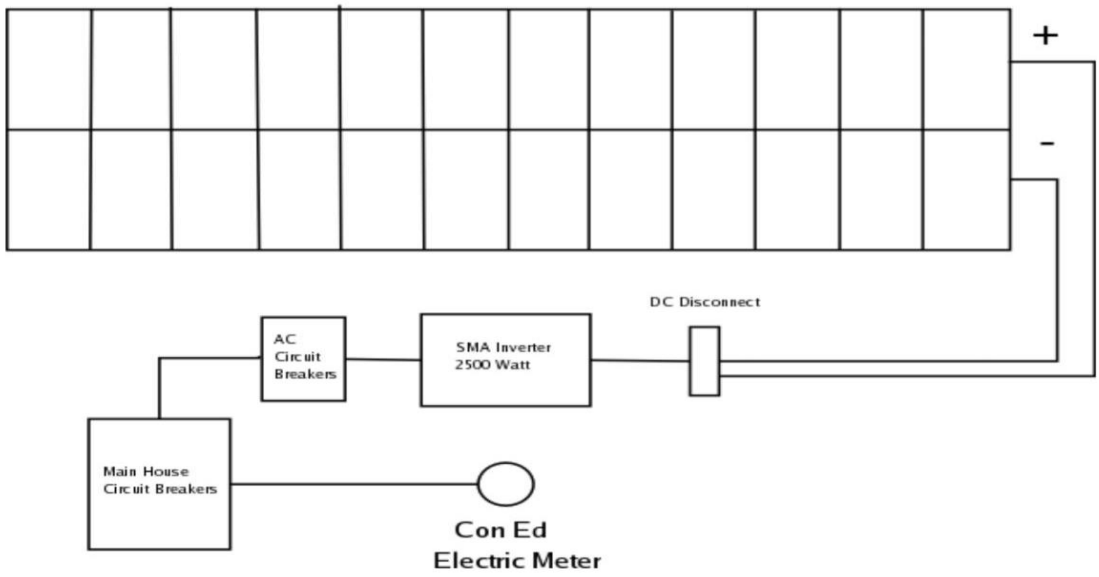

Figure 13-20:Solar panels design

Table 13-14: Estimate of solar panels

No.	Equipment	Quantity	Price/Watt	Total P./E
1	Solar panel	1000	25	25000
2	Solar battery	2	-	32000
3	Inverter	1	-	8000
4	Structure	-	5	5000
5	Basic Accessory	-	-	13000
			Total cost	**83000Rs**

13.1.8 Electrical Design 2 - CCTV SYSTEM

CCTV SYSTEM

Following a sound design process enables organizations to make purchasing decisions that result in the procurement and installation of a CCTV system that meets functional and operational requirements. As CCTV is part of a multi-layered security approach, a system design should begin with a comprehensive needs assessment to ensure security risks and mitigation plans are identified. Clear requirements, a comprehensive site survey, and proper equipment selection and installation must all be considered when designing a CCTV system. CCTV systems provide surveillance capabilities used in the protection of people, assets, and systems. A CCTV system serves mainly as a security force multiplier, providing surveillance for a larger area, more of the time, than would be feasible with security personnel alone. CCTV systems are often used to support comprehensive security systems by incorporating video coverage and security alarms for barriers, intrusion detection, and access control. For example, a CCTV system can provide the means to assess an alarm generated by an intrusion detection system and record the event.

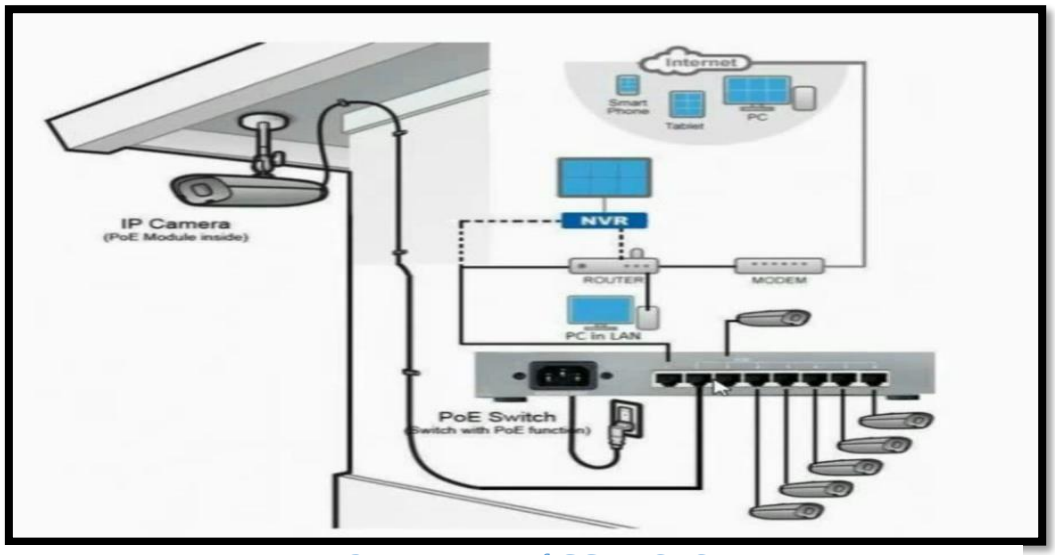

Figure 13-21: Design of CCTV SYSTEM

A CCTV system links a camera to a video monitor using a direct transmission system. This differs from broadcast television where the signal is transmitted over the air and viewed with a television. New approaches within the CCTV industry are moving towards more open architecture and transmission methods versus the closed circuit, hard-wired connection systems of the past.
CCTV systems have many components with a variety of functions, features, and specifications. Key components include cameras, lenses, data distribution, power, and lighting, among others. CCTV technologies continuously undergo feature refinements to improve performance in areas such as digital equipment options, data storage, component miniaturization, wireless communications, and automated image analysis

Table 13-15: Estimate of CCTV SYSTEM

S/N	Name of items	Quantity	Unite price	Total
1	2MB full HD CAMERA	6	3000	18000
2	8 channel standalone	1	6500	6500
3	Adapter 12v/2amp	4	200	800
4	1 TB HDD	1	4200	4200
5	BNC JACK MX-ISO	12	40	480
6	Video cable 100per. Copper	400meter	20tk/meter	8000
7	Power cable BRB 14/76	150 meter	20tk/meter	3000
8	Flexible pipe RFL	130meter	30tk/meter	3900
9	HDMI CABLE SET	1 set	1400	1400
10	Installation, testing and commissioning	-	-	3000
			Total cost	**49280**

13.1.9 Electrical Design 3 - Automatic solar street light

Automatic solar street light

Solar Street lights are raised light source which is powered by photovoltaic panels mounted on the lighting structure. the photovoltaic panels charge a rechargeable battery, which powers LDR during the night. The idea of designing a new system for the streetlight that do not consume a huge amount of electricity and illuminate large areas with the highest intensity of light is concerning each engineer working in this field. Providing street lighting is one of the most important and expensive responsibilities of a rural electrification, village, and campus. Automatic streetlight needs no manual operation of switching ON and OFF. The system itself detects whether there is a need for light or not. When darkness rises to a certain level then automatically streetlight is switched ON and when there is another source of light, the streetlight switches OFF.

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

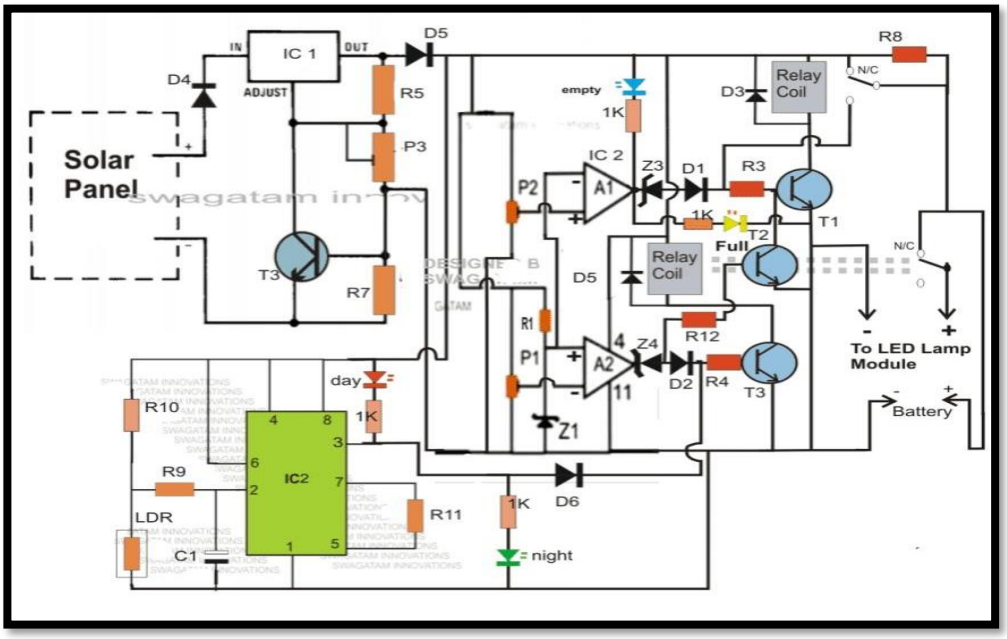

Figure 13-22: Design of automatic solar street light circuit

Table 13-16: Estimate of Charge controller circuit

S/N	Components	Specification	Quantity	Net price
1	Relay	PCB Relay	2	60
2	Transistor	BC547	4	60
3	Resistor	1k	4	8
4	LDR		1	20
5	Diode	1N4002	5	10

6	Transformer	230V/12V	1	180
7	Capacitor	47uF,63V	1	3
8	Inducting LED		4	8
			Total cost	349

13.2 Reason for Students Recommending this Design

Vocational training center

It is very useful for growth of children in early age. In vocational center so many cultural and social activities are organized and by that it is easy for children to find their area of interest in vacation time of their school and at weekends.

Septic tank

It is a underground chamber through which domestic waste water flows for basic treatment.

Common Service Centres

CSC are physical facilities for delivering Government of India e-Services to rural and remote locations where availability of computers and Internet was negligible or mostly absent. They are multiple-services-single-point model for providing facilities for multiple transactions at a single geographical location.

Public library

Public library is a library that is accessible by the general public and is usually founded from public sources, such as taxes. It is operated by librarians and library paraprofessionals, who are also civil servants. Public libraries exist in many countries across the world and are often considered an essential part of having an educated and literate population.

Plastic roads

Plastic roads are made entirely of plastic or of composites of plastic with other materials. Plastic roads are different from standard roads in the respect that standard roads are made from asphalt concrete, which consists of mineral aggregates and asphalt.

Rainwater harvesting

RWH is the collection and storage of rain, rather than allowing it to run off. Rainwater is collected from a roof-like surface and redirected to a tank, cistern, deep pit (well, shaft, or borehole), aquifer, or a reservoir with percolation, so that it seeps down and restores the ground water.

Solar panels

The most commonly known fact about solar energy is that it represents a **clean, green source of energy.** You might have heard of **solar farms** - panels used to harvest solar energy in large numbers. This highlights perfectly how solar power makes use of underutilized land.

CCTV Camera

In today's world, safety and security should always be given high importance and is supposed to be prioritized. It is practically impossible to have an eye on everything and this is where closed circuit television, simply known as CCTV, comes into the picture thorough risk and needs assessment should be conducted to identify locations or assets that will benefit from CCTV surveillance as part of an overall security approach.

Automatic solar street light

Currently, the initial investment in solar LED street light system remains a major problem. However, the efficiency of the solar cells is increasing, while the price is decreasing. At same time, the efficiency of the LED light is in a rapid increase, but the prices are lower. So following development of the outdoor lighting technic, the solar LED street light system has shown us it will have promising application and infinite vitality.

13.3 About designs Suggestions / Benefit of the villagers

Vocational training center

It is very useful for growth of children in early age. In vocational center so many cultural and social activities are organized and by that it is easy for children to find their area of interest in vacation time of their school and at weekends.

Septic tank

It is a underground chamber through which domestic waste water flows for basic treatment.

Common Service Centres

Rural and remote locations where availability of computers and Internet was negligible or mostly absent, they are multiple-services-single-point model for providing facilities for multiple transactions at a single geographical location.

Public library

Public library is a library that is accessible by the general public and is usually founded from public sources, beneficial foe those who wanets to read or to create a atmosphere of study zone were light is available 24hr.

Plastic roads

One to reduce plastic waste, to reuse the plastic waste, to use for long sustainable roads.

Rainwater harvesting

RWH is the collection and storage of rain, rather than allowing it to run off. Rainwater is collected from a roof-like surface and redirected to a tank, cistern, deep pit (well, shaft, or borehole), aquifer, or a reservoir with percolation, so that it seeps down and restores the ground water.

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lighting technic, the solar LED street light system has shown us it will have promising application and infinite vitality.

Chapter 14. Technical Options with Case Studies

14.1Civil Engineering

14.1.1Advanced Earthquake Resistant

Disasters are unexpected events which have adversely affected humans since the dawn of our existence. In response to such events, there have been attempts to mitigate devastating effects of these disasters. Results of such attempts are very encouraging in developed countries but unfortunately and miserably poor in developing countries including ours. Earthquakes are one of the nature's greatest hazards on our planet which have taken heavy toll on human life and property since ancient times . The sudden and unexpected nature of the earthquake event makes it even worse on psychological level and shakes the moral of the people. Man looks upon the mother earth for safety and stability under his feet and when it itself trembles, the shock he receives is indeed unnerving. Mitigation of the devastating damage caused by earthquakes is of prime requirements in many parts of the world. Since earthquakes are so far unpreventable and unpredictable, the only option with us is to design and build the structures which are earthquake resistant. Accordingly attempts have been made in this direction all over the world. Results of such attempts are very encouraging in developed countries but miserably poor in developing countries including our country India. This is proved by minimal damage generally without any loss of life when moderate to severe earthquake strikes developed countries, where as even a moderate earthquake cause's wide spread devastation in developing countries as has been observed in recent earthquakes. It is not the earthquake which kills the people but it is the unsafe buildings which is responsible for the wide spread devastation. Keeping in view the huge loss of life and property in recent earthquakes, it has become a hot topic worldwide and lot of research is going on to understand the reasons of such failures and learning useful lessons to mitigate the repetition of such devastation. If buildings are built earthquake resistant at its first place (as is being done in developed countries like USA, Japan etc) the devastation caused by earthquakes will be mitigated most effectively. The professionals involved in the design/construction of such structures are structural/civil engineers, who are responsible for building earthquake resistant structures and keep the society *at large in a safe* environment.

Understanding of earthquake and Basic Terminology Earthquake is defined as a sudden ground shaking caused by the release of huge stored strain energy at the interface of the tectonic plates

Epicenter:-It is the point on the free surface of the earth vertically above the place of origin of an earthquake.

Focus:-It is the point within the earth from where the seismic waves originate.

Focal Depth:-It is the vertical distance between the Focus and the epicenter.

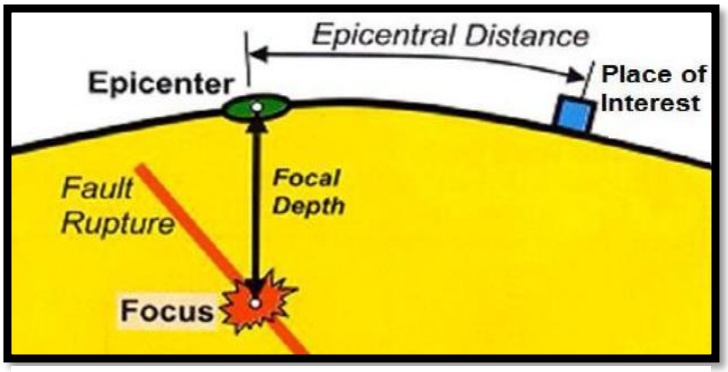

Figure 14-1: Earthquake basic info

S.No.	DISTRICT	No of deaths	No of injured persons	No of fully damaged houses	No of partially damaged houses	No of temporary shelter units constructed
1	Anantnag	Nil	Nil	10	112	11527
2	Baramulla	674	399	14710	91334	.....
3	Budgam	01	08	44	10560	7995
4	Kupwara	276	94	8994	66887	-----
5	Pulwama	Nil	Nil	13	120	.....
6	Srinagar	02	316	11	5857	19522
	Grand total	953	817	23782	174870	

Figure 14-2: Effect of earthqauke

BEHAVIOUR OF MASONRY BUILDINGS TO GROUND MOTION

Ground vibrations during earthquakes cause inertia forces at locations of mass in the building. These forces travel through the roof and walls to the foundation. The main emphasis is on ensuring that these forces reach the ground without causing major damage or collapse. Of the three components of a masonry building (*roof*, *wall* and *foundation*) (Figure (a), the walls are most vulnerable to damage caused by horizontal forces due to earthquake. A wall topples down easily if pushed horizontally at the top in a direction perpendicular to its plane (termed *weak direction*), but offers much greater resistance if pushed along its length (termed *strong direction*) [Figure (b)].

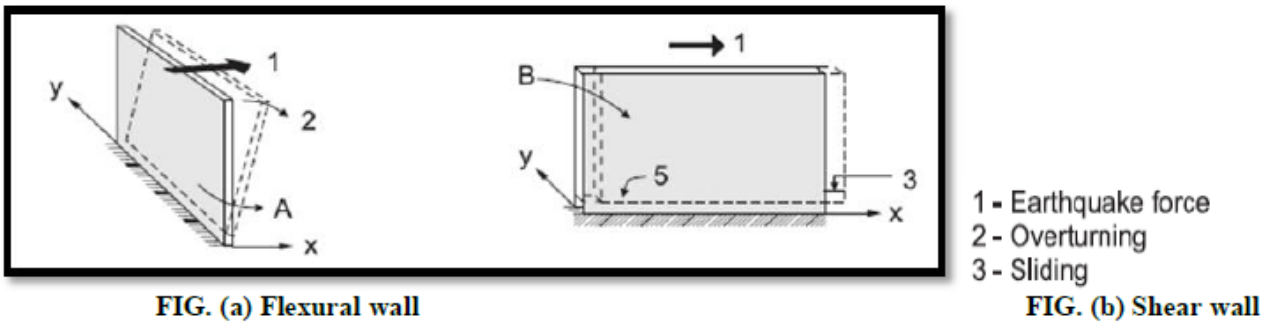

FIG. (a) Flexural wall **FIG. (b) Shear wall**

Figure 14-3: BEHAVIOUR OF MASONRY BUILDINGS TO GROUND MOTION

ROLE & RESPONSIBILITIES OF CIVIL ENGINEERS

It is not the earthquake which kills the people but it is the unsafe buildings which is responsible for the devastation. Keeping in view the huge loss of life and property in recent earthquakes, it has become a hot topic and worldwide lot of research is going on to understand the reasons of such failures and learning useful lessons to mitigate the repetition of such devastation. If buildings are built earthquake resistant at its first place (as is being done in developed countries like USA, Japan etc) we will be most effectively mitigating the earthquake disasters. The professionals involved in the design and construction of such structures are civil engineers. Who are responsible for building earthquake resistant structures and keep the society at large in a safe environment? *It is we the civil engineers who shoulder this responsibility for noble and social cause.*

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14.1.2 Seismic Retrofitting of Buildings

INTRODUCTION

The earthquake at Bhuj, Gujarat, in 2001 has been a watershed event in the earthquake engineering practice in India. The code of practice for seismic analysis, IS 1893:2002 [1] has been revised to reflect the increased seismic demand in many parts of the country. Many existing buildings lack the seismic strength and detailing requirements of IS 1893:2002, IS 4326:1993 [2] and IS 13920: 1993 [3], because they were built prior to the implementation of these codes. This paper is part of a project, whose aim is to evolve methodologies to assess the seismic vulnerability of reinforced concrete (RC) three-to tenstoreyed, residential and commercial buildings, particularly those located in the urban areas of earthquake zones V, IV and III, and to propose retrofit measures for the structurally deficient buildings. Several case studies have been performed and one such case study is presented in this paper. IS 1893:2002 is referred to as the 'Code' henceforth.

RETROFIT

Goals and objectives of retrofit

Retrofit strategy refers to options of increasing the strength, stiffness and ductility of the elements or the building as a whole. Several retrofit strategies may be selected under a retrofit scheme of a building. The goals of seismic retrofitting can be summarized as follows (IS 13935:1993 [4]; White [5]).

1. Increasing the lateral strength and stiffness of the building.
2. Increasing the ductility and enhancing the energy dissipation capacity.
3. Giving unity to the structure.
4. Eliminating sources of weakness or those that produce concentration of stresses.
5. Enhancement of redundancy in the number of lateral load resisting elements.
6. The retrofit scheme should be cost effective.
7. Each retrofit strategy should consistently achieve the performance objective.

To decide the retrofit scheme, a performance based approach can be adopted. The performance based approach identifies a target building performance level under an anticipated earthquake level. For retrofit of the buildings covered in this project, the basic safety objective can be selected. Under this objective, the dual requirement of life safety under design basis earthquake (DBE) and structural stability under maximum considered earthquake is aimed at.

BUILDING DEFICIENCIES

The following two sections highlight some common deficiencies observed in multi-storeyed RC buildings in India (Sinha and Shaw [6]; Murty et al. [7]). The building deficiencies can be broadly classified as

Local Deficiencies and Global Deficiencies.

Local Deficiencies

Local deficiencies lead to the failure of individual elements of the building. The observed deficiencies of the elements are summarized.

Global Deficiencies

Global deficiencies can broadly be classified as plan irregularities and vertical irregularities, as per the Code. The items left out are listed under miscellaneous deficiencies.

A CASE STUDY

The building presented in this paper is a residential, ordinary moment resisting RC framed building, located in Zone III. Figure 1 shows the typical floor plan of the building. The building is a four storeyed building. The height of the roof is 13.1 m from the ground level. Plan dimensions of the building are 20.47m ×13.29m. The construction drawings specify that M20 grade of concrete (characteristic cube compressive strength is 20 N/mm2) and Fe 415 grade of steel (characteristic 0.2 percent proof stress is 415 N/mm2) were used for the construction.

The floor slabs in the building were assumed to act as rigid diaphragms. This assumption leading to integral action of all the frames is of course debatable in absence of drag and chord reinforcements. The slabs are 150mm thick for all the floor levels. The infill wall thickness was assumed to be 230mm for the exterior walls and 120mm for the interior walls, as is the common practice in India. The subsoil for the building was considered to be Type-I soil (as per the Code), as majority of the standard penetration test values of the soil were more than 30 according to the geotechnical report. The elevation of the building.

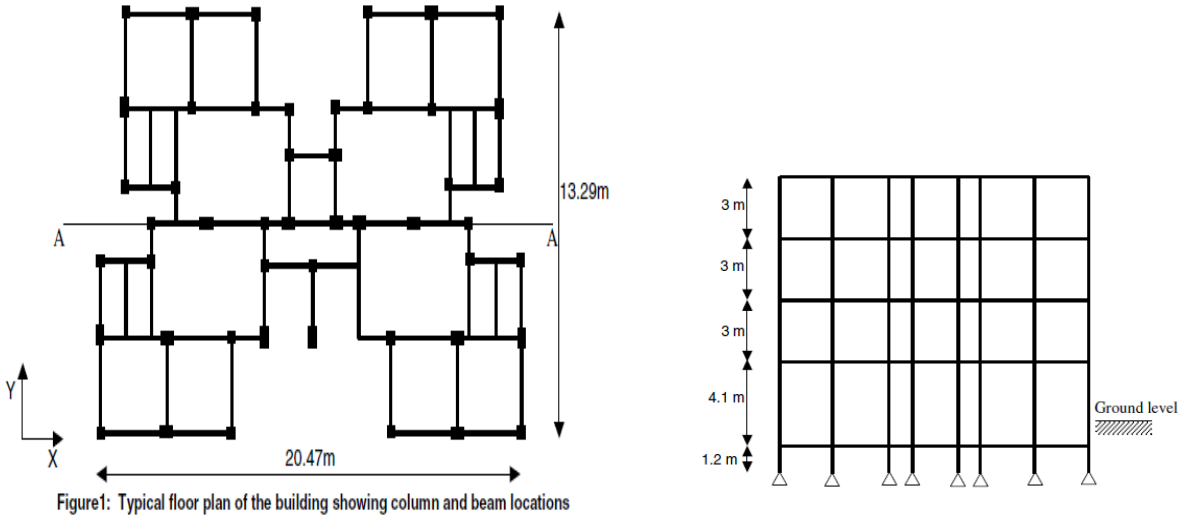


Figure1: Typical floor plan of the building showing column and beam locations

Figure 14-4: Typical floor plan of building

Modelling of infill walls

The weight and mass of all the brick masonry walls were applied on the supporting beams. When an infill wall is located in a lateral load resisting frame, the stiffness and strength contribution of the infill wall were considered by modelling it as an equivalent diagonal compression strut. In a moment resisting frame, the inclusion of equivalent struts leads to a truss frame model. The beams and columns are connected by rigid joints, but the equivalent struts are connected by pin joints at the beam-to-column junctions.

The required properties of an equivalent strut are the effective width, thickness, length and elastic modulus. The thickness is assumed same as that of the infill. The length is available from the dimensions of the corresponding infill panel. The elastic modulus E_i is equated to E_m, the elastic modulus of the

masonry. As per UBC 1997 [20], E_m is given as $E_m = 750 \cdot {}_m f$, where ${}_m f$ is the basic compressive strength of the masonry. Thus, the only remaining property to be determined is the effective width of the equivalent strut. For a nonlinear analysis, such as push-over analysis, in addition to the above properties, the axial load versus deformation behavior along with the failure load of the equivalent strut are also required.

The effective width (w) was found to depend on the following three variables (Smith and Carter [21]).

a. The relative stiffness of the infill to the frame, expressed in terms of λh. λ is the relative stiffness parameter and h is the height of the infill.

b. The magnitude of the instantaneous diagonal load in the infill (R).

c. The aspect ratio of the infill panel.

The following expression of *w*, in terms of λh and R/R_c was found to be adequate (Ramesh [22]). The influence of aspect ratio of the panel is neglected in this expression.

$$\frac{w}{w'} = 1.477 + 0.0356\lambda h - 0.912\left(\frac{R}{R_c}\right)$$

The expression of w' is given as

$$\left(\frac{w'}{d}\right) = \frac{0.43\sin 2\theta}{\sqrt{\lambda h}}$$

RESULTS AND DISCUSSIONS

Table 1 shows the comparison of design base shears of the building, with and without infill stiffness. *B V* is the base shear by equivalent static method. *EQx* and *EQy* represent the earthquake loads acting in the X and Y directions, respectively. The base shear from response spectrum analysis (*B V*) was calculated from the modal combination of first ten modes, by the SRSS method. These modes give more than 99% mass participation in both the directions. *x V* and *y V* are the components of *EQ* in X and Y directions, respectively. As *B V* was less than *B V* , the seismic force demands in the frame elements from response spectrum analysis were scaled up by a factor equal to the ratio of the two base shears (/) *B B V V* .

Table 14 1: Comparison of Base Shears

	Without infill stiffness		With infill stiffness	
	V_x (kN)	V_y (kN)	V_x (kN)	V_y (kN)
Equivalent static method $(\overline{V_B})$				
EQ_x	554.6	–	746.2	–
EQ_y	–	528.5	–	711.1
Response spectra method (V_B)				
EQ	264.1	237.9	484.6	569.2
$\overline{V_B}/V_B$	2.10	2.22	1.54	1.25

For beam sections, positive and negative bending moment and shear demands were compared with the respective capacities. A number of beam sections were found to have deficient flexural capacity. However, all the sections have sufficient shear capacity.

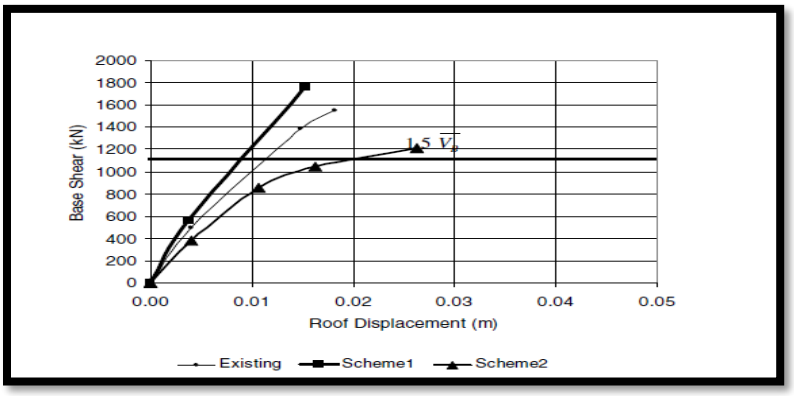


Figure 14-5: Push over curve in x direction

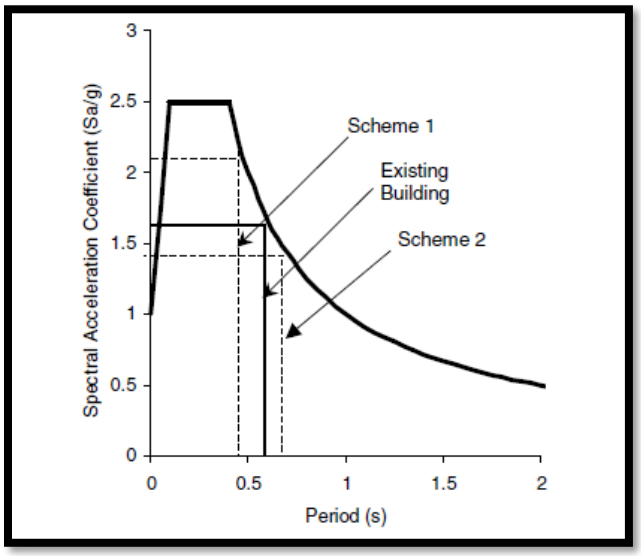


Figure 14- 6: comparison of fundamental period

CONCLUDING REMARKS

The paper presents a review of the existing retrofit strategies that are applicable for multi-storeyed residential reinforced concrete buildings addressed in the project. It also presents a case study of a three storeyed building, located in an urban area in earthquake zone III.

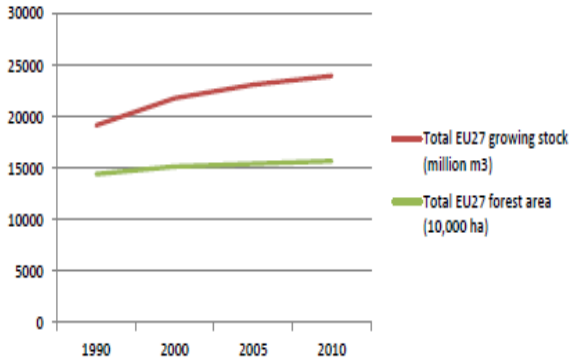
14.1.3 Advance Practices in construction field in Modern Material, Techniques and Equipment's

Wood

Modern method of construction

- *Faster, enhanced quality, less waste...Government agenda*
- *Suits modern 'skills' base?*

- Sustainability
- *Renewable material, full chain of custody*
- *Lower embodied energy/carbon*
- *Carbon store*
- Lightweight structure
- Versatile



Timber surplus

- EU27 forests are growing year on year
- *More than 100 million m3 of growth not harvested*
- What could we do with 100 million m3 of wood each year?
- *Build 3 million new homes?*
- *Build 250 million m2 of commercial buildings?*

Trees and carbon

- Wood is about 50% carbon (by dry mass)
- x 3.67 to convert C to CO2
- Broadleaf forests 100-250 tC per ha
- Conifer plantations 70-90 tC per ha
- Carbon uptake 4 tC per ha per year in fast
- growing stands

Conifers					Broadleaves				
Species	Scientific name	Carbon content	MMAI	Age	Species	Scientific name	Carbon content	MMAI	Age
Sitka spruce	*Picea sitchensis* (Bong.) Carr.	0.62	8–24	64–46	Oak	*Quercus robur* L., *Q. petraea.* (Matt.) Liebl.	1.12	4–8	90–68
Norway spruce	*Picea abies* L. Karst.	0.64	8–20	84–65	Birch	*Betula pendula* (Roth.), *B. pubescens* (Ehrh.)	1.10	4–12	49–40
Scots pine	*Pinus sylvestris* L.	0.84	6–12	82–69	Sweet chestnut	*Castanea sativa* Mill.	0.84	4–10	50–41

Figure 14-7: Trees carbon content

Engineering materials

- billion tonnes pa of engineering materials used globally
  - 1.5t person pa, main components are concrete, wood, steel, asphalt, glass, brick
  - Concrete is by far the dominant engineering material (factor 10) and responsible for some 5% of global CO2 emissions.

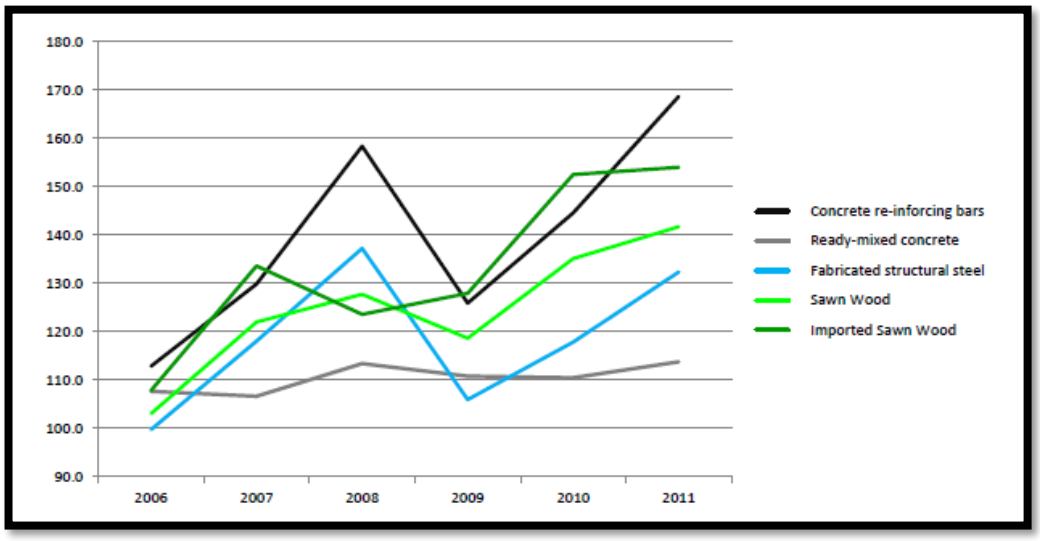


Figure 14- 8: Construction material costs variation

Engineered timber

Layered/Laminated

- *Glue laminated timber (glulam)*
- *Laminated veneer lumber (LVL)*
- *Cross laminated timber panels (CLT)*
- *Brettstapel*
- *Plywood*

Particle

- *Orientated strand board (OSB)*
- *Particle board (chipboard)*
- *Parallel strand lumber (PSL)*

Glulam

- *Spruce grades GL24 to GL36*
- *Lamella thickness typ 40mm*
- *Stock sizes up to 20cm x 65cm x 13.5m*
- *Other sizes up to 28cm x 2.2m x 36m*
- *Glues are melamine resin based.*

Figure 14 9: Gulam

Design

Glulam section in mm	Span in metres																
	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
56 x 225	2.37	1.88	1.44	1.04	0.78	0.60	0.48	0.38	0.31	0.26	0.21						
66 x 315	5.53	4.40	3.64	3.10	2.63	2.05	1.64	1.34	1.11	0.93	0.79	0.67	0.58	0.50	0.44	0.38	
90 x 315	7.54	5.99	4.97	4.23	3.58	2.80	2.24	1.83	1.51	1.27	1.07	0.92	0.79	0.68	0.59	0.52	0.45
90 x 360	8.86	7.67	6.36	5.42	4.72	4.17	3.40	2.78	2.31	1.94	1.65	1.42	1.23	1.07	0.94	0.82	0.73
90 x 405	9.95	9.61	7.97	6.80	5.92	5.24	4.69	4.01	3.34	2.82	2.40	2.07	1.80	1.57	1.38	1.22	1.08
115 x 405	12.72	12.27	10.18	8.68	7.56	6.69	5.99	5.12	4.26	3.60	3.07	2.65	2.30	2.01	1.77	1.56	1.39
115 x 495	15.55	15.55	14.95	12.76	11.12	9.85	8.83	7.99	7.30	6.71	5.75	4.97	4.33	3.81	3.36	2.99	2.67
115 x 630	19.80	19.80	19.80	19.80	17.86	15.83	14.20	12.87	11.76	10.82	10.01	9.31	8.70	8.16	7.16	6.39	5.73

Table 14-2: Maximum load bearing capacity(tones)

Load duration factors:
Long term 1.00 (ie dead + live load)
Medium term 1.25 (ie dead + snow load)
Short term 1.50 (ie dead + live + snow load)
Very short term 1.75 (ie dead + live + snow + wind load)
Moisture content:
40% to 20% reduction in strength and stiffness for 20%+ moisture content

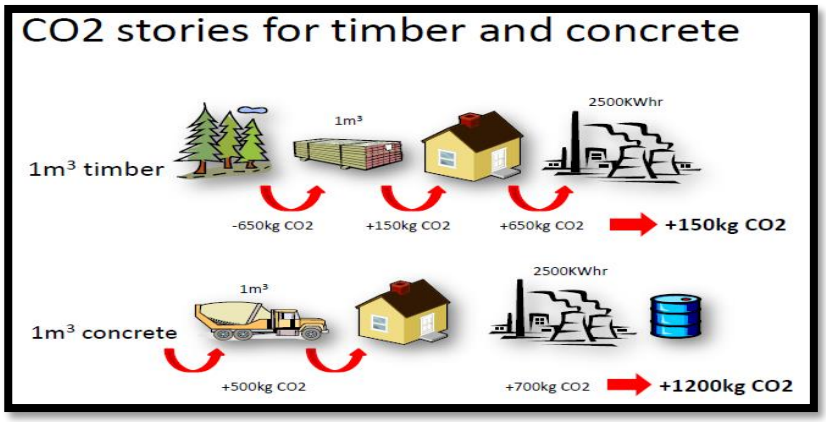


Figure 14-10: Comparison between timber and concrete

14.1.4 Engineering Aspects Of Soil mechanics - Environmental Impact Assessment

Introduction

Our daily life environment in Nigeria relates to air, noise, sunlight, geological features, fauna, flora, landscape, etcetera. All these affect the economy of the country: if the environment is abused, daily life style (living and working conditions, etc.) will be affected; and this will in turn affect the economy. As there is need to protect the environment in every possible way, it must also be noted that the need for the existence of infrastructure as an indispensable part of any economy cannot be over emphasized. As those infrastructures come into existence, there are resulting positive effects as well as adverse effects, which in many cases tend to out-number the positive effects; and yet not usually noticed. This inability to take cognizance of the adverse effects of civil engineering infrastructural development projects has become a source of worry to the environmentalists, civil engineers, and, indeed all stakeholders in the environment [1]. Infrastructure development projects are of many types, and their impact on the environment are also very many and vary in magnitude and form depending on the type of civil engineering project. According to the procedural guideline on Environmental Impact Assessment (EIA) by the Federal Environmental Protection Agency [2], infrastructure projects should include but not limited to: Industrial estate development projects; Canalization and flood relief works; Dams and Hydropower to hold water;; Oil and gas pipe line installations; Solid waste management and sanitation.

Ambient air quality Assessment

The assessment was aimed at determining the concentrations of total suspended particulate (TSP), volatile organic compounds (VOC), carbon monoxide (CO), oxides of Nitrogen (NOx) and sulphur dioxide (SO2). These formed the core of criteria pollutants recognized as having potential impacts on human health, and which are normally prevailing in routine combustion, industrial processes and other common sources of air pollution.

Soil Sampling

Random soil samples were done within areas of the flow station. Random samples were collected from the Saver Pit, Heater, Oil Tank, Compressor, Generators, Waste Pit, and Gas Flare Burnt Forest. At each of the location, soil sample was carried out with the aid of Dutch auger. At each sampling station, three auger borings spaced at 5m apart were collected and examined. Samples were collected at depths of 0-15cm and 15-30cm at a particular sample area. The soil samples were physically examined to assess the environmental impact the soil was subjected to, at different locations at the flow station, and to identify whether or not there was pollution of the soil. The sampling point description is shown in Table.

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

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

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

Figure 14-11: Sampling point description for flow station

Ambient air sampling result

The results of the TSP monitoring are presented in Table 4. It showed that the ambient air quality was exceeded at some of the city locations (road side and by a hotel premises) within the town. Results indicated that TSP around the flow station and neighborhood exceeded the FM ENV threshold limit value of 250 g/m3 at only one locations (within the flow station facilities, where construction works were on-going). The flow station control room had the lowest measurement (being an air conditioned office). However, the results were all above the WHO threshold limit value of 40 g/m3 The potential impact of the ambient air quality can be measured when comparing measured ambient air mixing values with recommended limits for these pollutants recommended [2]. These were termed the threshold limit values (TLV) for each pollutant and are usually published for reasons of assessing compliance to air

quality standards at locations under investigation. Results of the elemental concentrations of the TSP in parts per million by mass were presented in Table 5 while Table 6 showed the recommended TLV of some conventional.

TSP	Sampling site					
	Plant Gate	Control Room	Construction worksite	Inlet manifold	Open plant	Access road to flow station
($\mu g/m^3$)	28,000	65,000	560,000	225,000	135,000	142,000

Figure 14- 12: suspended particles

Sampling Sites	Plant Gate	Control Room	Construction Work Site	Inlet Manifold	Open Plant	Access Road to Flow station
Al	450	399	690	389	704	1102
Cr	128	190	109	90	203	200
Si	8739	9850	1208	650	1200	785
V	2263	3082	2263	5890	979	290
Ti	4280	2190	2780	2890	1209	2303
Ni	2930	1192	1293	1290	1378	1190
Fe	699	1389	2930	3984	2839	1290
Mn	2900	2936	2004	781	465	262
Ca	1190	8739	10289	1093	1920	2640
Mg	785	890	683	280	192	79
P	7839	9765	9517	6137	6137	3544
Na	639	984	783	83	73	4612
K	583	782	283	783	874	763
Co	790	882	66	873	930	1093
Cu	2590	3028	1530	6490	3743	2749
Zn	1209	1470	1379	387	183	2546
As	1648	1374	1537	2839	183	1932
Se	1844	87	183	162	126	127
Br	182	129	128	192	101	42
Pb	873	928	729	238	389	182
Cd	7544	8498	9404	8454	7548	4845

Figure 14- 13: relative concentration of trace elements

Physical Soil Sampling Result

After a physical assessment of the soil samples, Table 10 showed relevant observation.

Sample No	Depth (cm)	Location	Drainage	Remarks
OS1	0 – 15	API (saver pit)	Poorly drained	Abundant crude oil spillage impacted
	15 - 30	API (saver pit)	Very poorly drained	Grass cover showed brown scotched patches
OS2	0 – 25	Heater	Poorly drained stagnant water due to compressed clay in sub soil	Grass cover on topsoils. No visibly seen oil spills.
	15 – 30	Heater		
OS3	0 – 15	Oil Tank	Well drained	No visible oil spills, very thick layer of sand planted to grass
	15 – 30	Oil Tank	Well drained	
OS4	0 – 15	Compressor	Well drained	Top and bottom soils were compressed clay mixed with gravels, No visible oil spillage.
	15 - 30	Compressor	Well drained	
OS5	0 – 15	Pumping Generator	Moderately drained	Concrete floor with concrete surface drains soils were compressed clay and gravels.
	15 - 30	Pumping generator	Poorly	Red iron oxide mottles visibly
OS6	0 – 15	Waste pit	Poorly drained	Very abundant crude oil spills showing very bad pollution;
	15 - 30	Waste pit	Poorly drained	Frequent human faecal materials seen. Top and Bottom soils were dry.

Figure 14- 14: physical assessment of soil sample

General Conclusion

The aim of research was to identify and determine the environmental impact of civil Engineering infrastructural development projects. This was done through the utilization of the project by a Nigerian oil firm. The project was the upgrading of a flow station in Ahoada local Government Area, Rivers state. An Assessment of the existing environment was done through desktop; field and laboratory methodologies. Positive and negative impacts were deduced and comparison was made between the results of the assessment and national and international guidelines on the environment. From the assessment of the flow station environment, it was found that the environmental impacts can be managed within reasonable standards and acceptable limits by applying appropriate mitigating measures.

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

INTRODUCTION:

A STP can be express as the factory, which prevents the environment from waste produced by human beings. When the waste produced is beyond the limit of environment to decompose, STP is only the solution. The present STP reduces the waste produces manure& energy and helps us to keep our rivers, ponds clean. Various types of STPs are introducing each day, according to the requirement and economic view.STP in Delawas is working on ASP (activated sludge process). It consists of two phase capacity of each is 62.5MLD. It is a best example of STP known for not using any chemicals in whole treatment process & not using any pump in sewerage system for bringing the sewage to STP from 25 Km. The farthest point of sewerage is 25Km and nearest is 1Km from the STP. This type of STPs can also be termed as energy saver of a country. As it recharges the groundwater, flow freely and be used for irrigating purposes. The STP of Delawas consist inlet section, which is common for both phase of STP. The raw sewage first collects here.

Inlet section of STP
(Captured from the site)
After commencement of water in inlet section it is screened through automated screens. Screens are inclined at an angle of 45 degree.

Figure 14-15: inlet section

Automated screening (captured from the site)
After removing the solid waste from water, it transfers to grit chamber for removing the grit; the grit obtained from this chamber is highly nutritious for crops. The chamber is trapezoidal in shape for easy collection of grit. The whole process is fully automatic.

Figure 14-16: screening

Figure 14-17: Grit

Figure 14- 18: primary clarifier

Primary clarifier (captured from STP site)
In aeration tank, oxygen is providing with the help of blower for survival of bacteria. A small quantity of sludge returned from secondary clarifier to aeration tank for activated sludge process. Air blowers are being operated with variable frequency drive (VFD). Man Machine Interface(MMI) is provided through programmable logic control system (PLC) for handling anaerobic sludge digester

Aeration tank

From aeration tank, the wastewater goes to secondary clarifier. This is the final treatment process for water in this plant. The water from here opens to Amanisah runnel finally.

Figure 14-19: **Aeration tank**

Figure 14-20: secondary clarifier

Secondary clarifier

The sludge collected at different steps of process sent to the sump and then to the digester dome. The sludge is dewatered by using centrifugal pumps and the thickened sludge is sent to dome for anaerobic digestion. This process gives biogas and digested sludge, which use as manure by local farmers. The gas produce is using for revenue collection. The gas sent to CNG bottling plant, whichgives them cost price of 6.50 RSPNm3.

Graphs based on answers of survey:

Result and Analysis Based on data available:

Notation Used

RSI - Raw Sewage Inlet

AT - Aeration Tank

FO - Final Outlet

POF- Primary overflow

Based on data available at plant office, we analyses the variation in pH, TSS, COD, BOD of the various parts of the STP.

pH of the different sections of STP:

Parameters	Mar-16	May-16	Oct-16
RSI	7.47	7.45	7.38
POF	7.51	7.49	7.53
AT	7.50	7.50	7.54
RAS	7.33	8.18	7.32
FO	7.68	39.83	7.69
Digester	7.07	6.95	9.85

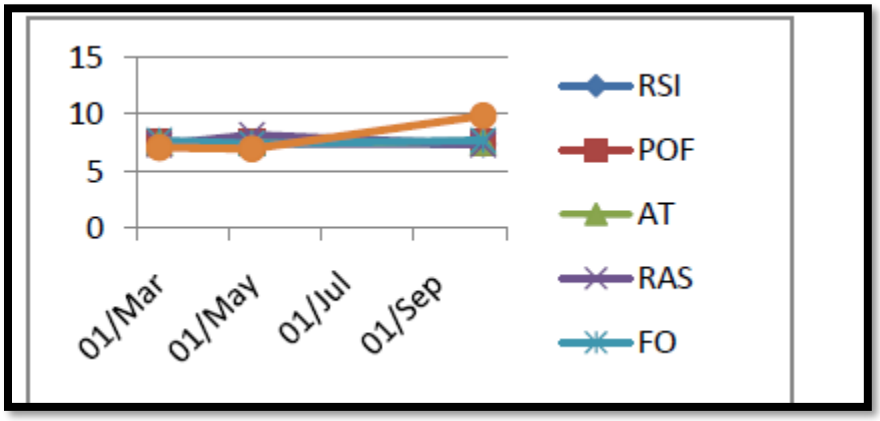


Figure 14- 21: variation in ph

CONCLUSION:

The STP is currently working well and farmers can use this water, as it cannot harm the crops, even increase the yield of crop. However, the irrigated crops should be of commercial purpose as people strongly opposed to use this water for farming food. The STP produced biogas, which can helps in meeting about its 75%-80% energy requirement for operation and maintenance. The concept of waste to energy of the designer is a subject of appreciation. The treated water can also be used for recharging groundwater or for horticulture and planting trees on both sides of road of the area. This practice will definitely again help in reducing power consumption as no need for pumping water from ground for planting trees and for commercial crops irrigation. This type of STP should setup on large scale so they will help India in improving health and sanitation with sustainable development. The survey report shows the open mind of majority of the subjects who take part in this survey enthusiastically.

14.2 Electrical Engineering

14.2.1 Design of Power Electronics converter

Introduction

The task of a power converter is to process and control the flow of electric energy by supplying voltages and currents in a form that is optimally suited for the user loads. Energy was initially converted in electromechanical converters (mostly rotating machines). Today, with the development and the mass production of power semiconductors, static power converters find applications in numerous domains and especially in particle accelerators. They are smaller and lighter and their

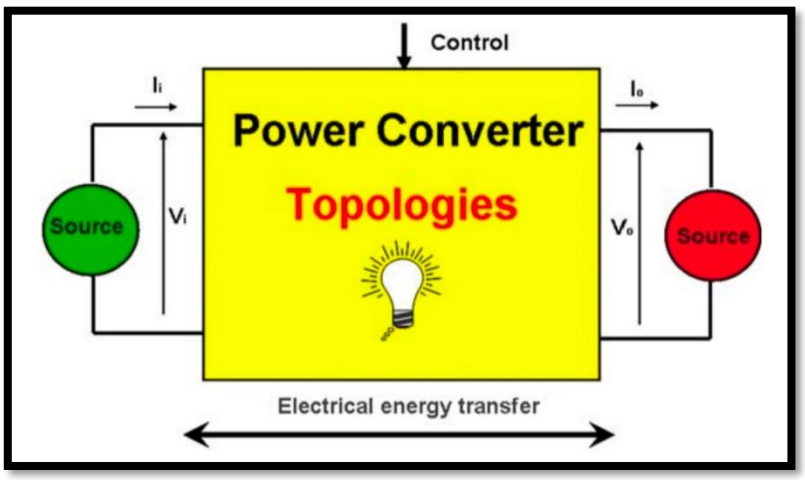


Figure 14-22: Power converter

static and dynamic performances are better. A static converter is a meshed network of electrical components that acts as a linking, adapting or transforming stage between two sources, generally between a generator and a load.

An ideal static converter controls the flow of power between the two sources with 100% efficiency. Power converter design aims at improving the efficiency. But in a first approach and to define basic topologies, it is interesting to assume that no loss occurs in the converter process of a power converter. This introductory paper reviews and gives a precise definition of basic concepts essential for the understanding and the design of power converter topologies. First of all the sources and the switches are defined. Then, the fundamental connection rules between these basic elements are reviewed. From there, converter topologies are derived. Some examples of topology synthesis are given.

Three-phase diode front end

Three-phase diode front end (DFE) rectifier composed of a DC bus capacitor (Cbus) and three legs with two diodes in each leg. As it is composed of diodes, the power flow is unidirectional (from AC source to DC bus) and the bus voltage cannot be controlled (it depends on the AC supply and the load). This rectifier is widely used in industry due to its low manufacturing cost and high efficiency and reliability [1]. However, they generate current harmonics in the AC side, which are detrimental for electrical generators

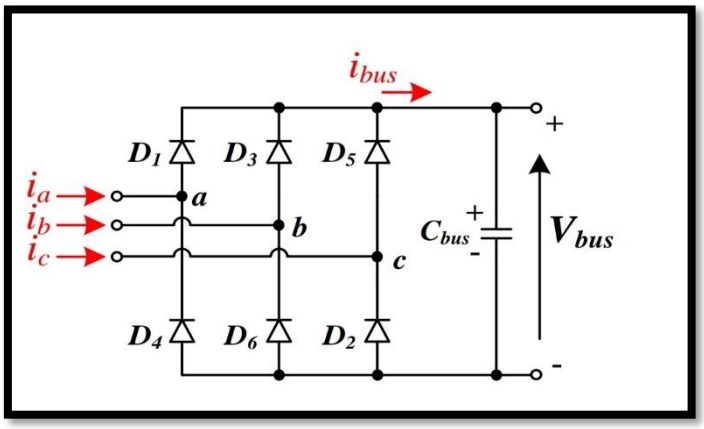


Figure 14-23: Three phase diode front end circuit

Each diode conducts when it is forward-biased and two diodes are always current conducting in the bridge. Assuming a highly inductive AC side, the current ripple in the DC side can be neglected . Thus, the current conducted by all the diodes is considered equal to the DC side current Ibus. This DC side current varies depending on the transferred power, i.e. the higher the power the higher is the circulating current. Being conservative, the maximum DC bus voltage (vbus) is equal to the line to line voltage and hence, the maximum reverse voltage of the diodes is given by the peak line to line voltage (Vibes). The conducted current and reverse voltage of all diodes are same and in consequence, it can be assumed that all diodes have same power losses and thermal stress.

Power losses estimation

Assuming an ideal DC bus capacitor with no losses, the converter power losses are equal to the diode power losses, which are given by average conduction power losses (Pcond) and average switching power losses (Psw).

P(losses)=P(cond)+P(sw)

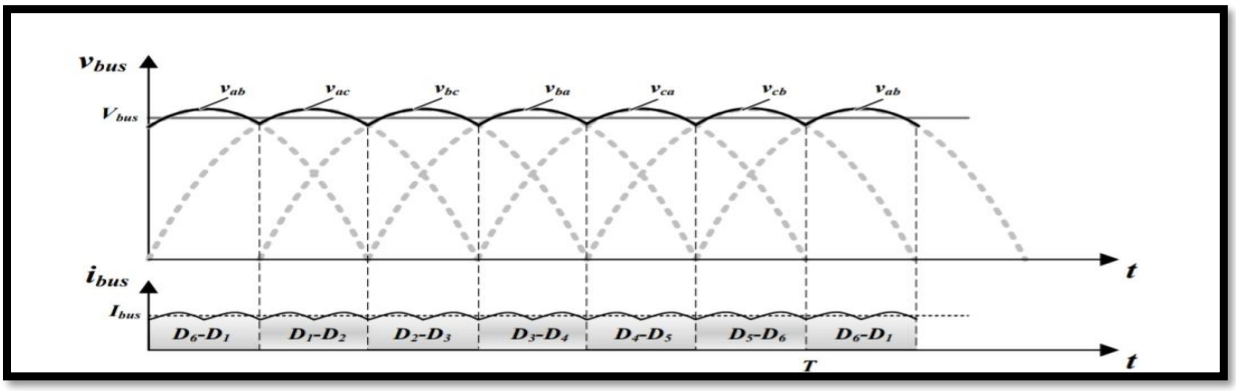


Figure 14- 24: Voltage-time graph

When a diode is suddenly reverse biased (with high di/dt), the carriers must be recovered before it starts acting as a blocking device. Average switching power losses (Psw) are due to this phenomenon. In order to estimate these losses (Erec), the manufacturer provides the dissipated energy (cf. Fig 2.3b) at the 100FIT test voltage (V100FIT). This curve can be modelled with a second order.

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

Introduction

The ac motor starters are increasingly becoming popular due to its controlled soft-starting capability. The ac motor starter provides limited starting current and hence conventional electromagnetic line starters and reduced-voltage starters are replaced with ac motor starters. Thyristor-based soft starters have many desirable properties and provide a viable solution to starting problems in three phase induction motors. These power semiconductor based starters are cheap, simple, and reliable and occupies less volume. The power density of these soft starters is also very high. A three phase induction motor produces electromagnetic torque on its shaft but initial switching instants of all three phases to the supply produces pulsations on the electromechanical torque when it is controlled by a direct- online starter. These severe pulsations in electromagnetic torque might cause shocks to the shaft and hence to the driven equipment. These pulsations might damage mechanical system components, such as shafts, couplings and gears etc. The electromagnetic torque pulsations also causes long term effects on

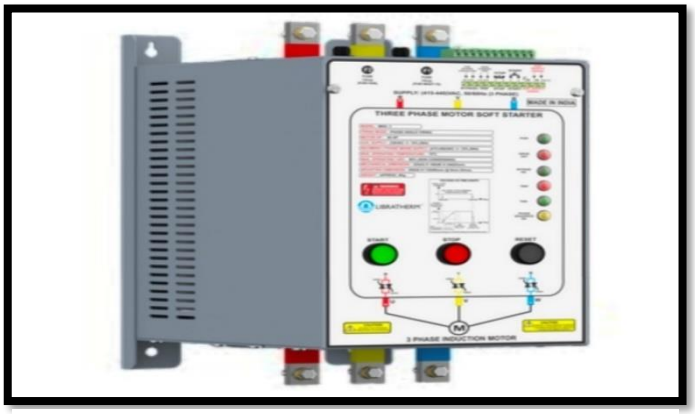


Figure 14- 25: Induction motor

various mechanical system components if the strength of materials is exceeded which might lead to fatigue also.The reduced voltage starting by soft starters eliminates stress from the electrical supply and it also reduces the possibility of voltage dip and brown out conditions. Soft and smooth starters provide smooth acceleration of rotor of three phase induction motor. Reduced voltage starting reduces high amount of starting torque applied on the shaft and therefore eliminates the shock on the driven load. An instantaneous high amount of starting torque can cause a jolt on the conveyor which can damage products, pump cavitation's and water hammer in pipes. Therefore, a soft starter ramps up the voltage applied to the motor from the initial voltage to the full voltage. The voltage is initially kept low to avoid sudden jerks during the start. The voltage and torque increases gradually so that the induction motor starts to accelerate. This ramp up voltage provides sufficient torque for the load to accelerate gradually and hence mechanical and electrical shocks are minimized from the system, The voltage supplied to stator windings are adjustable and it has ramp characteristic.

Method

The embedment of a microcontroller into the system makes it a standalone system that is capable of taking decisions to keep the system functioning properly. The microcontroller receives inputs signals from the three phase mains which is been step down by step-down transformers, depending on the input the microcontroller receives, it either takes decision to switch on the relays or switch off the relays.

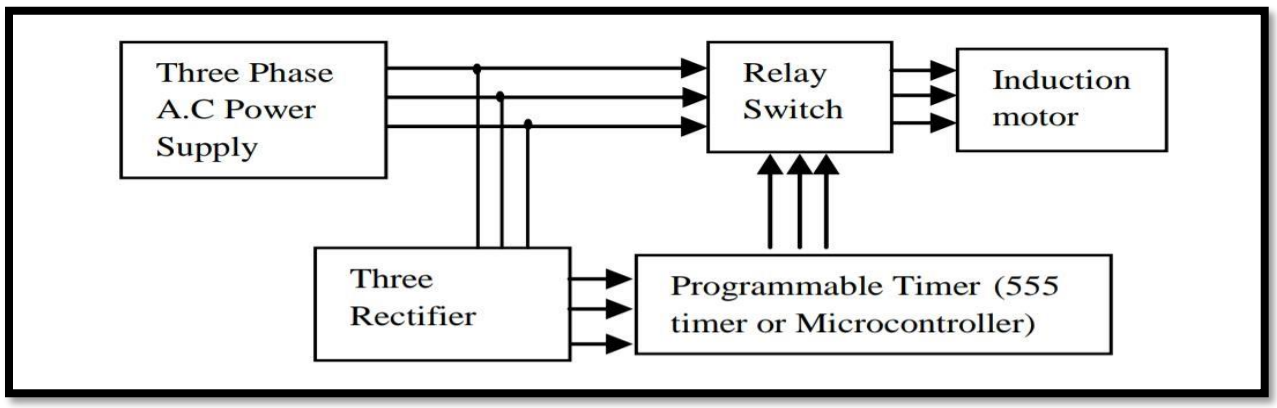


Figure 14-26: Induction motor flowchart

When the system is first switched on, it waits for 30 seconds to make sure the power source is stable and starts monitoring. By switching ON or OFF of the relays, the microcontroller also turn on LEDs and the color of LED, being lit ON, indicates which the three phases is ON or OFF. The schematic diagram of the automatic three phase direct starter controller system is given .The microcontroller used for the project is the PIC16F84A [5]. The microcontroller takes inputs from the three mains continuously via step-down transformer. Under the control of the program written in the microcontroller's memory, the microcontroller turns either Red or Green LEDs and turns
the three relays ON or OFF.

EXISTING SYSTEM

Soft starters of motors may offer a much variety of methods which are useful for controlling motor starting. Every soft starting method uses a different primary control parameter. Best results are obtained by selecting the soft start method that directly controls the parameter of most importance for the application. Typically soft starters are mainly used to limit motor starting current or to control load acceleration and/or deceleration

a)Timed Voltage Ramp (TVR) Starting

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

b)Current limit starting

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

c)Adaptive Control for Starting

Adaptive Acceleration Control is a new intelligent motor control technique. In an adaptive nature of control with soft start method, the soft starter are able adjusts the current value to start the motor within a specified time and using a selected acceleration profile. Every application has a particular starting profile, based characteristics of the load and the motor. Adaptive Acceleration Control offers three different starting profiles schemes, to be suit the requirements of various applications. Selecting a profile that matches the inherent profile of the application can help smooth out acceleration across the full start time. Selection of the dramatically different Adaptive Control profile can somewhat able neutralize the inherent profile. The soft starter monitors the motor's performance during each start, to improve control for future soft starts.

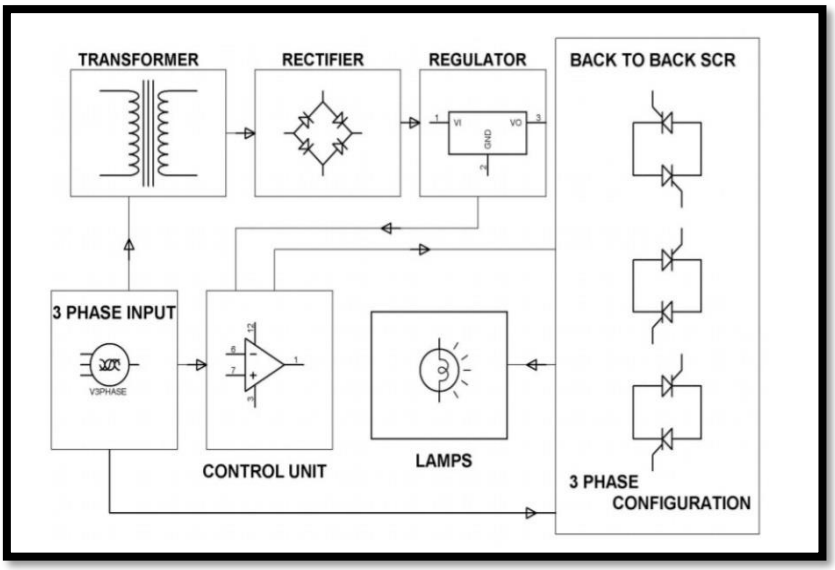


Figure 14- 27: Soft Start for 3-Phase-Induction Motor

14.2.3 Advanced Wireless Power Transfer System

Introduction

Although WPT has been known for more than a century, only now has the WPT industry started its rapid growth. The number of publications on wireless power has increased by at least 1200% in the last 10 years. Current solutions are having great success in the marketplace with diffusions of innovations from innovators to early adopters as of now. However the main focus of the current solutions is a "wow" factor which in most cases neglects convenience .Obviously, there is a need for a real-life application, for average users who are not particularly familiar with the engineering world and do not follow state of the art technologies.

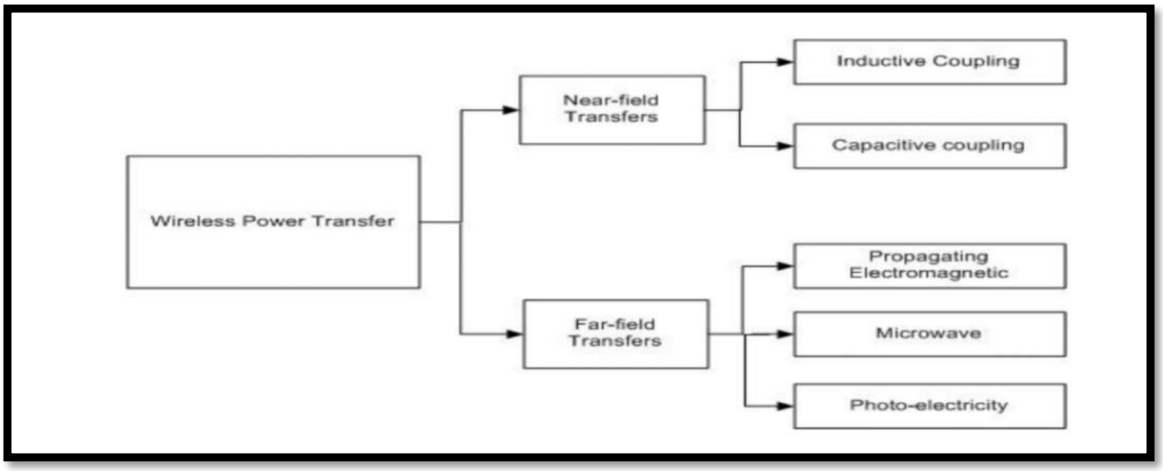


Figure 14-28: Wireless power transfer flowchart

History of Wireless Power Transfer

The development of the WPT systems started already in the late 19th century with the ideas of Nikola Tesla, who is rightfully considered an acknowledged genius in thtechnologie. Already then, he was rather skeptical about the slow though inevitable adoption of these technologies: "I shall proceed slowly and carefully… might not have been given to the world for a long time yet… my best wishes for your future success …see the excitement coming."

As result, William C. Brown's cordless helicopter was introduced in 1964, the main concept of which was a 400W continuous power microwave transmitter delivering 100e machine. Furthermore, as mentioned by Garnica et al. (2013) and Brown (2011), the idea of long-distance power transmission from space objects emerged where energy would be gathered, beamed from a solar-power satellite to Earth and then converted into electrical form.

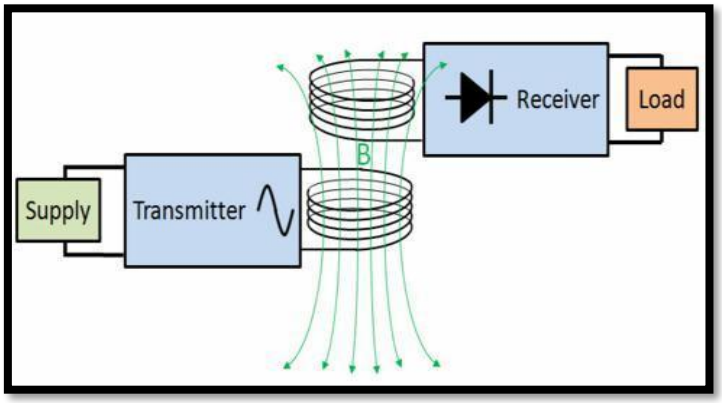


Figure 14-29: Wireless power transfer

The next step towards WPT was development of the RFID system in 1973 where tags were powered using induction coupling. It took three decades before the WiTricity re-search group introduced the real cordless electricity transfer in 2007 with a 60W bulb being powered at two meters distance. Apparently, this was the starting point for a rap-idly growing and competitive industry of wireless Power Transfer.

Main concepts of wireless transmission of electric energy

Every electromagnetic source creates both electric (E-fields) and magnetic (H-fields) fields around itself, and they are characterized by the radiative and non-radiative components. Depending on the distance from the source there are near-field, transition and far-field regions that are defined by the way they interact with the surrounding media. The small transition region has both the characteristic of near-field and far-field. The situation when the distance to the source is less than $\lambda/2\pi$ is near-field (Near-field has a complex definition in terms of relation between E and H, but more importantly, it has all four types of polarization present (horizontal, vertical, circular and elliptical), while far-field has only

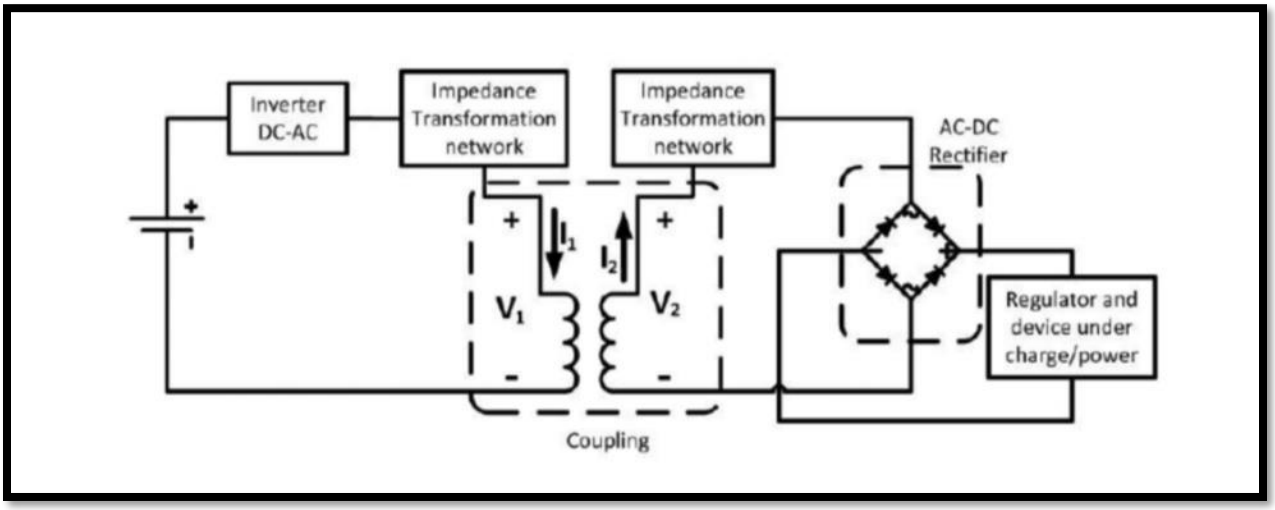


Figure 14- 30: Wireless power transfer circuit

one type. A striking point is that a near-field region is a better environment for electromagnetic induction than far-field, where electric and magnetic fields decrease proportionally to the distance. A near-field region allows higher power transfer efficiency and diffraction of the wave, which results in stronger penetrability and weak directivity on a short range. In addition, near-field transfer is divided into inductive (magnetic) coupling and capacitive (electro-static) coupling. Capacitive coupling of two conductors is achieved via transfer of electric energy through dielectric media. However, inductive coupling is based on alternating is magnetic field and considered to be more secure and productive for wireless power transfer. Denotes the main WPT methods which were developed historically.

Health and safety considerations

Since WPT systems are based on the electromagnetic radiation, it is important to con-sider safety issues when dealing with cordless electricity transmission. Sun et al. (2013) states that there are still no official regulations or safety standards for WPT (which is another sign that it is a completely new industry) [9,32]. However, as claimed by the World Health Organization (WHO), developers can rely on the existing reference standards from the Institute of Electrical and Electronics Engineers (IEEE)

and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) [8,21]. There are two main standards nowadays: "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz" (IEEE C95.1-2005) and "ICNIRP Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300 GHz)". According to Kesler (2013), although neither IEEE nor ICNIRP organizations have evidences to show that exposure to radio-frequency electromagnetic fields could cause cancer, they both agree that it could stimulate nerves and muscles, heat tissues and increase body temperature. Nonetheless, the existing limitations assure that the mentioned effects never happen if the device complies. summarizes both standards' maximum permissible exposure of radio-frequency electromagnetic fields.

One point that clearly stands out is that the graph has a downward trend as the frequency goes up. Moreover, a typical WPT frequency range is denoted from roughly 100 kHz up to 100 MHz. The maximum permissible exposure is represented by three trends: IEEE controlled environment, IEEE uncontrolled environment and ICNIRP occupational environment. The IEEE controlled environment and ICNIRP occupational environment are less strict since they mean locations where people are aware of potential exposure while the IEEE uncontrolled environment is meant for the general public. [9,33.] Looking at the figure, we may say that a good rule of thumb could be that a 100stem may have a maximum permissible exposure of 6 μT to certainly comply.

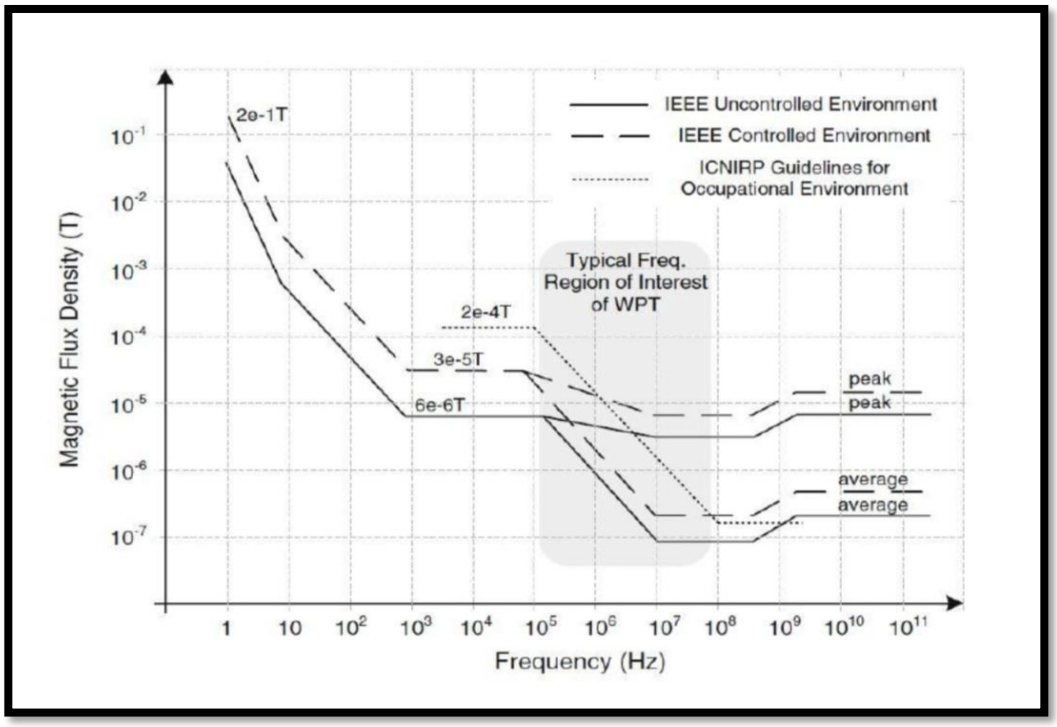


Figure 14- 31: Magnetic flux density vs frequency graph

14.2.4 Industrial Temperature Controller

Introduction

This is the degree of hotness or coldness of a or an environment. A control system is a device or set of devices that manage, command, direct or regulate the behavior of other devices or systems. Thus we can

literally say that a Temperature Control System is a device or set of devices that manage, command, direct or regulate the behavior of other devices or systems in order to influence the degree of hotness or coldness of a body or an environment. A temperature control system consists of a small programmable digital logic controller device, wired to a heating and/or cooling system. About the size of a typical wall-mounted thermostat, a temperature control system contains a small circuit board and a memory chip(s). After setting the temperature control system to a desired temperature, known as a set point, the system will utilize the heater and/or air conditioning unit(as needed) as effector maintain that setting for the duration programmed.

Temperature is one of the main parameter to control in most of the manufacturing industries like chemical, food processing, pharmaceutical etc. In these kinds of industries, some product need the required temperature to be maintained at highest priority the product will fail. So the temperature controller is most widely used in almost all the industries.

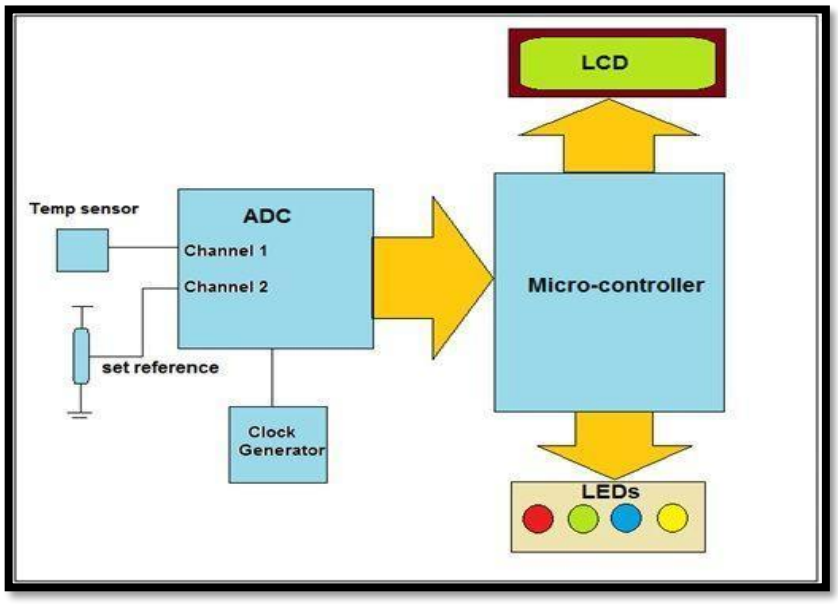


Figure 14-32: Industrial temperature controller

METHODOLOGY

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

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

CONCEPT OF TEMPERATURE CONTROL TECHNIQUE

To increase the production of an industry, smooth control of temperature is the key function.5 Different industry has its own individual temperature requirement for specific role. Conventionally, industrial temperature measurement instrument thermometer is used to measure the temperature. After observing temperature reading, operator controls temperature manually. Sometimes controlling is not appropriate because of time consuming human operated control of cooling device and heating device.

As a result, efficiency of temperature control fails and production is hampered in industries. Besides that, thermostat is used to select temperature which is not efficient because of erosion of metal and losing to strength of metal for successive using. Consequently, analog system loses its own linearity function since it is mechanically designed temperature control device. The temperature can be controlled more efficiently using interface between temperature sensors LM35 which produce linear voltage signal with rising temperature and microcontroller which takes response fraction of millisecond to response. Microcontroller takes signal from temperature sensor and compare with pre-set value of temperature then take decision when heating device or cooling device would be turned on and the duration of maintained temperature in system.

TEMPERATURE MEASUREMENT PRECISION

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

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

Introduction

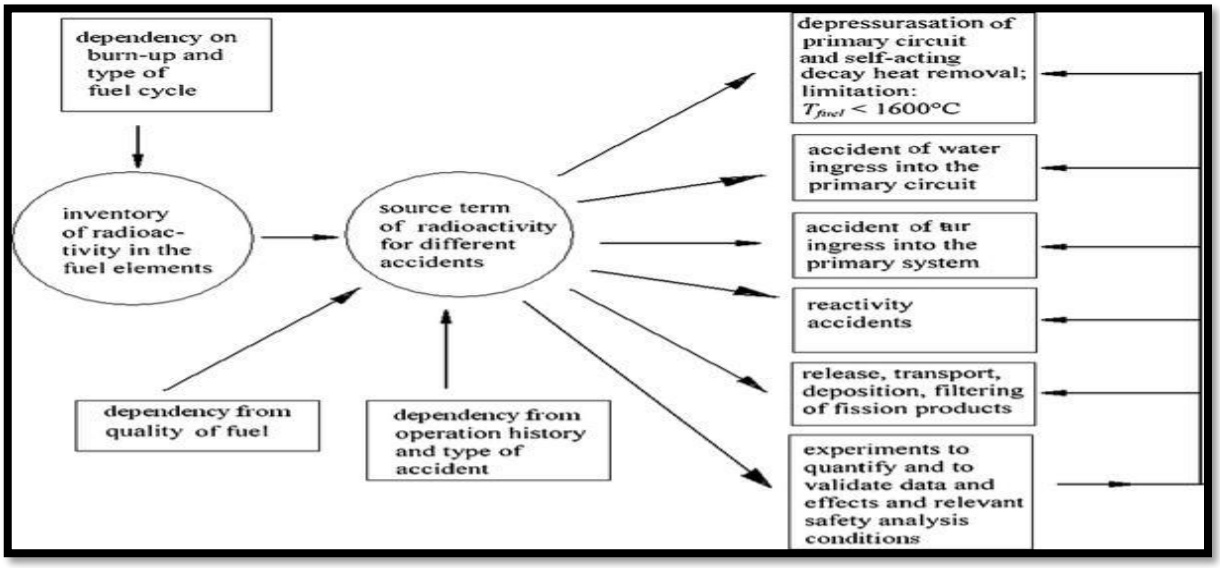


Figure 14- 33: Traffic Signal Control System flowchart

Indian Railways have decided to induct Self Propelled Accident Relief Trains (SPART) with speed potential of 160 kmph, with a view to putting in place a fast and reliable disaster management system.

SPART are trainsets required to proceed to accident sites and are located at important yards and stations on Indian Railways (IR) at vantage locations so as to be able reach the accident spot for rescue and relief work at very short notice. This specification outlines the requirement for SPART to be procured for Indian Railways. The Contractor shall design, manufacture, test and deliver the SPART as described by this specification.

Accident Relief on IR

The Indian Railways is having an organized system of relief for managing accidents with its own resources. In most of the countries in the unfortunate event of Railway accident, relief and rescue work is spearheaded by civil authorities as in case of road accidents. However, on Indian Railways, all the rescue and relief work is carried over by Railways. Presently, 161 ARMVs (Accident Relief Medical Van) and 206 ARTs, (Accident Relief Train)are positioned at strategic locations which cover the entire rail network of Indian Railways for rushing to accident sites on top priority, along with doctors, para-medical staff, rescue workers and engineers. Many ARTs also have 140 Ton Diesel Hydraulic crane attached to them. The accident is reported by the guard or loco pilot of the train to the nearest station or divisional control room and the nearest railway stations, through telephone sockets provided at the poles alongside the railway track. The control gauges the extent of requirement of relief operations and dispatches the ART and ARMV as per requirement. Effective communication and response time is of essence. The idea is to reach the spot as early as possible so as to provide medical relief in the 'Golden Hour'. The existing layout has provision of 22 berths in the supervisor van however the Indian Railway guidelines say that as many trained staff are to be sent with the relief train as possible. Staff would include team of doctors and paramedics like stretcher bearers, dressers, assistants for boiling instruments in water to keep in readiness etc.

Contract Submittals

This specification requires the submittal of drawings, documents, system descriptions, design calculations and analysis, 3-D models and FE analysis, test results, manuals and similar information for review by IR to verify compliance with requirements specified in this specification and for after-delivery support of the vehicles. Submittal requiring approval are identified in each section. Typically, the RDL (Required Document List) submittals relate to the design requirements in any given sections. Unless otherwise specified herein, the Contractor shall submit all analyses, reports, etc even if they do not appear in the RDL.

The Contractor shall submit for review and approval, a Required Document List.. The first draft shall be due as part of the Monthly Progress Report (MPR) within 30 days of NTP. The RDL Status Report shall provide submittal dates and current status of all Contract Deliverables. It shall be structured chronologically such that those deliverables required first are at the top of the list.

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

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

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

Sr. No.	Design Name	Period	Amount Expenditure	Available Fund
1	**Vocational training center**	1yr	1,10,943.96	8,60,000
2	**Septic tank**	3-5 months	1,62,954.00	
3	**Common Service Centres**	1yr	98577.18	
4	**Public library**	1yr	7,72,500.00	
5	**Plastic roads**	1yr	384387/- per Km	
6	**Rainwater harvesting**	3-5 months	6775/ltr storage	
7	**Solar panels**	3-5 months	83000Rs	
8	**CCTV Camera**	3-5 months	49280	
9	**Automatic solar street light**	1yr	349/ light	
Total cost: 12,27,974 384387/- per Km 6775/ltr storage 349/ light				

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

Source of fund	2019-20
village earning from land	2,60,000
Party fund	3,50,000
MLA grant	2,50,000
Total funding 8,60,000	

Chapter 16. Survey By Interviewing With Talati And/Or Sarpanch

Sr.	Questions	Yes/ No	Remarks
1	What are the sources of income in village?	Yes	Farming, labour, animal husbandry
2	What are the chances of employment in village?	yes	Local market
3	What are the special technical facilities in village?	No	
4	Is any debt on village dwellers?	No	
5	Are village people getting agricultural help?	yes	But no equipments only by sharing experience
6	Is women health awareness Program organized in village?	No	
7	Are women having opportunity to work and income?	yes	Vegetable-vendors, farming
8	Child girl education is appreciated in village?	yes	School to college
9	Facility of vaccination to child is available in village?	yes	
10	Are village people aware about child vaccination and done to each and every child as per norms?	yes	100% according to data shown by talati
11	Women help line number information is provided to village people?	yes	
12	Is water scarcity in village? How many days per year?	No	
13	Is village under any debt?	No	
14	Is any serious issue due to debt from bank or any person happened in village?	No	
15	Is any suicide like incident observed in village due to government policy, debt or threatening?	No	
16	Is any death of patient occurred due to unavailability of medical facility in village?	No	Medical facility is adequate
17	How many disabled (physically challenged) is observed in village? Provide list with Male/female/girl/boy with age and type of disability and reason of disability.		No data
18	Is village improvement is observed in comparative scenario from past to present?	yes	Education
19	Is any unavoidable difficulty village people are facing? Any natural calamity is there?	No	
20	Life Living standard of girls and women is appreciated and uplifted in village?	yes	Major part

Chapter 17.Irrigation / Agriculture Activites And Agro Industry, Altenate Technics And Solution

Irrigation/agriculture Activities

We compute irrigation water consumption at the field (SimU) level, which accounts for the beneficial water use by the crops, and the application efficiency of the particular irrigation system. We do not compute gross water use in terms of actual water withdrawals from surface waters or ground-water. Thus we do not consider the efficiency of water delivery from source to field, which would account for return flows and water potentially available for reuse. The model portrays four major types of irrigation systems: surface systems including basin and furrow irrigation, localized drip, and sprinkler irrigation. The suitability of these systems depends on various factors, which influence crop suitability, water demand, energy requirement, labor intensity, and overall cost, and thus affect motivation-based decision making that aims at individual as well as societal welfare maximization. The interdisciplinary range of factors that determine irrigation decisions in our model is shown in For each irrigation method we evaluate biophysical and technical suitability to exclude inappropriate system applications. Among the biophysical determinants of irrigation system choice, the model enables us to take directly into account the slope, soil, and crop types. For the purpose of this study, we further disaggregated the first slope class considered in the basic SimU delineation (0–3 degrees) into five subclasses . The new slope classes were defined with respect to threshold values that determine the applicability of the different irrigation methods [Brouwer et al.,1988]. In combination with the soil type, the slope class determines the suitability to apply a particular irrigation system as well as the appropriate choice of flow rate.

We apply an economic optimization approach dealing with trade-offs between competing land use types. Within the optimization procedure, trade-offs in terms of cost-benefit comparisons are dealt with from a sectorial perspective, and on behalf of maximized welfare across the modeled sectors. In the agricultural sector, farmers are the prior agents of decision making, which are also assumed to act driven by economic motivation. However, for the optimization the surplus of the agricultural sector as a whole is relevant. From such a macroeconomic (national) accounting point of view we consider total expenditures for irrigation, and we neglect public cost recovery and subsidies for irrigation facilities or water delivery to farmers for reasons of simplification. This is done with respect to the global scale and the relative coarse temporal, spatial, and sectoral resolution of our partial equilibrium model.

Figure 17- 1: Irrigation/agriculture Activities

Agro industries

Agriculture and allied activities have great potential in the contribution of national development. Because of low productivity in agricultural sector most of the rural workforce look forward to diversify their occupation from their low productive agricultural sector to service sector.

Despite of increase in adapting the modern farming techniques with high yielding variety of seeds, irrigation and increased use of fertilizer, a vast number of farmers still depended on conventional way of farming. Though the country has achieved the status of self-sufficiency in regards to food production, the farmers are yet to gather benefits from it. Diversification can improve the human capital by improving their skills. Agro based industry needs both agricultural development and industries which can make the agricultural output more profitable which can pave a way for poverty alleviation of rural farmers. The development of agro-industry can also have an important impact on the local agricultural sector as well as the livelihoods of small holder farmers, provided their basic requirements are taken care by the government and facilitate the environment in which the rural people in general and poor in particular would find a sustainable livelihood.

Agro based industry can be seen as a combination of agriculture and industry. Though agriculture and industry are viewed as two separate sectors in terms of their character and role in economic growth yet, agro based industry needs both agricultural development and industries which can make the agricultural output more profitable. Agro based industries may be defined as "Those industries which are engaged in either processing of products of raw materials or manufacturing them to finished products on the basis of primary and secondary products of agriculture and forest". Agro-based industry, thus have a great potential to influence positive economic development through contributing to the enhancement of the economy of the farmers. Agro based industry refers to the subset of manufacturing that processes raw materials and intermediate products derived from the agricultural sector. Agro-based industry thus means transforming products originating from agriculture, forestry and fisheries. Agro-based industry can be classified of two types. These are Agro-produce Processing units and Agro-produce Manufacturing units.

Figure 17-2: Agro industries

Alternate Technics

Agriculture has been the basic source of subsistence for human societies, over thousands of years and it provides a livelihood to half of the world's population, even today. Food and Agricultural Organization, 2007 reports that the quantity of food produced per capita has been declining since 1984 as the population is increasing in alarming rate. In 1960 when the world population numbered only 3billion, approximately 0.5 ha of cropland per capita was available and considered as the minimum area essential for the production of a diverse, healthy, nutritious diet of plant and animal products (Keyzer et al. 2005; Southgate 2009). Globally available per-capita cropland is now about 0.23ha (FAO 2007; LaSalle et al. 2008).For the world as a whole, per-hectareoutput of cereals, which account for more than half the food people eat if the grain fed to livestock is factored in, had risen by the late 1990s to 3.0 metric tons, which was double the average yield in the early 1960s (Southgate et al. 2007; Southgate 2009).The global population is predicted to increase to 9.5 billion people in the year 2050 (U.S. Census Bureau 2008). Total food requirements will increase by100% (Tilman et al. 2002)

as a function of both the 50% increase in population and the additional global demand for animal protein as people in developing countries become more affluent.

This approach depends on finding a crop variety that can give a good yield. Varieties or strains of crops can be selected by breeding for various useful characteristics such as disease resistance, response to fertilisers, product quality and high yields. One way of incorporating desirable characters into crop varieties is by hybridisation. Hybridisation refers to crossing between genetically dissimilar plants. This crossing may be intervarietal (between different varieties),interspecific (between two different species of the same genus) or intergeneric (between different genera). Another way of improving the crop is by introducing a gene that would provide the desired characteristic. This results in genetically modified crops.For new varieties of crops to be accepted,it is necessary that the variety produces high yields under different conditions that are found in different areas. Farmers would need to be provided with good quality seeds of a particular variety, that is, the seeds should all be of the same variety and germinate under the same conditions.

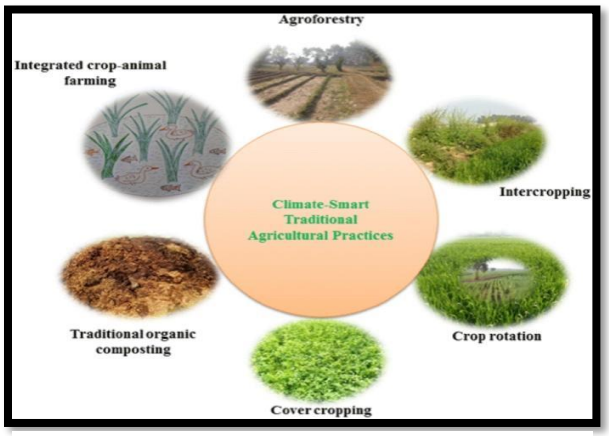


Figure 17- 3: Alternate Technics

Alternate Technics solution

An essential, but often limiting, assumption of conventional linear programming models is that all objective function, resource constraint and input-output coefficients are known with certainty. Relaxation of the assumption for just one of these groups of coefficients greatly increases the complexity of determining an optimal solution. For the simplest of these cases-risk in the elements of the objective function-quadratic programming provides one possible method of solution . However, practical application of the technique has been restricted by the limited availability of suitable algorithms, and by doubts about its adequacy as a means of taking account of risk 1281. Consequently, alternative formulations which are capable of handling this form of risk within the conventional linear programming framework have evolved. These include Hazell's original MOTAD formulation [111, Hazell and Scandizzo's modification of MOTAD for the estimation of (E, V) or (E, u) efficient production frontiers C131, marginal risk eon-straint linear programming , focus-loss constrained programming and separable programming .

In this paper an alternative method for solving non-sequential stochastic linear programming problems, where the stochastic is in the input-output coefficients, has been developed. The method used extends the MOTAD approach of Hazel1 to incorporate other important aspects of risk in farm planning. The solutions obtained represent estimated partial equilibria for given expected gross margins, resource availabilities and attitudes to risk, and can be readily updated when any of these components change significantly.

Chapter 18. Social Activities – Any Activates Planned By Students

After meeting with the sarpanch and talati, we conducted a survey in the school there. After that we met the children. We made the children aware of Corona virus.

Figure 18- 1: SocialAwareness

COVID 19 has forced most of us to be confined inside our homes. Human history will record this period as a time of unparalleled separation and crisis but also of great courage, learning and collaboration. Each one of us is having to review/ rethink the way they function and their way of life itself. As we have seen across the world in multiple situations of crisis, children being the most vulnerable are often the worst affected. To fight Covid19, the country is under lockdown to contain the spread of the pandemic. However, CHILDLINE's message to every child in distress or concerned adult has been from day 1 – 'We are not locked down!' As India's exclusive emergency helpline for children, how could 1098 possibly be?

Figure 18-2: Awareness topic

CHILDLINE has seen a spike in calls by 50% since the lockdown including people calling in for information on the pandemic. Amongst these a percentage of calls have required reaching out and physically intervening including for nutrition, shelter and medical assistance, and also to prevent or protect from abuse, violence and exploitation such as abandonment, physical abuse, child labor, child marriage and so on. Despite the constraints and challenges encountered while doing so in these circumstances, CHILDLINE has reached out to the child, comforted, provided immediate help and connected to the concerned authorities for long term assistance. We would like to place on record our

gratitude to the Ministry of Women and Child Development, State Governments and District Administrations/Child Protection Services, who have helped us to help children.

This manual provides resources to help calm the minds of children and help them cope with the stresses they face by engaging in solution oriented, future focused, creative activities. Creative Printable with messaging (7 Corona Warriors Reward Stickers and 3 Gratitude Coloring Sheets). Infographic Poster & Worksheet explaining Symptomatology, Contagion and Prevention for Covid-19 Handout for Caregivers with Covid-19 Messaging on Do's and Don'ts Word Wizards (Storytelling activities on Covid-19).

Parents and Caregivers can use these stickers as cut-outs and initiate conversations about positive and healthy behaviors to fight the virus for a 6-10 year old child. Remember children don't need to know every little detail. Unless children ask specifically, there's no reason to volunteer information that might worry them. Keep a sense of perspective, engage in solution-focused thinking and balance this with mindful acceptance. Very young children may be oblivious to the facts of the situation, but they may still feel unsettled by the changes in routine, or pick up on the fact that people around them are worried and upset. Check in with younger children periodically and give them the chance to process any worries they may be having.

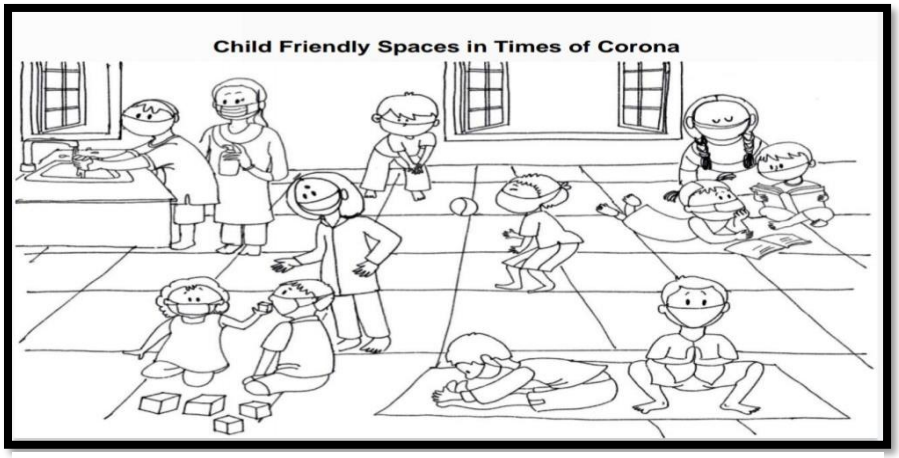


Figure 18- 3: child friendly spaces in time of corona

Chapter 19. <<VANKAL VILLAGE>> SAGY Questionnaire Survey form

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: VANKAL Gram Panchayat: VANKAL Ward No. 12

Block: District: SURAT

State: GUJARAT LS Constituency: BARDOLI

1. Family Identity and Size

Name of Head of Household	JAGDISHBHAI KANUBHAI GAMIT							Male/ Female	M
SECC Survey ID:		Family Size	7	Over 18	7	6 to 18		Under 6	

2. Category & Entitlement Details (Tick as appropriate)

Social Category[2]		Life Insurance	1. All Adults ✓ 2. Some Adults 3. None	AABY	1. Yes 2. No	Kisan Credit Card	Yes / No ✓
Poverty Status Year[3]:	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]
JAGDISHBHAI GAMIT	50	M	N	Y	8	Y	Y	
SMT VIMA GAMIT	48	F	N	Y	7	Y	Y	
ANKUSH GAMIT	20	M	N	Y	8	Y	Y	
KIRAN GAMIT	27	M	N	Y	GRD	Y	Y	

3. Children from 6 years and up to 18 years

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

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 - 05, Class 8th – 08, Class 10th -10, Class 12th -12, ITI Diploma-13, Graduate-14, Post Graduate/Professional – 15 (write the highest level applicable)

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

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

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

6. Use of Mosquito Net

Children: Yes / No ✓ Adults: Yes / No ✓

7. Do members take Regular Physical Exercise

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

8. Consumption of Tobacco

	Smoking	Chewing
Adults	✓	
Children		✓

9. House & Homestead Data

Own House: Yes / No	No. of Rooms: 7
Type: Kutcha / Semi Pucca / Pucca	
Toilet: Private / Community / Open Defecation	
Drainage linked to House: Covered / Open / None	
Waste Collection System	Door Step / Common Point / No Collection System
Homestead Land: Yes / No	Kitchen Garden Yes / No
Compost Pit: Individual/ Group/ None	Biogas Plant: Individual/ Group/ None

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

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

11. Source of Lighting and Power

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

12. Landholding (Acres)

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

13. Principal Occupations in the Household

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

14. Migration Status

Does any member of the household migrate for Work: Yes / No. If Yes Entire Year / Seasonal

Does anyone below 18 years migrate for work: Y/N

15. Agriculture Inputs

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

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

Name	Unit	Quantity

17. Livestock Numbers

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

18. What games do Children Play

19. Do children play musical instrument (mention)

Schedule Filled By

Principal Respondent

Date of Survey

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: VANKAL

b. Block: MANGROL

c. District: SURAT

d. State: GUJARAT

e. Lok Sabha Constituency: BARDOLI

f. Number of Wards in the Gram Panchayat: 11

g. Number of Villages in the Gram Panchayat: 2

h. Names of Villages:

VANKAL, CHARNI

Demographic Information

Number of Households 1240 Total Population 6390 Male 3213 Female 3177

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

I. Access to Infrastructure / Facilities / Services

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
a.	ANM/ Health Sub Centre	Y	
b.	Nearest Primary Health Centre (PHC)	Y	
c.	Nearest Community Health Centre (CHC)	N	
d.	Nearest Post Office	Y	
e.	Nearest Bank Branch (Any)	BOB	
f.	Nearest Bank with CBS Facility	-	
g.	Nearest ATM	SBI, BOB	
h.	Nearest Primary School	Y	
i.	Nearest Middle School	Y	
j.	Nearest Secondary School	Y	
k.	Nearest Higher Secondary School / +2 College	Y	
l.	Nearest Graduate College	Y	
m	Nearest ITI / Polytechnic Centre	N	10 KM
n	Kisan Seva Kendra	Y	

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
o	Agriculture Credit Cooperative Society	N	
p	Nearest Agro Service Centre	N	
p	MSP based Government Procurement Centre		
q	Milk Cooperative /Collection Centre	Y	
r	Veterinary Care Centre	N	
s	Ayurveda Centre	Y	
t	E – Seva Kendra	N	
u	Bus Stop	Y	
v	Railway Station	N	5 K.M.
w	Library	N	
x	Common Service Centre		

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total _____ Public _____ Private 1

b. Mini Stadium : 0 N 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 1

Names of such villages: _____

c. Schools (Number)

Primary Private: ____ Primary Govt.: 1

Middle Private: ____ Middle Govt.: 1

Secondary Private: ____ Secondary Govt.: 1

Higher Secondary Private: ____ Higher Secondary Govt: 1

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 HQ(s)
a.	Cereal (Rice/ Wheat/ Millets)							
b.	Kerosene							
c.	Other (mention) Sugar/Pulses	Y						

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	VANKAL, ZHARNI	
b.	Hand Pump Coverage in Villages:	Covered ✓ Not Covered	VANKAL, ZHARNI	
c.	Coverage under Covered Drains:	Covered ✓ Not Covered	VANKAL, ZHARNI ZHARNI	
d.	Coverage under Open Drains:	Covered Not Covered	VANKAL ZHARNI	
e.	Villages with Household Electricity Connection (Numbers)	Connected ✓ Not Connected		

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	0	d.	Pasture / Grazing Land		g.	Check Dam	1
b.	Irrigated Land		e.	Forests/ Plantations	0	h.	Wells/Bore Wells	[illegible]
c.	Un-irrigated Land		f.	Other Common Land		i.	Lanks /Ponds	5

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

Saansad Aadarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

IX. Parameters relating to Households & Institutions

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

Name and Signature of Surveyor and Respondent

Chandan Surveyor	સરપંચ વંકલ જૂથ ગ્રામ પંચાયત તા. ચોર્યાસી, જી. સુરત. PRI Respondent (Preferably Gram Panchayat Chairperson)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	17/4/21 Date of Survey

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

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

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

I. Basic Information

a. Village: ZHARNI

b. Ward Number: 1

c. Gram Panchayat: VANKAL

d. Block:

e. District: SURAT

f. State: GUJARAT

g. Lok Sabha Constituency: BARDOLI

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

i. Names of Habitations / Hamlets:

Demographic Information

Number of Households 234 Total Population 757 Male 370 Female 387

SC HHs ____ ST HHs ____ OBC HHs ____ Other HHs ____

II. Access to Infrastructure/Amenities etc.

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
a.	Nearest Primary School	Y	
b.	Nearest Middle School	N	1 K.M.
c.	Nearest Secondary School	N	1 K.M.
d.	Kisan Seva Kendra	N	
e.	Milk Cooperative /Collection Centre	Y	1 K.M.
g.	Health Sub Centre	Y	1 K.M.
h.	Bank	N	1 K.M.
i.	ATM	N	1 K.M.
j.	Bus Stop	N	1 K.M.
k.	Railway Station	N	

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

1

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

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

ii. Road Connectivity
a. Habitations connected by All-weather Roads ✓ (1-All 2-None 3-Some)
If 3 mention the name of the habitations where not available: _____

iii. Drinking Water Facilities
a.Piped Water Supply Coverage to Habitations: _____ (1-All 2-None 3-Some)
If 3 mention the name of the habitations not covered: _____

b.Hand Pump Coverage in Habitations: _____ (1-All 2-None 3-Some)
If 3 mention the name of the habitations not covered: _____

iv. Coverage of Habitations under Waste Management System
a. Coverage under Covered Drains: _____ (1-All 2-None 3-Some)
If 3 mention the name of the habitations not covered: _____

b. Coverage under Open Drains: _____ (1-All 2-None 3-Some)
If 3 mention the name of the habitations not covered: _____

c. Coverage under Doorstep Waste Collection: (1-All 2-None 3-Some)
If 3 mention the name of the habitations not covered: _____

v. Coverage of Habitations under Electrification
a. Coverage under Household Connections: (1-All ✓ 2-None 3-Some)
If 3 mention the name of the habitations not covered: _____

b.Coverage under Street Lighting: All(1-All 2-None 3-Some)
If 3 mention the name of the habitations not covered: _____

vi. Sports Facilities in the Village
a.Number of Play Grounds in the Village (minimum size 200 square meters): _____
b.Mini Stadium : N 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

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

viii. Land Category		Area in Acres		Land Category	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land		d.	Pasture / Grazing Land		g.	Check Dam	1
b.	Irrigated Land		e.	Forests/ Plnatations		h.	Wells/Bore Wells	1+1
c.	Un-irrigated Land		f.	Other Common Land		i	Tanks /Ponds	1

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

Name and Signature of Surveyor and Respondent'

Chandan Surveyor	સરપંચ વંકલ ગ્રુપ ગ્રામ પંચાયત તા. ..., જી. સુરત.	વંકલ ગ્રુપ ગ્રામ પંચાયત તા. માંગરોળ, જી. સુરત.	19/2/21
	PRI Respondent (Preferably a ward member from a ward that is fully or partially covered under the Village)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey

3

Chapter 20.TDO-DDO-Collector email sending Soft copy attachment in the report

chandan Pradhan <chandanpradhan268@gmail.com>
04:46 PM

To: ddo-sur@gujarat.gov.in

Respected Sir/Madam

We are the students of Dr. S & S.S GHANDHY GOVERNMENT ENGINEERING COLLEGE, surat affiliated to GUJARAT TECHNOLOGICAL UNIVERSITY – GTU. GTU has been assigned to Vishwakarma yogna in which students survey various village allovated to them and design various amenities to deliver them, making the ideal for better life as per gap analysis survey.

As a part of Vishwakarma yogna's guidelines, we have been asked to inform all the respected officers about our project in which we will shortly notify about VANKAL village profile of issues for development

List of students are as follow

STUDENT NAME	BRANCH NAME	ENROLLMENT NO
SUMIT ANGHAN N	CIVIL	170230106003
PRADHAN CHANDAN R	CIVIL	170230106045
RAJPUT SHIVENDRA S	ELECTRICAL	160230109044

We hope for your generous support.

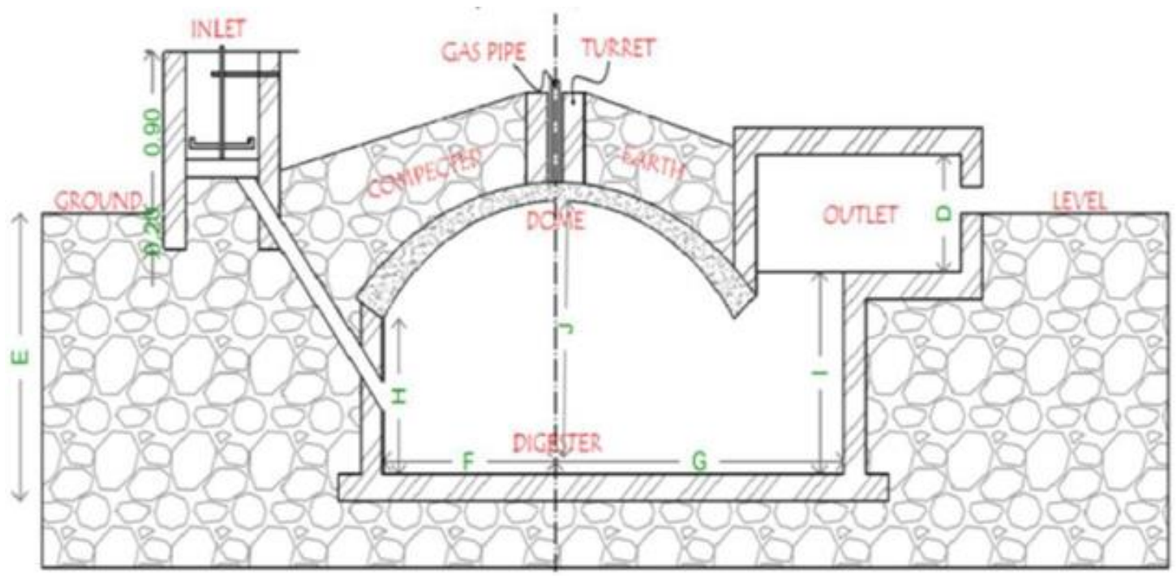
With warm regards our designs are as follow

Sr. No.	Design Name	Period	Amount Expenditure
Civil engineering based design			
1	Vocational-training center	1-2yr	1,10,943.96
2	Septic tank	3-5 months	1,62,954.00
3	Common-Service Centres	1-2yr	98577.18
4	Public library	1-2yr	7,72,500.00
5	Plastic roads	1-2yr	384387/- per Km
6	Rainwater harvesting	3-5 months	6775/ltr storage
7	Biogas plant	3-5 months	14,000/-
8	Bus stand	1-2yr	73000
9	Public toilet	1-2yr	199590
10	Soak pit	3-5 months	35,341.50
11	Skill Development Centre	1-2yr	19,60,000.00
12	Village Gate	1-2yr	2,90,000
Electrical engineering based design			
1	Solar panels	3-5 months	83000Rs
2	CCTV Camera	3-5 months	49280
3	Automatic-solar street light	1-2yr	349/ light
4	SOLAR STREET LIGHT	1-2yr	1,01,320
5	tube well	3-5 months	3743
6	Drip irrigation	1-2yr	84114.96

Chapter 21. Comprehensive report for the entire village

Comprehensive report preparation contains the design of all proposed projects. It shows the plan, elevation and section of the structure. The details of the sheet is also mentioned in the design. All the instruction about the drawing is written along the details. The estimation of the projects are based on the designs below. The format of design as per Vishwakarma yogna project. These designs will be useful to get the plan for construction and renovations of the mentioned structures

This report contains the detailed survey of Ideal village Ena, Smart village Baben and the allocated village vankal. According to this detailed survey we have come to the conclusion that our allocated villager equires some structures to take step forward towards developing to ideal or smart village. For these reasons here we have given the entire report for the development of the village. In this report we have given the design with estimation of construction of these structures. Below is given the designs off all 18 proposed structures with all necessary details in A3 sheets. It shows the plan, elevation, section and the 3D view of constructed structure. The details of the sheets are also mentioned in the designs. All the instruction about drawing is written along the details. The estimations of the projects are based on the design below. The format for the sheets are as per Vishwakarma Yojana Project. These designs will be helpful to get the plan for construction and renovations of the mentioned structures. We have also given the case studies of various innovative designs with the examples, which will be very helpful to enhance the the quality of structures and to make the village developed if implemented in near future to the village. We have given ideas such as Rain-water harvesting, Waste water sewage system, Earthquake resistant designs of building, various cost-cutting and useful materials for construction, etc. Doing this work gave us the immense pleasure as we are making our contribution in making this country prosperous. After completing the work mentioned in this report, there will be a very good chance for the vankal village to be considered as Smart village and Ideal village also. We have tried our best to explore the every possible difficulties of the villagers and conclude the solution of these difficulties in this report. It was a great experience for us and it will be for the villagers, once the structures and facilities will be provided. It is a very good and utilizing scheme of the government to develop the rural areas of the country. It will obviously be the part of new India in which every village of the country will be developed and up to date with all the latest technologies of the world. It is truly a step for ward for making the progress of the country and reducing the urban pressure in the villages and migration of the people towards the cities. All the design we have proposed in Chapter 8 and Chapter 13 are given below in the A3 sheets, along with the 3D elevation of the structure.



NOTES:

- **ALL DIMENSIONS ARE IN METERS EXCEPT STATED OTHERWISE.**
- **DO NOT SCALE THE DRAWINGS ONLY WRITTENDIMENSIONS SHALL BE FOLLOWED.**
- **UNLESS SPECIFIED OTHERWISE ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE AS PER IS: 456-200**
- **ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PORTION OF 1:6.**
- **ALL CONCRETE SHOULD BE MACHINE MIXED AND MACHINE VIBRATED.**
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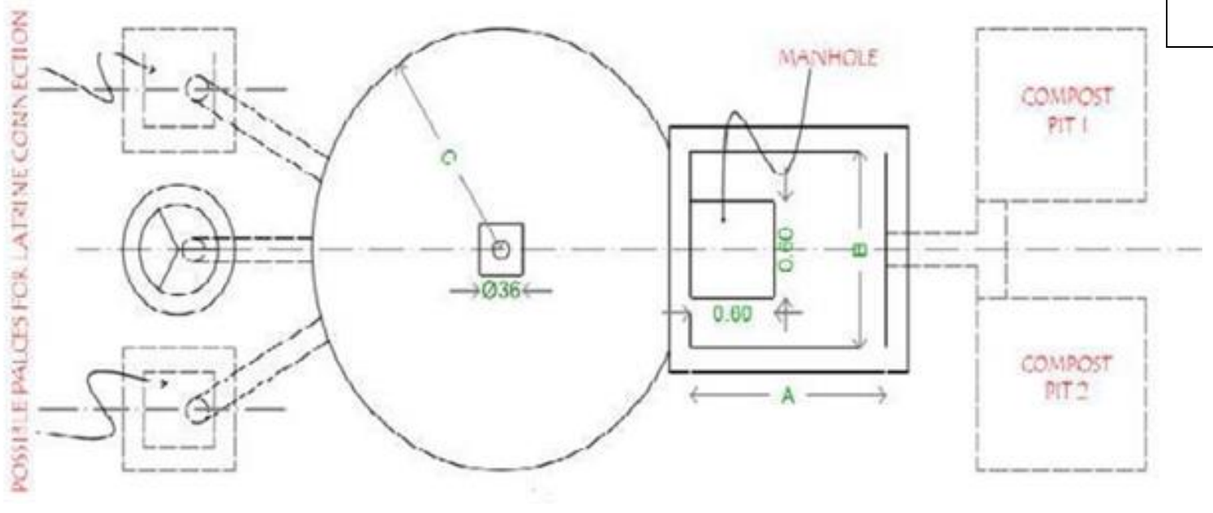
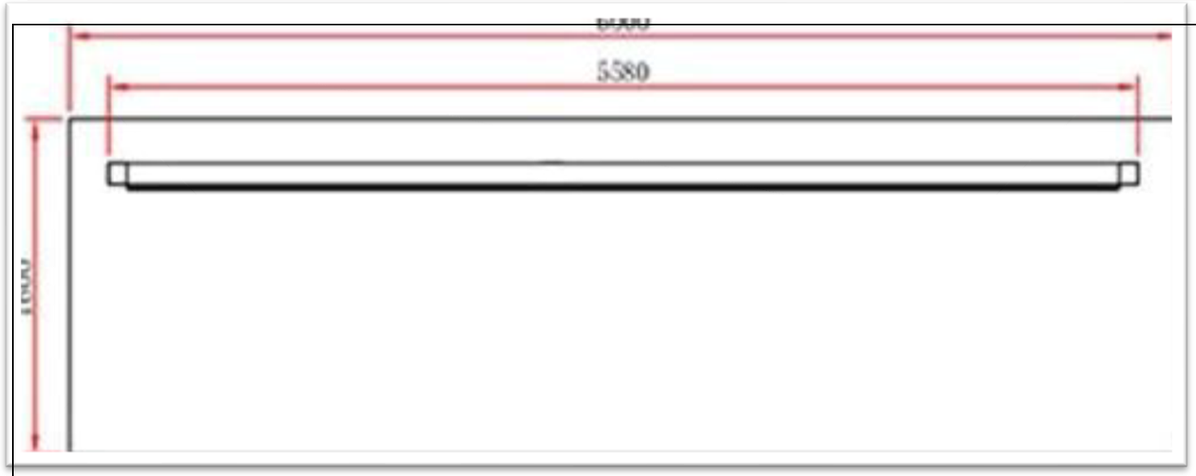


DESIGN NAME:	**BIO GAS PLANT**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 1**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	



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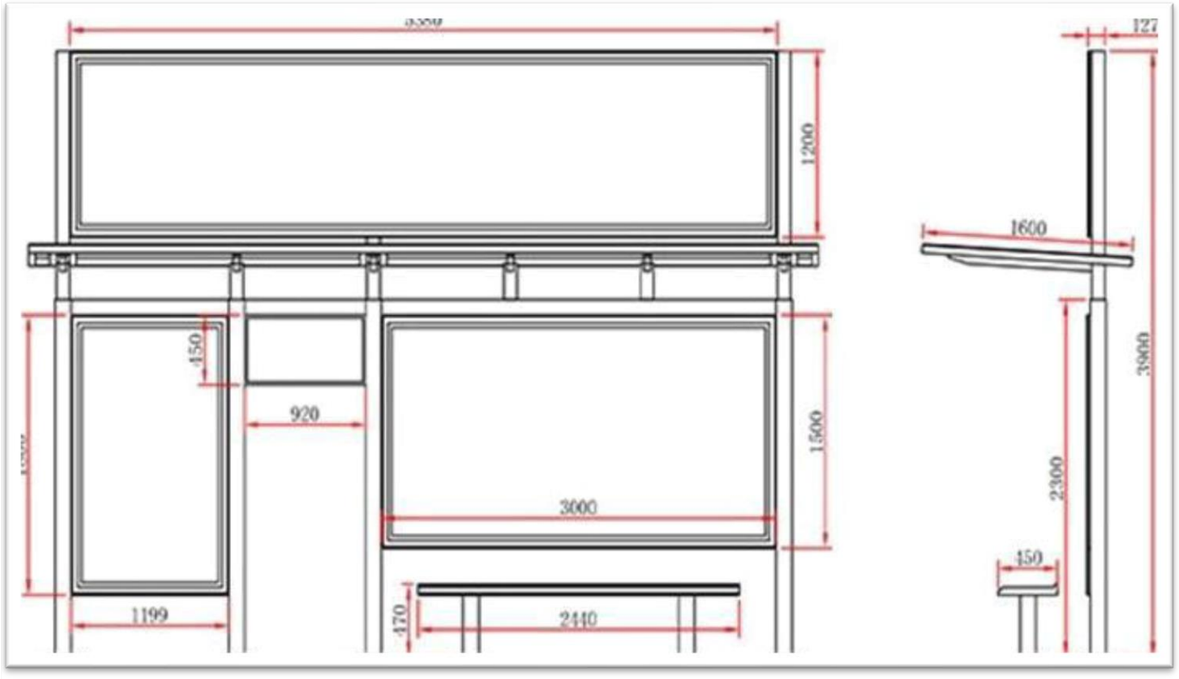
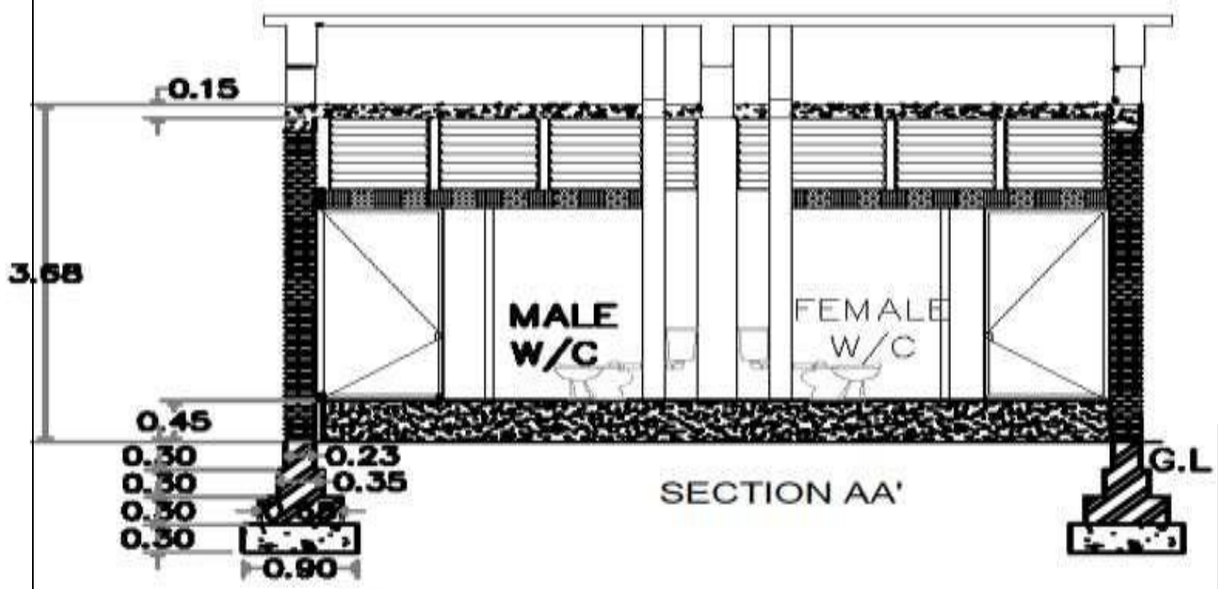
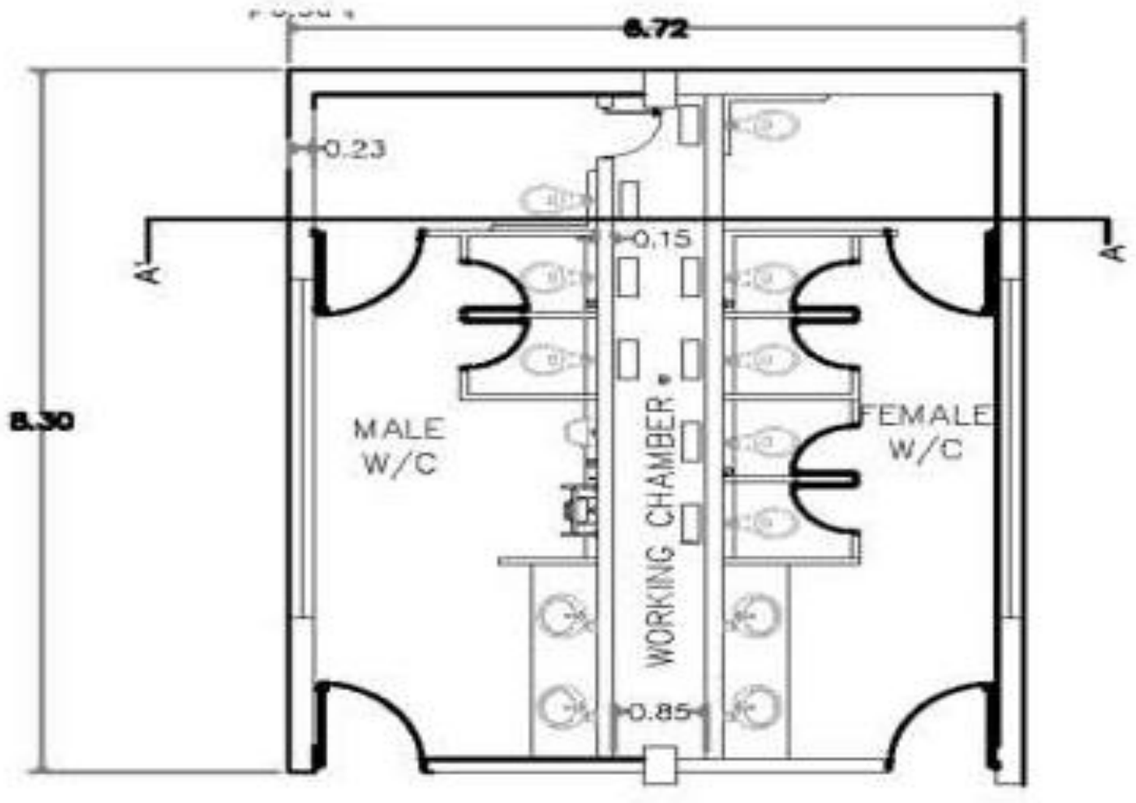


DESIGN NAME:	**BUS STATION**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 2**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	



SECTION AA'



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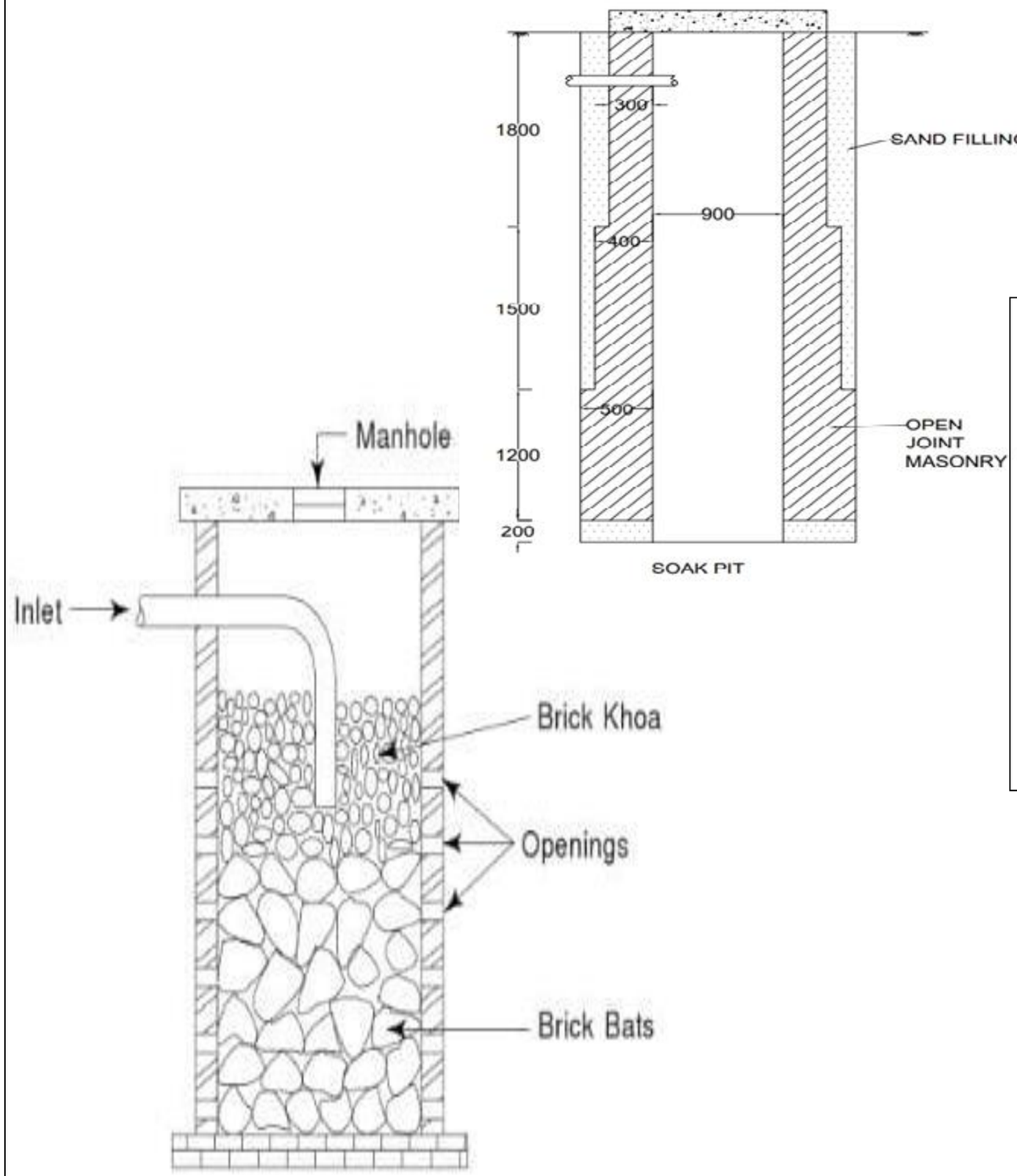
DESIGN NAME:	**PUBLIC TOILET**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 3**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	



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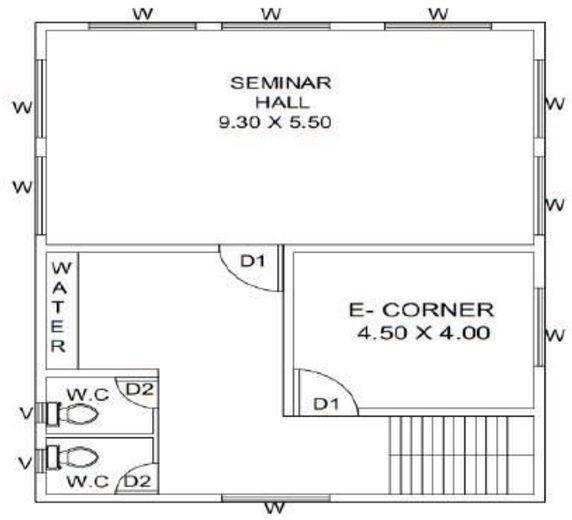
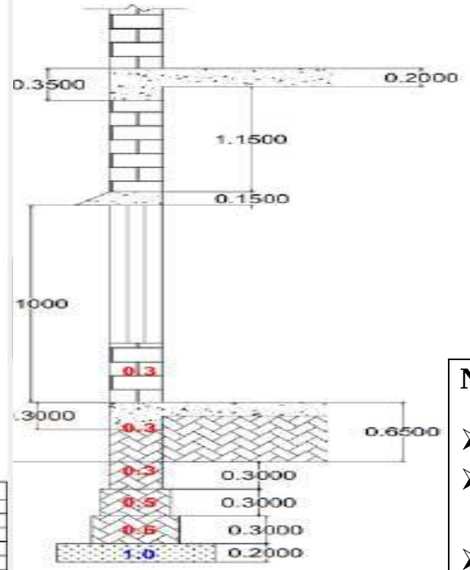
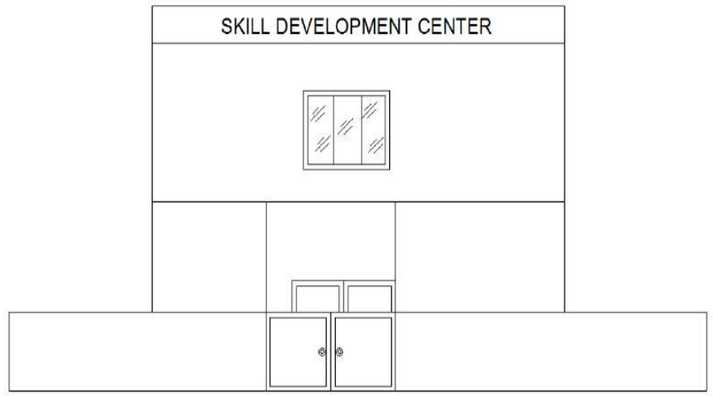
DESIGN NAME:	**SOAK PIT**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 4**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	



SCHEDULE		
DESCRIPTION	DENOTE	SIZE(m)
DOOR	D1	1.20 x 2.10
DOOR	D2	0.80 x 2.10
DOOR	D3	1.50 x 1.50
WINDOW	W	2.00 x 1.50
VENTILATION	V	0.60 x 0.60
W.C	W.C	1.50 x 2.00





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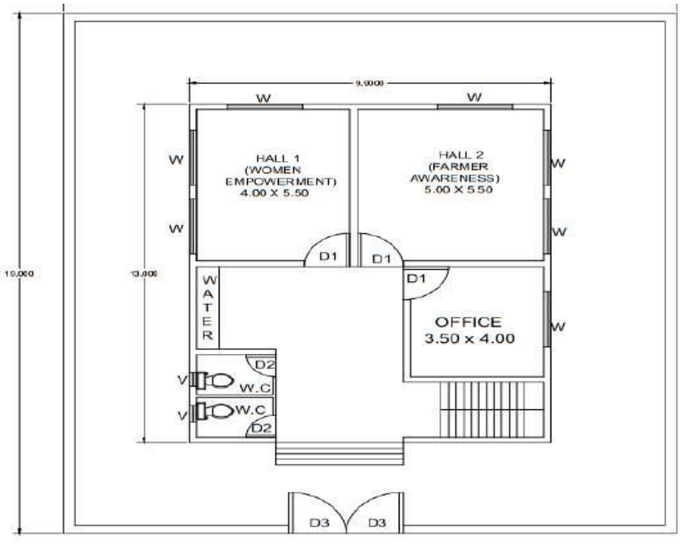
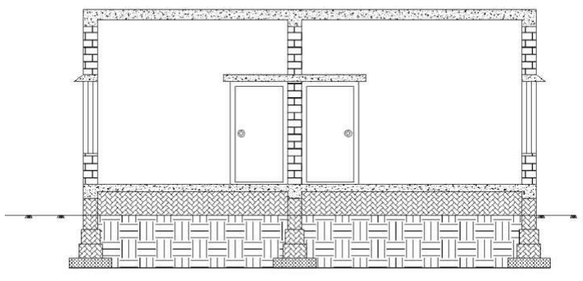
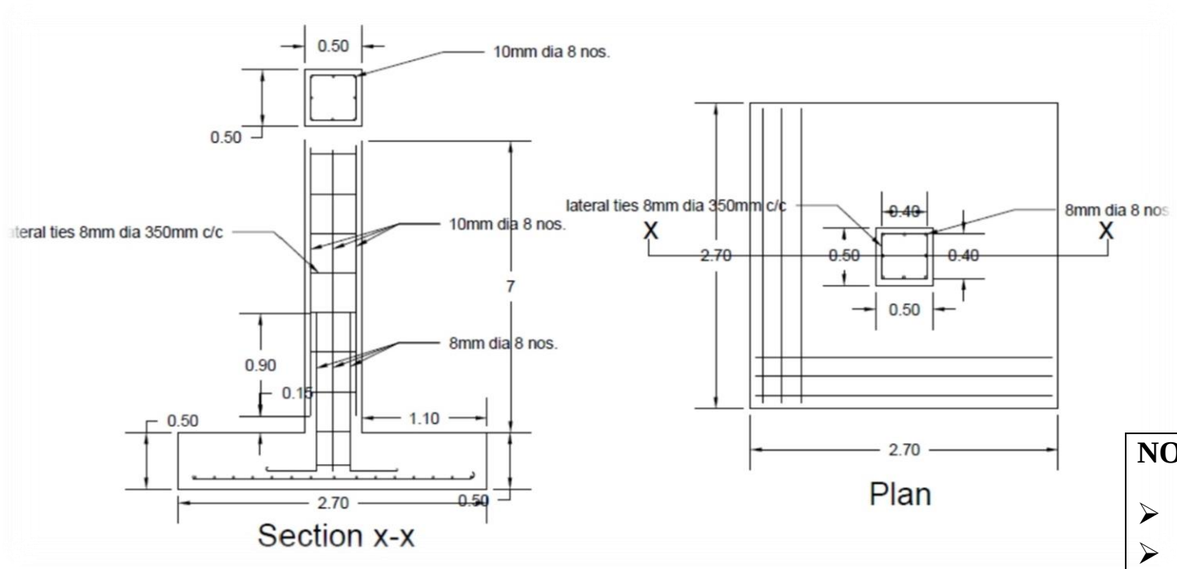
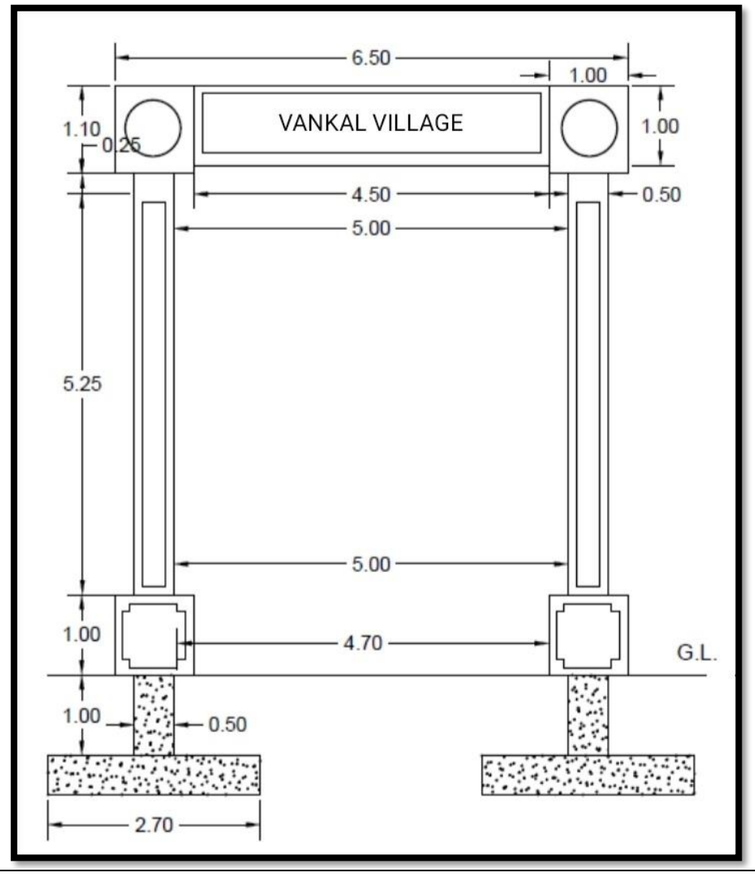




DESIGN NAME:	**SKILL DEVELOPMENT CENTER**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 5**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	





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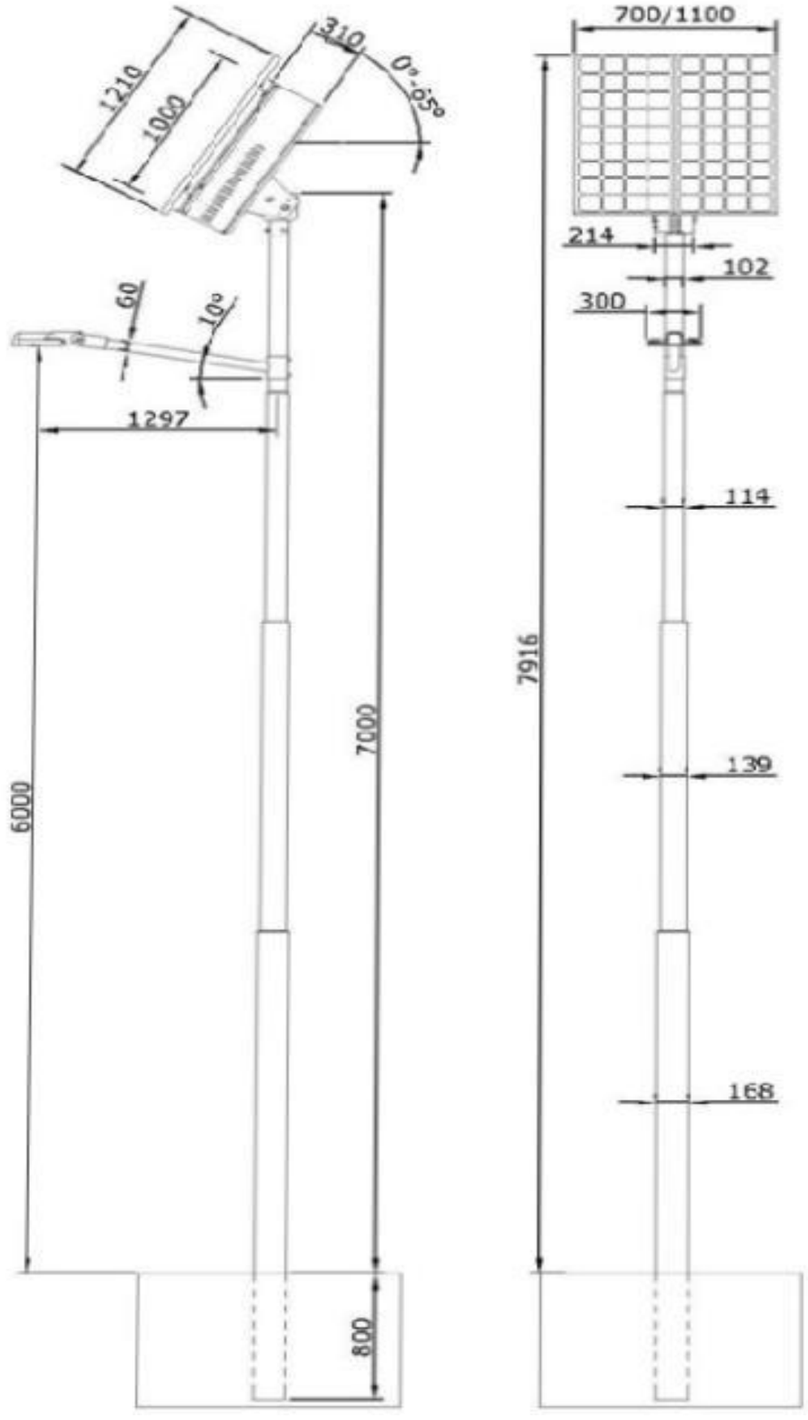
DESIGN NAME:	**VILLAGE GATE**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 6**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	



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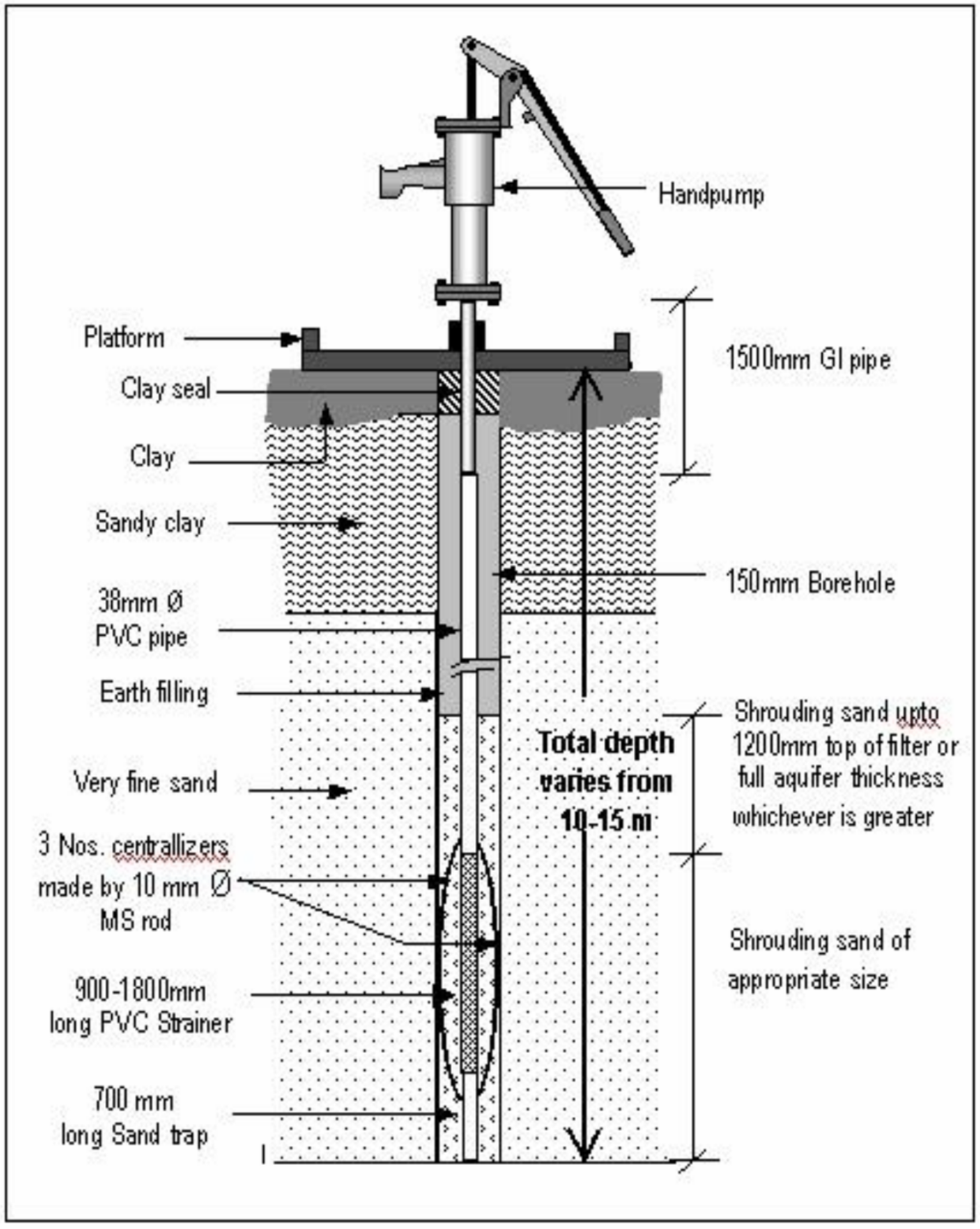
DESIGN NAME:	**SOLAR STREET LIGHT**	
PREPARED BY	**SHIVENDRA RAJPUT**	**SHEET NO: 7**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	



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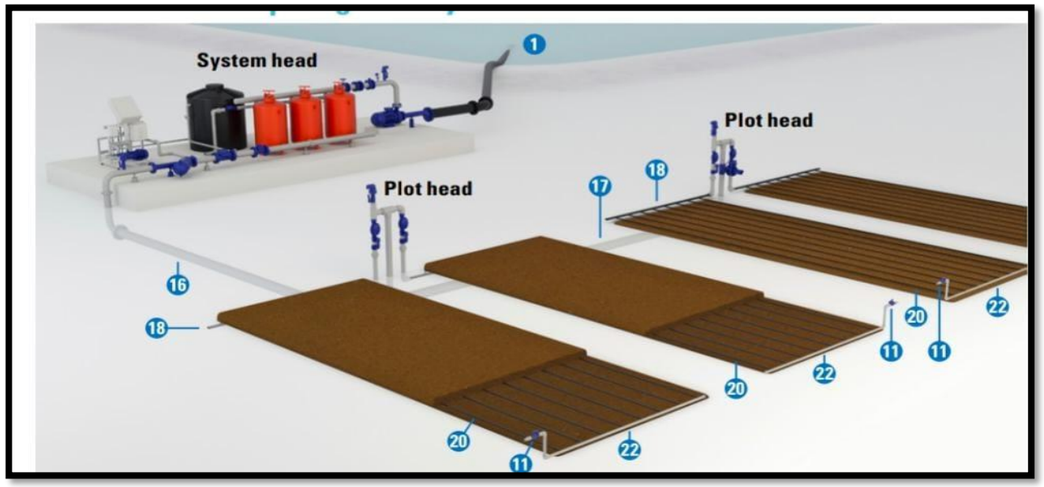
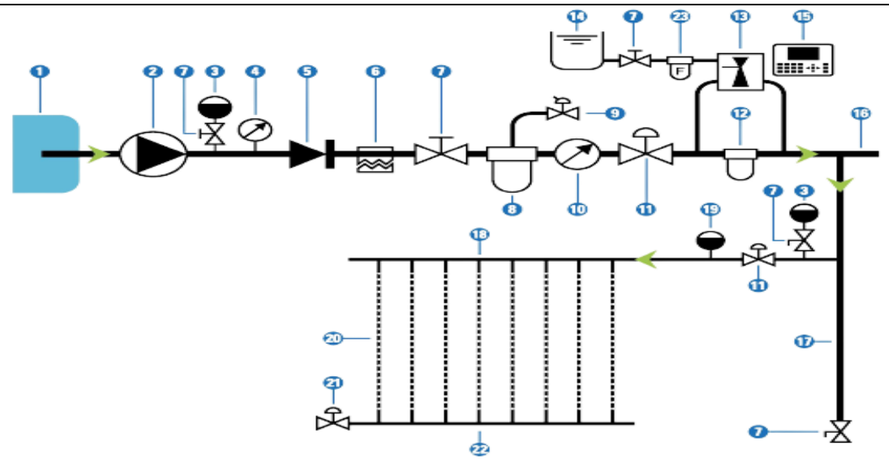
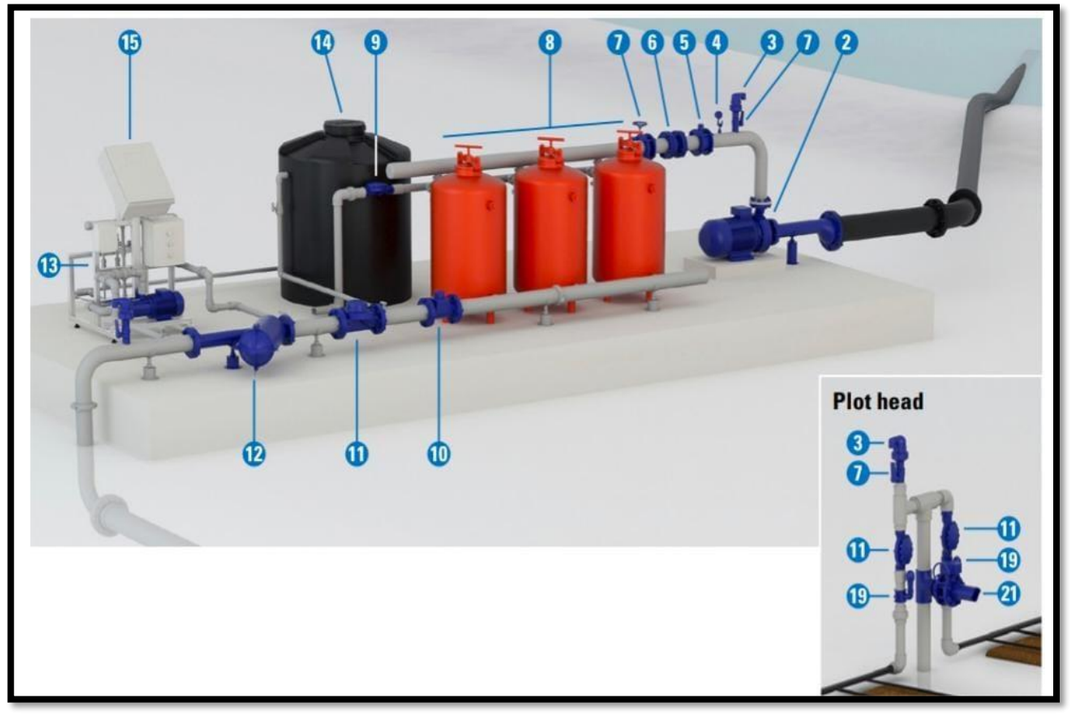
DESIGN NAME:	**TUBE WELL**	
PREPARED BY	**SHIVENDRA RAJPUT**	**SHEET NO: 8**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	







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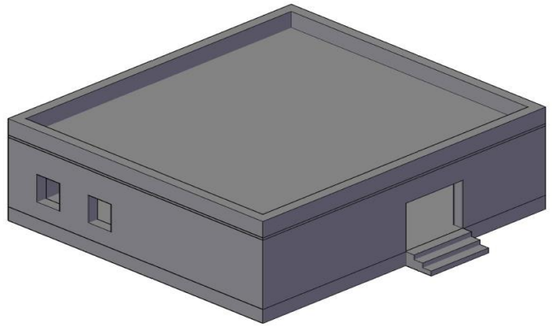
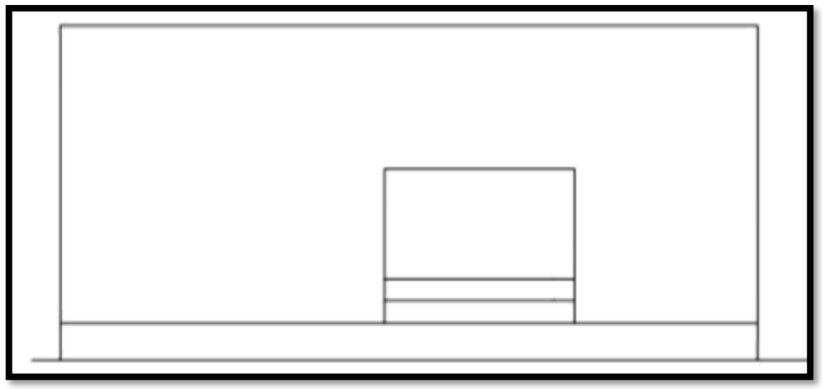
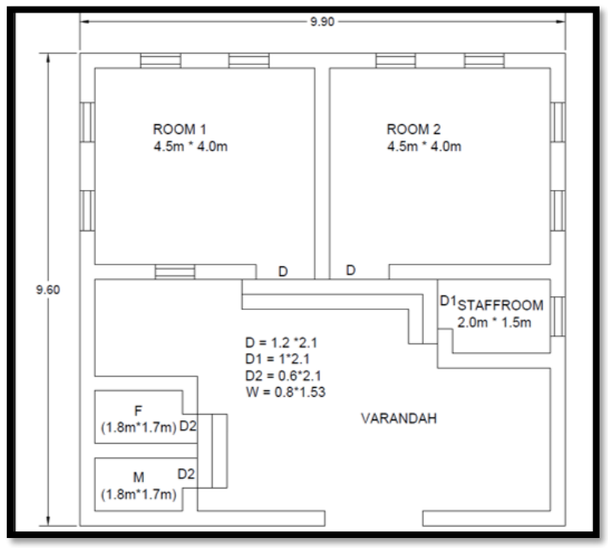
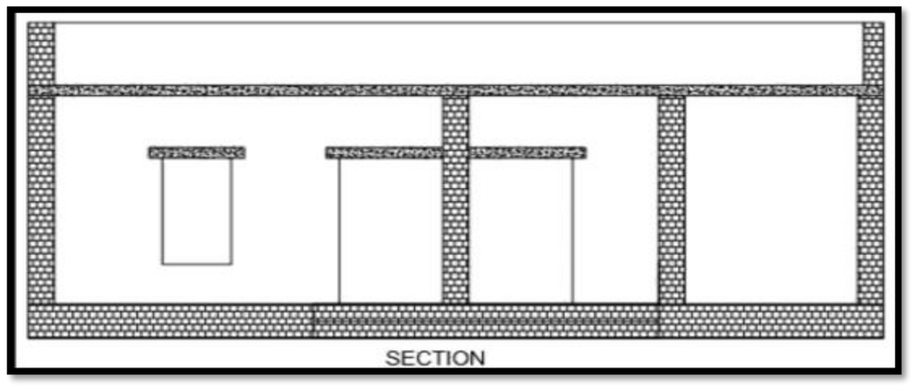
DESIGN NAME:	**DRIP IRRIGATION**	
PREPARED BY	**SHIVENDRA RAJPUT**	**SHEET NO: 9**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	









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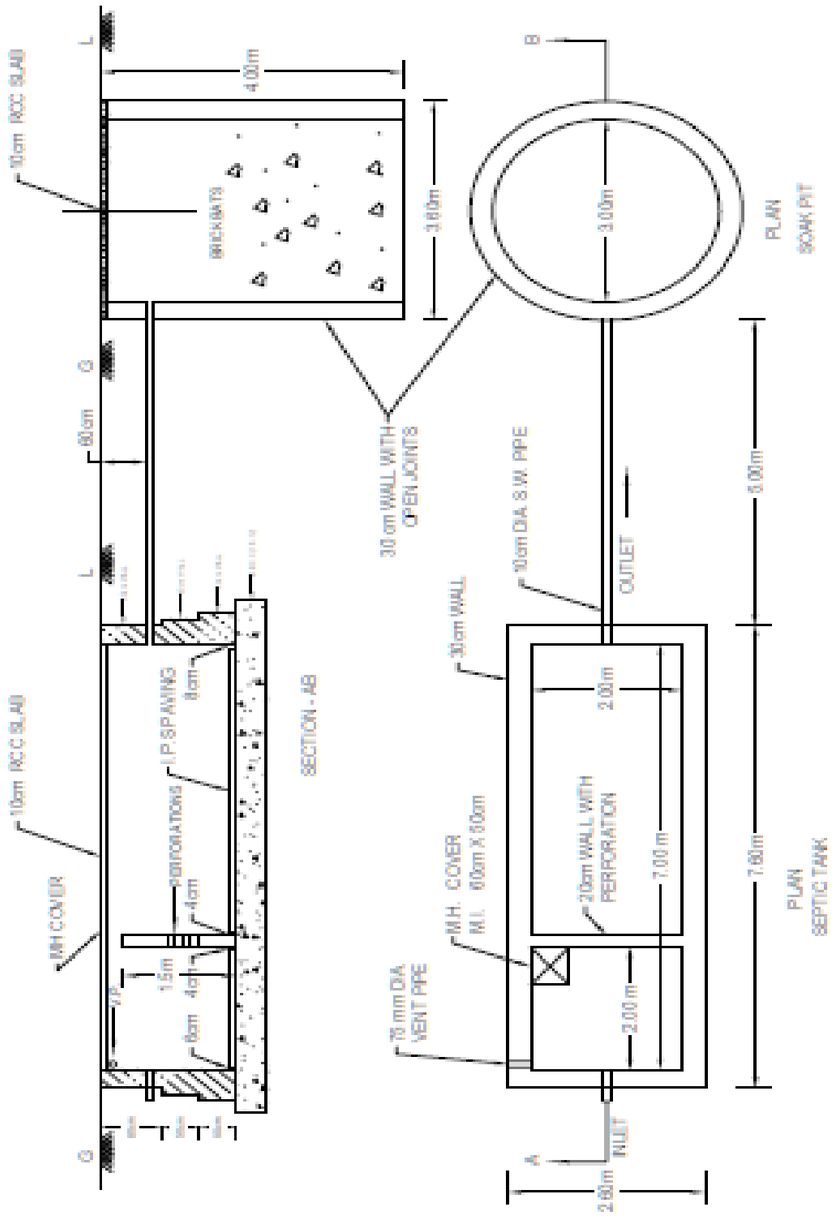
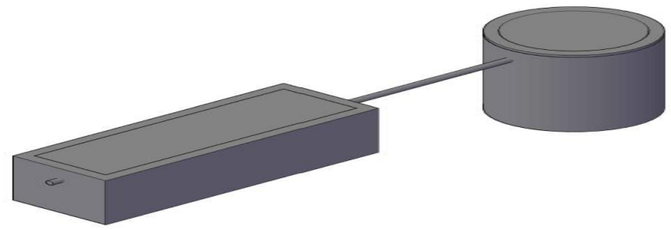
DESIGN NAME:	**VOCATIONAL TRAINING CENTRE**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 10**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	





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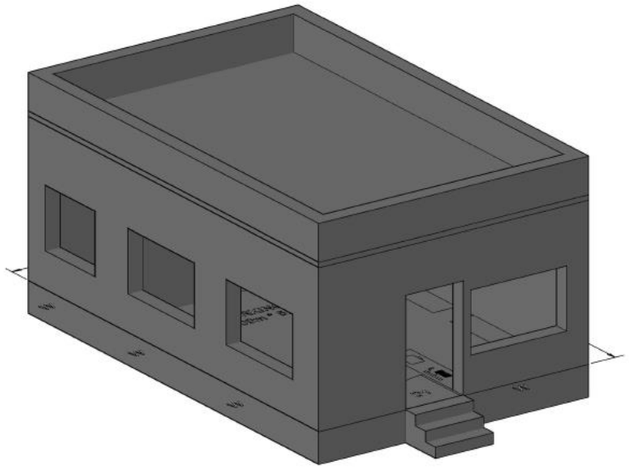
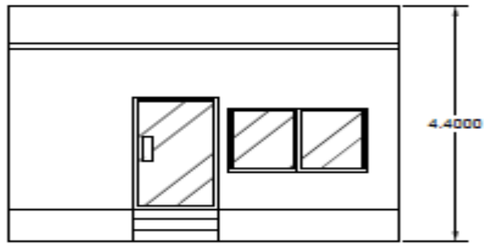
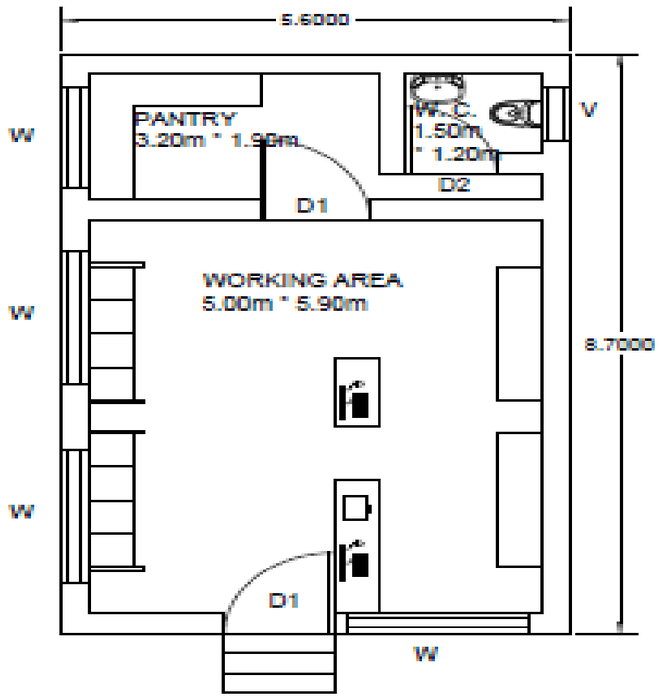
DESIGN NAME:	**SEPTIC TANK**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 11**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	





ELEVATION



PLAN

Schedule of doors and windows		
Type	Number	Dimensions
Door 1	1	1 x 2.1
Door 2	1	0.9 x 2.1
Door 3	4	1 x 2.1
Window	3	1 x 1.2
Window 1	1	1.8 x 1.2
Ventilator	1	0.6 x 0.6

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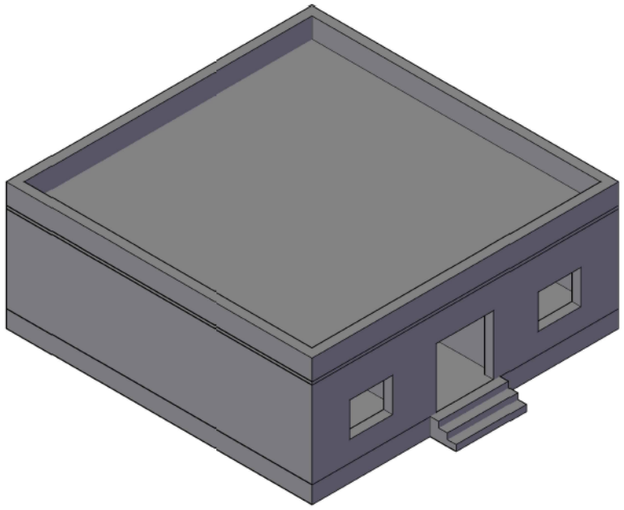
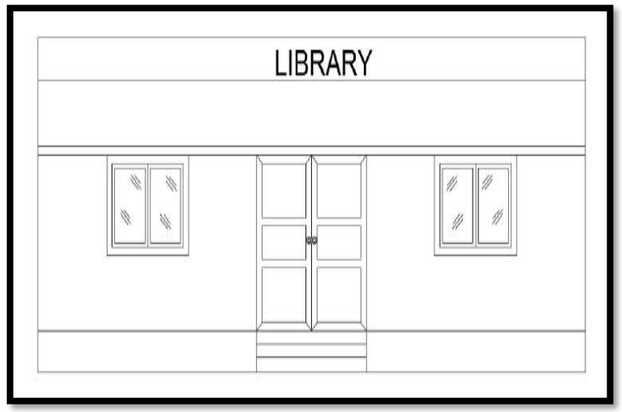
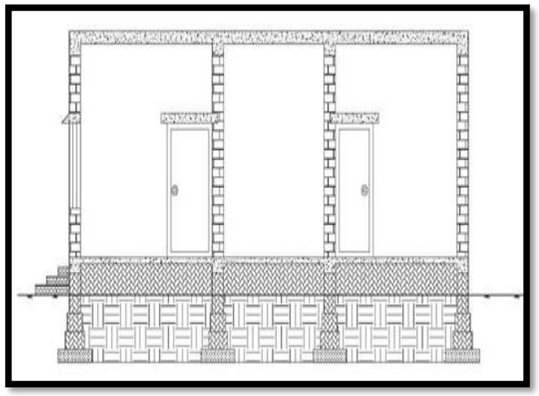
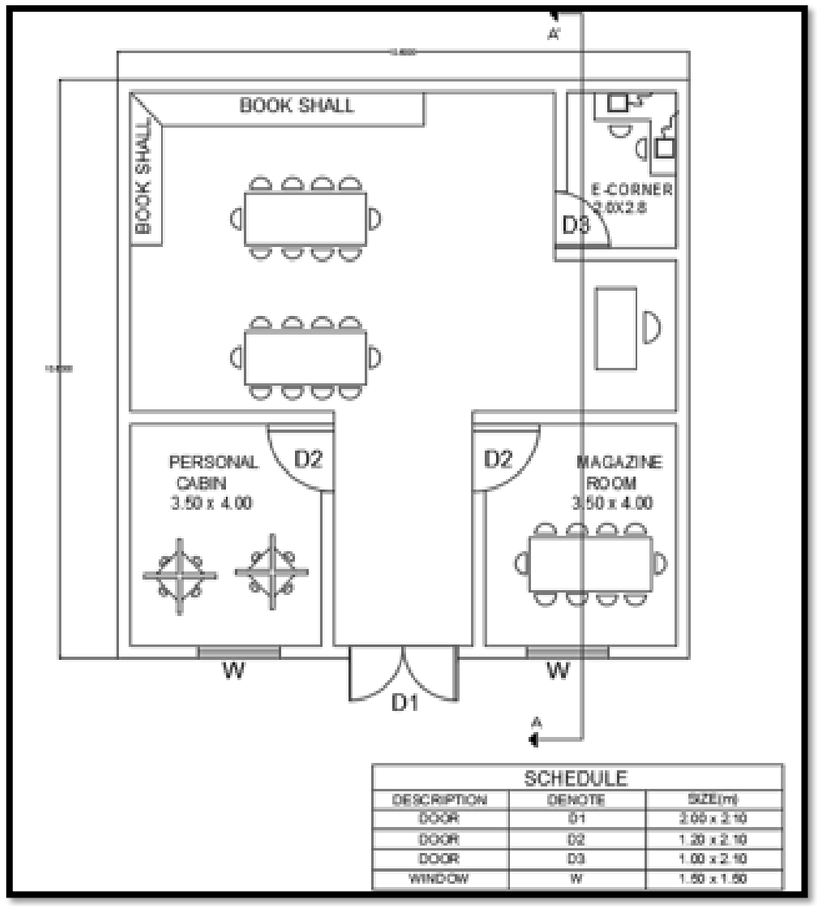
DESIGN NAME:	**COMMON SERVICE CENTRE**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 12**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	









NOTES:

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- **DO NOT SCALE THE DRAWINGS ONLY WRITTENDIMENSIONS SHALL BE FOLLOWED.**
- **UNLESS SPECIFIED OTHERWISE ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE AS PER IS: 456-200**
- **ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PORTION OF 1:6.**
- **ALL CONCRETE SHOULD BE MACHINE MIXED AND MACHINE VIBRATED.**
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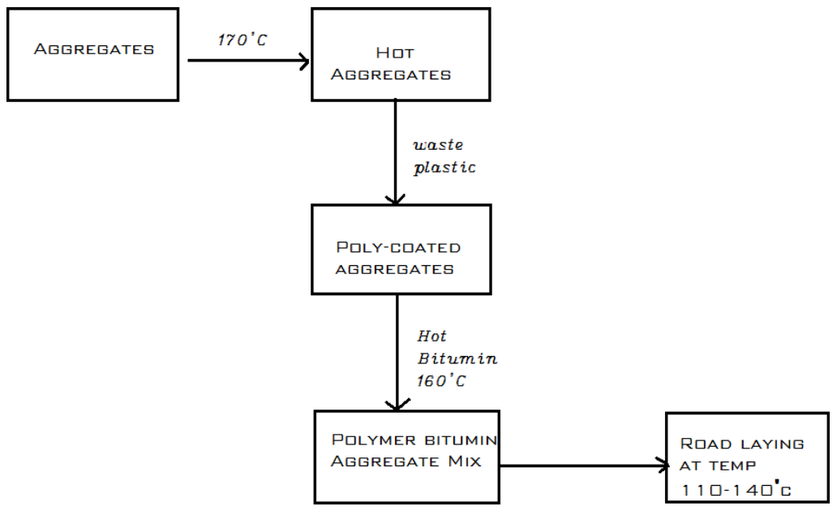
DESIGN NAME:	**LIBRARY**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 13**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	



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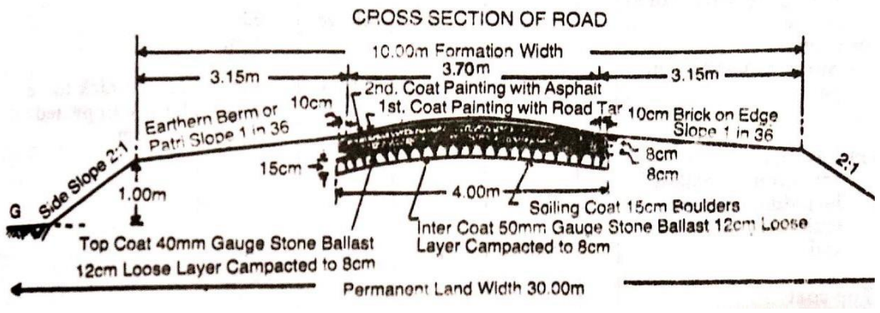
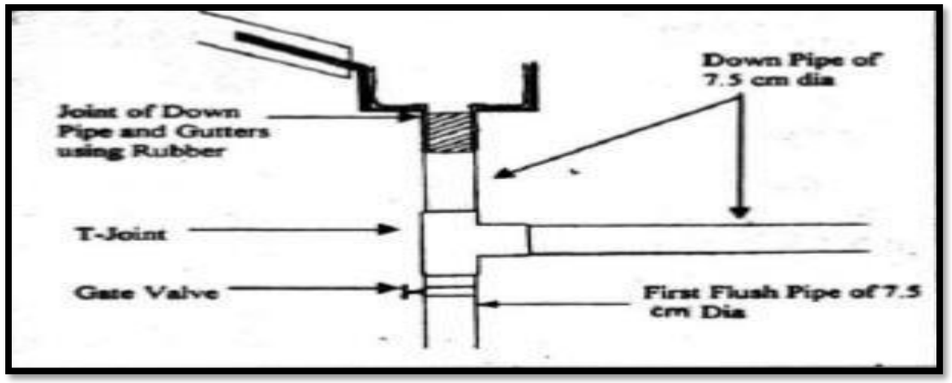


DESIGN NAME:	**PLASTIC ROAD**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 14**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	



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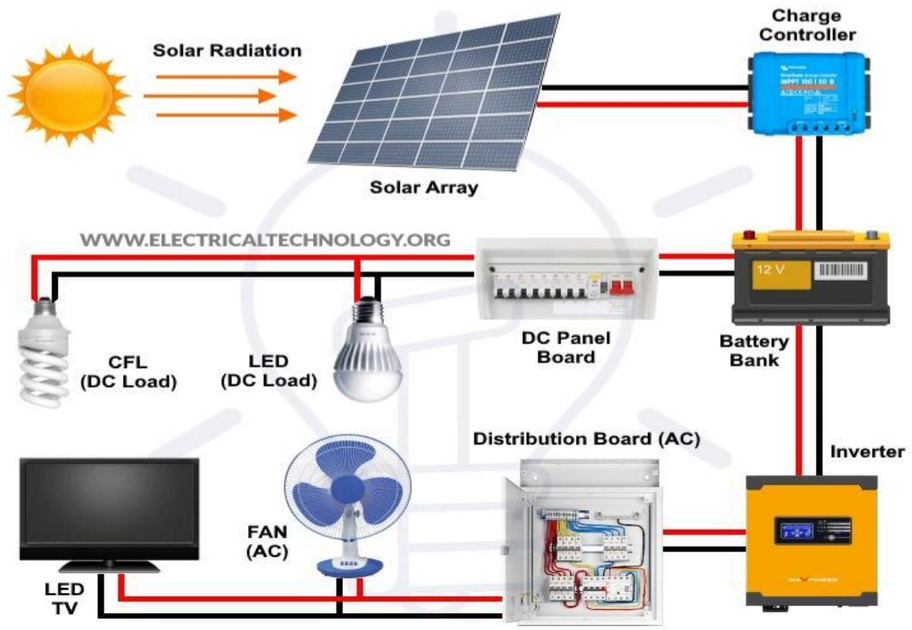
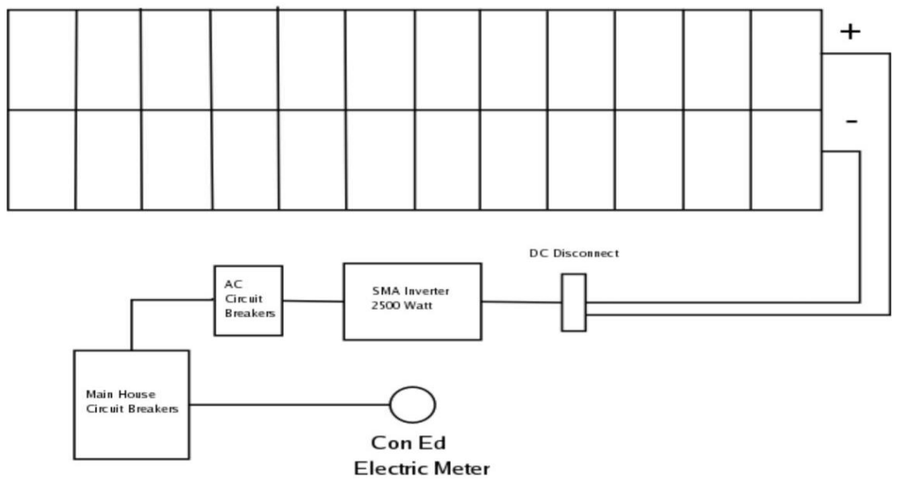
DESIGN NAME:	**RAIN WATER HARVESTING:**	
PREPARED BY	**PRADHAN CHANDAN ANGHAN SUMIT N**	**SHEET NO: 15**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	





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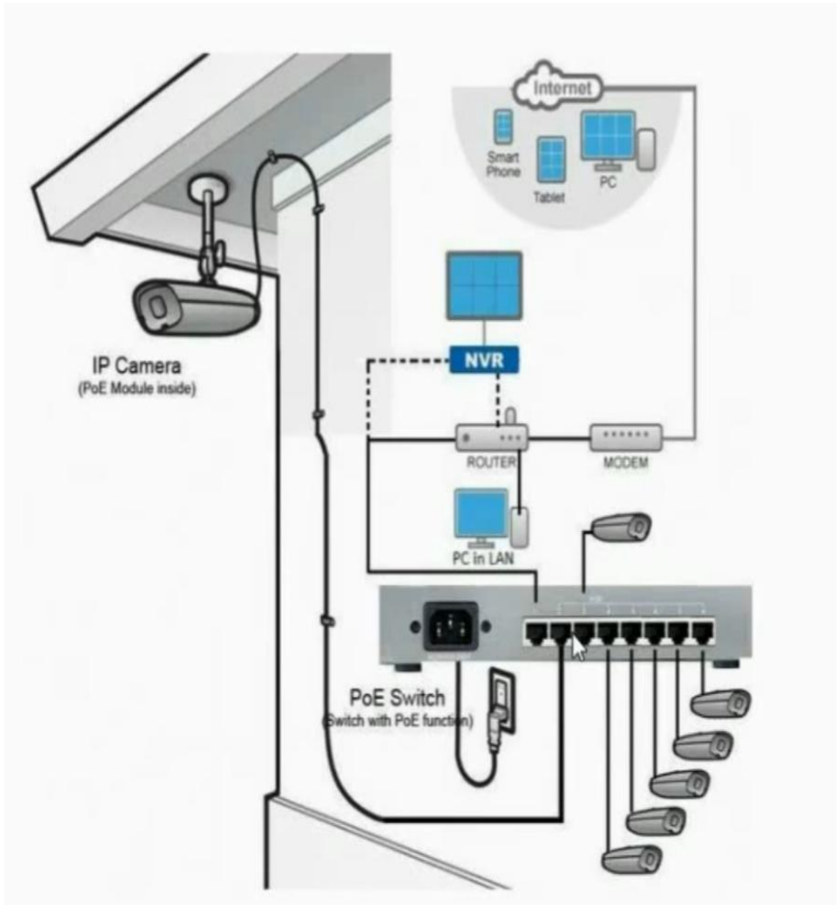
DESIGN NAME:	**SOLAR PANEL**	
PREPARED BY	**SHIVENDRA RAJPUT**	**SHEET NO: 16**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	



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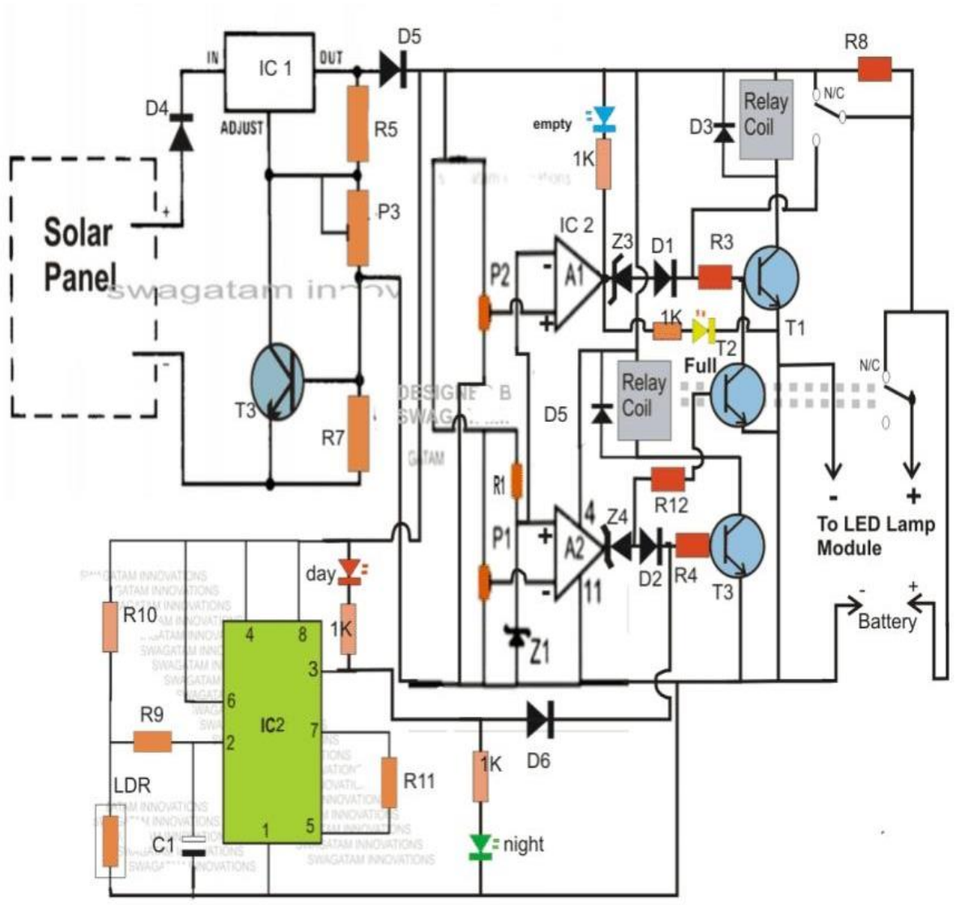
DESIGN NAME:	**CCTV SYSTEM**	
PREPARED BY	**SHIVENDRA RAJPUT**	**SHEET NO: 17**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	



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DESIGN NAME:	**AUTOMATIC STREET LIGHT**	
PREPARED BY	**SHIVENDRA RAJPUT**	**SHEET NO: 18**
PROJECT NAME	**VISHWAKARMA YOJNA PHASE-VIII VANKAL, SURAT.**	
INSTITUTE NAME	**DR. S. & S. S. GHANDHY GOVERNMENT ENGINEERING COLLEGE**	
UNIVERSITY NAME	**GUJARAT TECHNOLOGICAL UNIVERSITY**	