DETAIL PROJECT REPORT

VISHWAKARMA YOJNA: VIII
AN APPROACH TOWARDS RURBANISATION
Narthan Village

Surat District

PREPARED BY

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Nodal Officers
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Prof. Hetal H. Jivanramjiwala

YEAR: 2020-21

GUJARAT TECHNOLOGICAL UNIVERSITY
Chandkheda, Ahmedabad – 382424 Gujarat

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CERTIFICATE

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

Detail Project Report for ,

VILLAGE: NARTHAN

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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College Name:	**C.K.Pithawala College of Engineering & Technology**
College Stamp:	

ABSTRACT

The Government of Gujarat has launched Vishwakarma Yojana(scheme) for the development of villages by identifying the requirements of villages. Under this scheme, the villages are surveyed and this project was identified and selected for implementation. Rurbanisation is to bring peace of mind to the villagers by providing them the basic amenities required and still keeping the village soul intact. This project gives one new idea for the development of rural villages. Also gives the procedure of how they fulfill the requirement of the villages. Now a day people are moving from rural to urban area due to lack of basic amenities. With the help of this yojana, the awareness about the entity which is not available in rural areas can be brought. So, this helps to provide a better solution for the available problems in rural area like drinking water, drainage facility, road network, etc.

Narthan is a village placed in Olpad block of Surat district in Gujarat. According to Census 2011 information the location code or village code of Narthan village is 523774. sPositioned in rural region of Surat district of Gujarat, it is one of the villages among 108 villages of Olpad Block of Surat district. As per the administration records, It is situated 15 km away from sub-district headquarter Olpad and 20 km away from district headquarter Surat. Narthan village has a gram panchayat. The village is spread on a total geographical area of 577.59 hectares. And its population is 1237 which include 634 males and 603 females.

Narthan village has all the main basic amenities required for village people and gram panchayat is also involving actively for the day-to-day improvement of the village. It has the education facility from 1^{st} to 8^{th} standards. The condition of the roads in the village is very good. As per the discussion with the sarpanch, it is observed that deficiency of the solid waste disposal sites in this village is a major problem for the village. The village doesn't have health centre availability. Drainage facility provided 80% area of village remaining 20% faced difficulty due to lack of drainage system. Internal road and housing conditions are good in village.

The report highlights to propose designs for the development of the physical infrastructure, social infrastructure, socio-cultural infrastructure and green village approach.

Key words: Vishwakarma Yojana, Infrastructure, Survey and Design

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ABBREVIATIONS

SHORT NAME / SYMBOL	FULL NAME
Wi-Fi	Wireless fidelity
DGVCL	Dakshin Gujrat vij company
GEB	Gujrat electricity board
ppm	Parts per million
km	Kilometer
FDI	Foreign direct investment
UN	United nations
AD	Anaerobic digester
CSC	Concentrate solar cooker System
CSP	Concentrate solar power
SHS	Solar home system
PV	Photovoltaic
RPR	Residue to product ratio
WBM	Water bound macadam

CHAPTER 1 - IDEAL VILLAGE VISIT FROM DISTRICT OF GUJARAT STATE (CIVIL & ELECTRICAL CONCEPT)

1.1 Background & Study Area Location

Background of the Baben village

"Bench mark for the development of other villages in India: Baben village".
In the history this Baben village had received swarnim gram award in the year 2012 and a cash prize of Rs 45000000/-. It had also received many such awards from the year 2007-2016. Baben village got the best gram panchayat of the year award in 2011 from the state government.The tax collection of Baben village is raised higher compare to the other villages by villagers through miscellaneous schemes and government fund. According to Baben Gram Panchayat Sarpanch Bhavesh Patel they were taking contribution from real estate developers who come to develop land and houses in the village and use that money for development of the basic amenities for the residents of the village.
The village Panchayat collected Rs 3 crore in the past five years from the real estate developers and used that money on roads, street lights, a lake, public toilets, drainage and water system for the 15,000 people of Baben village. The village also has a degree and diploma engineering college, a school and number of restaurants. A developer was charged Rs 2,000 per plot. The buyer of the plot was too charged the same amount by the Panchayat.The number of occupied people of Baben town is 6628 yet 982 are non-working. And out of 6628 occupied individual 131 individuals are fully dependent on agriculture.

Study area Location of Baben village

Baben is a village panchayat located in the Surat district of Gujarat state, India. The latitude 21.1378786 and longitude 73.0966019 are the geo coordinate of this village. Gandhinagar is the state capital for this village. It is located around 245.2 kilometers away from Baben. Baben village which is located about 34 km from Surat city typifies development. Here villagers enjoy all the facilities that one living in the city enjoys.

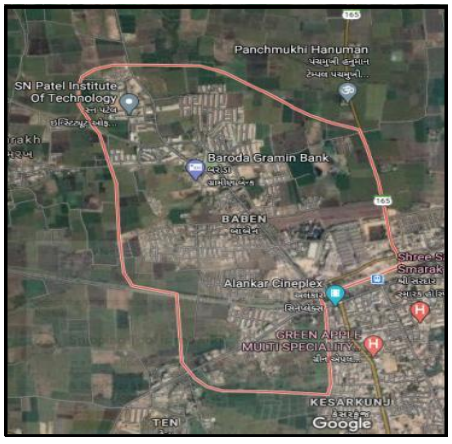

Figure 1– Map of Baben village

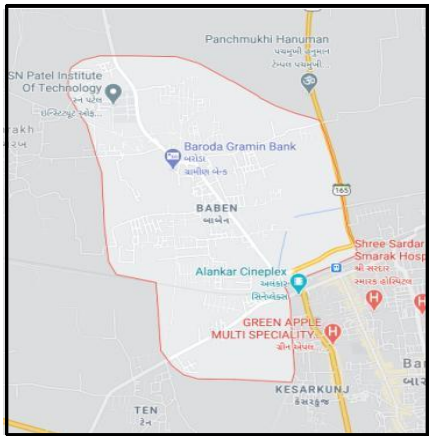

Figure 2 – Location of Baben village

1.2 Concept: Ideal Village, Normal Village

1.2.1 Objectives

Objectives of ideal village

The Ideal Village Concept is a community village with a self-sustaining income producing projects, independent electrification system generated from non-fuel based device, clean water facility for drinking including water for irrigation, quality but affordable housings, school, medical facilities for human beings and animals, proper sanitation system, information center, bank, police station, retail outlet for household and agriculture needs, phone facility, connecting roads to nearby villages and towns, legal councilor. Provide drinking water security through an integrated combination of pipe, local traditional water sources and multiple sources for alternative use. Conserve water through water resource management that includes rainwater harvesting and artificial recharge, conservation and renovation of traditional water sources. Build effective community institutions at the local level by supporting capacity building and empowerment. Ensure that all community groups, including women, are able to participate in the decision-making processes and benefit from program improvements and improve household and community environments with sanitation improvement and increased hygiene awareness in communities.

Objectives of Normal village

Create a healthy and environmentally sustainable community. To encourage the provision of local business services within the village. Encourage slow and sustainable development that maintains the village's rural and historic character and identity. Improve pedestrian and traffic safety within the village. Cooperate on planning and future development activities. Maintain the historic village character and identity and Preserve heritage buildings within the village. Develop new transportation infrastructure to make the village safe and accessible via all modes of transportation. Cooperate on planning and future development in consideration of the village as a whole. Increase economic development. Maintain the quiet rural character.

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

Punsari village, Gujarat

This is a village in Gujarat region, nearby Gandhinagar. Punsari has been dubbed a "model village" by the state government and its young headman, Himanshu Patel, proudly states that his village offers "The amenities of a city but the Spirit of a village".

- Every house has a toilet, two primary schools and healthcare
- Street lights and drainage system
- Enabled with CCTV camera and Wi-Fi
- Public Address system with 140 loudspeakers which cover entire village
- Mid-day meal schemes in schools & Offers computer classes.

Punsari, located in Gujarat, puts most metros to shame. Funded by the Indian government and the village's own funding model, Punsari is no NRI-blessed zone. The village also boasts of a mini-bus commute system and various other facilities.

Figure 3 - Punsari village Board

1.2.3 The Idea of a model/Smart Village

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

Objectives of model village

A model village project has the following important objectives:

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

The challenges

Social mobilization: One of the major challenges is the lack of awareness among citizens about such schemes. The aim should be to engage the residents and empower them through

community programs that can create awareness and impart training for village-level maintenance of the infrastructure.
Basic facilities: The administrators will have to attend to the primary needs of the residents first. These include access to clean water, proper sanitation, etc. The aim should be to provide better quality of life and then move to other areas that need to be addressed. Not just housing: Apart from providing affordable housing, the government should also work towards creating sustainable employment means.

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

It might be appropriate to assume that the science of civil engineering truly commenced between 4000 and 2000 BC in Egypt when transportation gained such importance that it led to the development of the wheel. According to the historians, the Pyramids were constructed in Egypt during 2800-2400 BC and may be considered as the first large structure construction ever. The Great Wall of China that was constructed around 200 BC is considered another achievement of ancient civil engineering. The Romans developed extensive structures in their empire, including aqueducts, bridges, and dams. A scientific approach to the physical sciences concerning civil engineering was implemented by Archimedes in the third century BC, by utilizing the Archimedes Principle concerning buoyancy and the Archimedes screw for raising water.
The role of investment, especially foreign direct investment (FDI), in driving economic growth and development has been a contested one ever since the UN development decade of the 1960s. There have always been views in favor of FDI and against it. Some argue that FDI leads to economic growth and productivity increases in the economy as a whole and hence contributes to differences in economic growth and development performances across countries, but others stress the risk of FDI destroying local capabilities and extracting natural resources without adequately compensating poor countries. This background paper for UN World Economic and Social Survey examines trends in the relationship between FDI and development in an historical context.
The government considers a village to be electrified if the number of households electrified is at least 10% and electricity is provided to public buildings including schools, health centers, dispensaries, community centers and village councils. So, by definition, all Indian villages have now been electrified. Remote and inaccessible villages have always proved to be a major challenge in the country's electrification drive. Though most Indian villages have some electrical connection today, connecting the last remote households in the surrounding areas can be expensive. Additionally, state-owned power distribution companies are struggling with debt and poor demand, which has made it difficult to practically electrify every Indian household.

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

Social scenario

Another essential facility for any village is Social Infrastructure Facility which leads to development of the village to the greater extent. Baben is a village having all the social infrastructure facilities such as Schools, Colleges and Primary Health Centers etc. There are 12 Anganwadi 2 Primary Schools and a College near Baben village which accommodates around 5000-6000 students which plays an important role in the economic development of the village. All these facilities are essential for the growth of a village and as Baben has all these facilities it is considered to be developed or facilitated village.

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Figure 4 – Play group

Figure 5 - Primary school

Figure 6 - Anganwadi

Figure 7 - Public Health Centre

Economic profile:

The economic status of Baben gram panchayat is much better as compared to other villages or rural towns. Baben panchayat collects around 1.5 crore rupees as various taxes and funds from private as well as government sectors. The various sources of income are housing tax, income tax, water tax, electricity bills, cleaning charges, taxes from Bardoli sugar factory etc.

Various taxes collected by Baben gram Panchayat are:

Table 1 - Various taxes collected by Baben Gram Panchayat		
Serial no.	**Particular Tax**	**Amount (Rs)**
1	Housing tax	30,65,820
2	Jilla panchayat tax	3,06,582
3	Electricity tax	82,700
4	Water tax	2,30,440
5	Cleaning tax	3,06,570
6	Income tax EC	36,64,630
7	Income tax RC	85,400
8	Sales tax	4,54,660

So, based on the above data we can say that the economic profile of Baben village is very much strong as compared to other villages.

Physical and Demographical Growth

These facilities are essential for economic as well as social growth of any area. These facilities include proper road network, water supply, drainage, electricity etc. Any village which needs to be economically developed must contain the above-mentioned facilities.

Baben is a village facilitated with bituminous and R.C.C. roads for main village roads as well as society streets. The roads are facilitated with sign boards, markings and signals for proper functioning of the vehicular traffic as well as pedestrian's traffic. The village is facilitated with 32 CCTV cameras for proper monitoring and protection from thefts, damages etc. to the village. The roads are also facilitated with proper street lights for 33night travel. Pure Drinking Water for morning and evening peak hours is also provided door to door with the help of 6 over head water tanks which range from 15000L to 25000L which are cleaned at regular intervals to maintain hygienic conditions.

Along with the facility of pure drinking water the facility for the removal of waste water is also provided. Drainage network for the whole town is constructed from door to door and is connected to the main sewage line at Bardoli Taluka. Along with sewage disposal solid waste management is also given a wide importance and is collected from door to door with the help of 3 collecting vans and is given to the Bardoli Nagarpalika for disposal and treatment. 5 public toilets are also constructed with the help of government grant and by the fund collected from the local residents which had led the people to leave a better life than before.24hrs electricity supply is also provide to the residents from GEB.

Infrastructure facility

Similarly, as social infrastructure Socio-Cultural Infrastructure Facilities are also essential for any village to compete with the urban area and any village must have all the above-mentioned facilities so that the residents of village may not get forced to migrate to the urban areas. If the village or panchayat is facilitated with all the above facilities people can leave in rural area with more comfort and ease.

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

Figure 8- Circular Water Tank

Figure 9 – Rectangular water tank

Figure 10 - Garbage Collection Van

Figure 11 – Public Toilet block

Figure 12 - Garbage Collecting Tricycle

Figure 13- Entrance Gate

Figure 14 - Village Road

Figure 15- Community Hall

Figure 16- Statue of Sardar Vallabhbhai Patel

Figure 17: CNG Pump

Awards achieved by baben village

- Shresth Gram Panchayat Competition Swarnim Puraskar 2010-2011
- Shresth gram panchayat competition Swarnim Puraskar 2010-2011.

Figure 18- 1st Rank in State Level 2010-11

Figure 19- 2nd Rank in District Level 2010-11

Figure 20 - 1st Rank in Taluka Level 2010-11

Figure 21 - Panchayat Empowerment and Accountability Incentive Scheme PEAIS-2012

Figure 22- Panchayat Sashaktikaran Purashkar 2011-12

Figure 23 - Swarnim Gram Purashkar 2011

1.4 SWOT analysis of ideal village

SWOT Analysis is a framework for identifying and analyzing the internal and external factors that can have an impact on the viability of a project, product, place or person and useful technique for understanding the Strengths and Weaknesses, and for identifying both the Opportunities and Threats.

Table 2 - SWOT Analysis of Baben village	
Strengths	**Weaknesses**
▪ Ponds and sidewalks ▪ Lake site ▪ Local businesses ▪ Schools and colleges ▪ Religious places (temples/masjid) ▪ Excellent water quality ▪ Easy access to highway ▪ Parking facilities ▪ Police / fire Station	▪ No facility of clubs for adults and seniors ▪ Need to upgrade village parks and playgrounds
Opportunities	**Threats**
▪ Opportunity for more in parks ▪ Construction of library ▪ Construction of theatre ▪ Opportunity for business ▪ Entertainment parks	▪ Algae in ponds ▪ Accidents due to rough driving by college students ▪ High commercial rents

1.5 Future prospects of the ideal village

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

Figure 24 - Vidyabharti college

Figure 25 - Bardoli Sugar Factory

Figure 26 - Lake

1.6 Benefits of the visit of ideal village / smart village

The Sarpanch of Baben gram panchayat gave us a brief idea about the methods, techniques, strategies that muse be used for the development of any village and what plays an important role for the development of any village as Baben has developed a lot during the year 2007 to 2016. we got a good knowledge related to rural development and general infrastructure facilities to be provided in a village. By visiting such villages, we students of civil engineering can understand about the actual development that a rural area needs to satisfy its basic infrastructure facilities and to compete with urban area and can implement these techniques and facilities for the development of other villages which actually needs development and can implement the same for the development of the villages which are allotted to us in Vishwakarma Yojana Phase-VII as our final year project.

We enjoyed lot during this visit and also we experienced lots of new things that not available in city. We got new ideas to develop the village facilities. We came to know what facilities actually needed in village. We have seen the facilities exist and their conditions like, road network, Water distribution and management, Gram, Panchayat management, Connectivity with city. To study about the development as well as the infrastructure facilities of the villages which is an ideal village and can be considered as Benchmark for the development and growth of other villages which are developing or which needs development. After visiting the village, we came to know about the various facilities that can be provided in a village for Reurbanization of village and to reduce the migration of people from villages to city areas. We also came to know about the various methodologies and techniques that can be used for the development of the villages.

We came to know about the tax collection and finance management of baben village differs from other villages in terms of amount and its use. Other villages are lacking from the finance but baben has full finance support but due to the limit of using it for the various purposes is not allowed and limited for certain level as it comes under village.

1.7 Electrical concept of Ideal village / Smart Village

Baben is village with basic power infrastructure such as transformer and distribution line provided to inhabited locality too and the electricity is for any purpose in its revenue boundary. Hence, we can say this village as Electrified village.

Electricity provided to public places like schools, panchayat offices etc. The community hall has Television Facility. The village is facilitated with 32 CCTV cameras for proper monitoring and protection from thefts, damages etc. The roads are also facilitated with proper street lights for night travel. The Baben village has underground system for transmission of power supply for the half of the village. The remaining village will be underground electrified in future according to Sarpanch Bhavesh Patel. DGVLC BARDOLI DIVISION OFFICE, which supplies electricity to the whole baben village. DGVCL is only 5km away from this village. 24hrs electricity supply is also provide to the residents from GEB.

Figure 27 - Traffic Camera monitoring system

Figure 28 - DGVCL Bardoli office

CHAPTER -2 LITERATURE REVIEW

2.1 Introduction: Urban & Rural village concept

Urban:

An urban area is a human settlement with high population density an infrastructure of built environment. Urban areas are created through urbanization and are categorized by urban morphology as cities, towns, conurbations or suburbs

Figure 29 - Views of Urban area

The world's urban population in 1950 of just 746 million has soared in the decades since. In 2009, the number of people living in urban areas (3.42 billion) surpassed the number living in rural areas (3.41 billion) and since, then the world has become more urban than rural. This was the first time that the majority of the world's population lived in a city. In 2014 there were 7.25 billion people living on the planet, of which the global urban population comprised 3.9 billion. A new concept that had been developed for the 1971 Census for the tabulation of certain urban data was the Standard Urban Area. The essential of a Standard Urban Area are: It should have a core town of a minimum population size of 50,000. The contiguous areas made up of other urban as well as rural administrative units should have close usual socio-economic links with the core town. The probabilities are that this entire area will get fully urbanized in a period of two to three decades.

Rural:

"India lives in its villages" – **Mahatma Gandhi .**

This famous observation made by the Father of the Nation many years ago, still holds true. Villagers comprise the core of Indian society and also represent the real India. And it is for villagers who need to make sure we build a system that delivers basic social infrastructure in an effective manner. In order to ensure that the fruits of India's progress are shared by all sections of the society, the government has identified several elements of social and economic infrastructure, critical to the quality of life in rural areas.

Figure 30 - Views in Rural area

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.

2.2 Importance of the Rural development

Poverty means the condition where the people basic needs ie food, shelter, clothing, etc are not meet . Poverty can be reduced by pro viding basic facilities to the citizen like.

Education: - Every child must go to school so that children's get basic knowledge of life and earn the money. Facilities in education means teacher, school, books, etc.

Health:- Ill health of a person will directly effects on working . if his health remain improper than he will not be able to work directly will not get money for survivors.

Employment: - Greater the employment lesser will be the poverty.

Various schemes taken by the government to reduce the poverty:

- Deen Dayal Antyodaya Yojna (DAY-NRLM)
- Mahatma Gandhi national rural employment guarantee Scheme (MGNREGS)
- State proverty Eradication missions
- National social assistance programme (NSAP)
- Prada MantriAwas yojna (PMAY)
- Public distribution system (PDS)
- Rastriya swasthya bima yojna (RSBY)

2.3 Ancient Villages / Different Definition of: Rural Urban Villages

Area with low facility and less primary amenities are provided e.g. water supply, drainage, Infrastructure facilities. Rural areas are also known as the 'countryside' or a ' village' in India. It has a very low population density. In rural areas, agriculture is the chief source of livelihood along with fishing, cottage industries, pottery etc. According to the Planning Commission, a town with not more than population of 15,000 is considered rural in nature. In these areas the panchayat takes all the decisions. There are five persons in the panchayat.

The National Sample Survey Organization (NSSO) given the definition of rural as follows:

An area with a population density of up to 400 per square kilometers, Villages with clear surveyed boundaries but no municipal board,

A minimum of 75% of male working population involved in agriculture and allied activities.

2.4 Scenario: Rural / Urban village of India population Growth

For the first time since Independence, the increase in population is more in urban areas than that in rural areas

- Rural – Urban distribution: 68.84% and 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%

DATA HIGHLIGHTS – CENSUS 2011

Table.3 Growth Rate of Population (in crore)

Description	1991-2001	2001-2011	Difference
Population in India	21.5	17.6	-3.9
Rural	18.1	12.2	-4.19
Urban	31.5	31.8	+0.3

2.5 Scenario: Rural / Urban village of Gujarat as per Census 2011 and 2001

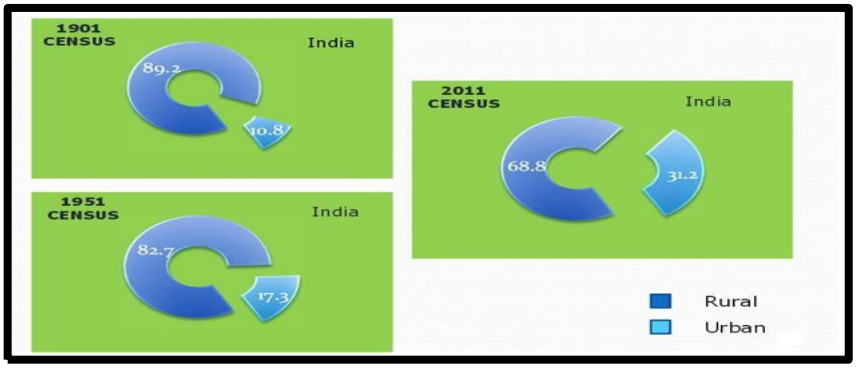

Figure 31- Different trend in Urban and Rural population percentage in 1901, 1951

Table 4 - Data comparison of 2001 &2011 in Gujarat		
Description	**2011**	**2001**
Approximate Population	6.04 Crores	5.07 Crore
Actual Population	60,439,692	50,671,017
Male	31,491,260	26,385,577
Female	28,948,432	24,285,440
Description	2011	2001
Population Growth	19.28%	22.48%
Percentage of total Population	4.99%	4.93%
Sex Ratio	919	920
Child Sex Ratio	890	883
Density/km2	308	258
Density/mi2	798	669
Area (Km^2)	196,244	196,024
Areami2	75,770	75,685
Total Child Population (0-6 Age)	7,777,262	7,532,404
Male Population (0-6 Age)	4,115,384	4,000,148
Female Population (0-6Age)	3,661,878	3,532,256
Literacy	78.03 %	69.14 %
Male Literacy	85.75 %	79.66 %
Female Literacy	69.68 %	57.80 %

2.6 Rural Development Issues - Concerns – Measures

Problems faced for Rural Development in India:

The financial, manpower and managerial resources devoted to the implementation of rural development programs are utterly inadequate. Better implementation of rural development programs can be ensured only if those responsible for actual implementation are paid reasonably well, appropriately trained, and sufficiently motivated. But this has not been done as yet. It is being increasingly observed that the objectives of one program conflict with those of others, and there is no institutional mechanism for reconciling them. Consequently, many programs utterly fail in fulfilling their objectives. In addition, they also affect other

programs. In many cases, instruments of rural development are not properly selected, and their levels are not consistent with the objectives they seek to achieve. This results in the wastage of valuable public resources, and unnecessary delays in achieving the objectives. In the Indian context, not much attention has been paid to this aspect of development.

Observance of rituals, lack of rational decisions in economic matters, spending huge amounts of money on marriage, birth or death ceremonies, prevalence of the caste system and the joint family system in the rural areas and illiteracy are some of the factors which arrest the rural development in India. The political parties have a vital role to play in rural development. But unfortunately, this role has not been effectively realized by any democratic political party so far. The political parties, today, are guided more by party interests rather than by national interests.

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

Norms & Standards

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

(a) Land under each use

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

Table 5 Land use information

Area	Land under each
(i) Residential	50 - 60 %
(ii) Work place, Schools, Institutions, Nursing Home, Dispensary, Community places/Facilities, Veterinary Hospitals etc.	15 - 20 %
(iii) Shops, Offices, Consumer Stores, Fertilizer Depot and other bazaar's	3 - 5%
(iv) Open spaces	10 - 15%
(v) Roads, Pedestrian Paths, Drains, Cooperative Bank, P.O. and other utilities	15- 20%

(b) Residential Development

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

Table 6 Residential Development	
(a) Plotted Development excluding other activities such as Cattle Shed, Storage etc.	60 and above plots/hectare
(b) Covered area per dwelling unit	25 sq. m. (minimum)
(c) Height of buildings	10 maximums (3 storey)

(c) Road hierarchy

Table -7 Road hierarchy	
(a) Road which connects villages to nearby areas	9 m (min.)
(b) Main Village Roads	6 m
(c) Internal Village Roads	4.5 m

(d) Social Facilities

Table -8 Social Facilities		
Use	**Standard/Population**	**Area**
(a) Primary School	1 for 5000 population	0.4 to .6 hectare
(b) High School with primary school	1 for 15000 population	1 hectare
(c)Dispensary/Health Centre	1 for 5000 population	.05 hectare
(d) Community Hall	1 for 5000 population	.05 hectare
(e) Anganwadi	1 for 5000 population	.05 hectare

Space Requirement

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

- The setbacks proposed here under will be limited to table 1 to 5. The setbacks along highways will be minimum as prescribed in section 12.
- The norms are suggestive and may be modified as per local conditions in the States.
- The norms of nearby urban areas may also be referred.

(a) Residential: Plotted Housing

Table - 9 Residential plotted housing								
Sr.No.	Plot Area in Sq m	Max in Ground Coverage %	Far	No. Of D/U	Max Height in m	Set Backs M Front	Set Backs M Side	Set Backs M Back
1	Below30	90%	180	2	6	1.2	-	-
2	30 to 50	80%	160	2	6	1.2	-	-
3	51-100	80%	160	3	9	1.2	-	1.5
4	101-150	75%	150	3	9	1.2	-	2.0
5	151-250	66%	130	3	9	1.2	-	3.0
6	251-500	60%	120	3	9	1.2	1.5	3.0
7	> 501	50%	100	3	9	1.2	3.0	3.0

(b) - Commercial Use Table:

Table -10 Commercial Use						
Sr.no.	Plot size in sq m	Ground coverage%	FAR	Max Height in M	Set Backs M Front	Set Backs M side
1	Convenient Shops	75%	100	6	2	-
2	Local Shopping Centre	50%	100	6	3	-
3	Sectoral/Shopping	40%	120	9	4.5	-

(c) – Institutional & Community facilities

Table - 11 Institutional & community facilities							
Sr. no.	Plot size in sq m	Ground coverage %	FAR	Max height in M	Set Backs Front	Set Backs Front	Set Backs M Back
1	500-1500	40%	120	8	3	-	3
2	1001-2000	33%	100	8	4.5	-	3
3	2001-4000	30%	90	8	6	3	3
4	>4001	25%	90	8	9	3	4.5

(d) – Educational & health

Table - 12 Educational & health								
Sr. no.	Use	Min Plot Area in Sq m	Ground coverage %	FAR	Max height in M	Set Backs M Front	Set Backs M Front	Set Backs M Back
1	Anganwadi	500-1500	33.3%	100	10	4.5	3	3
2	Primary School	1500 - 3000	30%	90	10	6	3	6
3	Senior Secondary	4000 -10000	25%	100	12.5	9	4.5	6
4	Nursing Home Dispensary	250 250- 500 >501	35% 33.3% 30%	70 100 100	6 91	3 45	- 33	3 3 4.5

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

Most households in rural developing countries do not have access to modern energy supply. Household level biogas energy was considered as an option but failed due to lack of sufficient resources for its installation and operation. A community energy system can be an option, but most studies focused on off-grid electricity. This energy system cannot be a realistic option particularly for cooking demand. An efficient and suitable system matching local resources and demand expectation needs to be developed which this study focuses on assessing. Biogas and solar energy technologies are viable to establish such kind of a system since they can be converted to different forms of energy. Therefore, this study aims to determine efficient biogas and solar energy production and utilization options for small scale village energy application in rural Ethiopia.

Methods

The efficiencies of the production and utilization options are determined based on the system configurations involving resource, conversion, and utilization combination models. We used local resources, data, and relevant literature information for the system analysis.

Results

The analysis shows that most energy is needed in the form of heat for cooking and a smaller part in the form of electricity (about 10%). The community waste stream converted to biogas will be enough for cooking, but not enough biogas is left to produce enough electricity. Co-digesting altogether provides biogas that can meet only about 75% of the electricity demand.

Concentrated solar cookers can be an alternative for cooking in areas where installation of biogas is not possible. About 2-m^2size solar concentrator is sufficient to meet each household's cooking energy demand. The lighting and appliance energy demand can be met with photovoltaic (PV) energy produced with reasonably sized panels. However, the use of electrical energy for cooking produced with PV cannot be an economic option with the available technologies.

Conclusions

The community energy system involving anaerobic co-digestion (biogas) and/or solar energy technologies is viable to meet the demand when efficient production and conversion is made based on specific local resource supply and demand.

2.9 Other Projects / Schemes of Gujarat / Indian Government

Projects / Schemes by Govt. sector

The schemes for rural development in India are as follows:

1. Point Program:

This has been major program of rural development encompassing various aspects of rural people. This program is associated with former Prime Minister Indira Gandhi, who introduced it in July 1975 for reducing poverty and economic exploitation and for the uplift of weaker sections of society. She gave the slogan 'Garibi Hatao' during parliamentary elections.

The important goals of this program were:

- Welfare of the rural masses.
- Increase in rural employment.
- Minimum wages to landless laborers.
- Uplift of the SC and ST people.
- Growth of housing facilities.
- New programs of family planning.
- Extension of primary health facilities.
- Making primary education more effective.
- Welfare of women and children.
- Some other programs like drinking water facilities, public distribution system and increasing power production.

2. Integrated Rural Development Program (IRDP):

The program was launched by the Centre in March 1976 as a major instrument of the government to alleviate poverty. Its main feature was to enable selected families to cross the poverty line in a given time-frame by taking up self-employment in various activities like agriculture, horticulture, animal husbandry, weaving and handicrafts and services and business activities. The target group consisted of small and marginal farmers, agricultural laborers and

rural artisans having annual income below Rs. 11,000 defined as poverty line in the Eighth Plan. Among the selected families, it is stipulated that at least 50 per cent of assisted families should be from SCs and STs. Furthermore, 40 per cent of the coverage should be of women beneficiaries.

3. Training Rural Youths for Self-Employment (TRYSEM):

This scheme was launched in 1979 to provide technical skills (training) to rural youths (between 18-35 years) living below the poverty line, to enable them to seek employment in fields of agriculture, industry, services and business activities.

As in other schemes of poverty alleviation, in this scheme also, youths belonging to SCs and STs and ex-servicemen, who had passed ninth class, were given priority. One-third seats were reserved for women. The beneficiaries of this scheme after completion of training were absorbed in the IRDP scheme. According to an estimate, up to 1995-96, about two lakh youths were being trained every year, of whom about 45 per cent became self-employed and 30 per cent got regular employment.

4. Food for Work Program (FWP):

This program was introduced in 1977 by the then Janta government with the objective to provide employment to the unemployed/underemployed village persons during the slack season. The wages paid to the workers were in kind, i.e., food grains.

The works undertaken were flood protection, maintenance of existing roads, construction of new link roads, improvement of irrigation facilities, construction of school buildings, medical and health centers and Panchayat Ghar (community halls) etc.

5. National Rural Employment Program (NREP):

This is redesigned program of FWP, planned for creating additional employment opportunities in the rural areas with the help of surplus food grains. It was started in 1980 as a part of the Sixth Plan (1980-85). This program was especially for those rural people who largely depended on wage employment but had no source of income during lean agricultural period. PRIs were actively involved in this program. Later on, this program was merged with Jawahar Rozgar Yojana (JRY).

6. Rural Landless Employment Guarantee Program (RLEGP):

Special schemes were formulated by some states such as Maharashtra and Gujarat to provide increasing employment opportunities to rural people, especially landless people. Maharashtra started the Employment Guarantee Scheme (EGS) for the unemployed in rural areas. The Gujarat government's scheme provided for unskilled jobs to the unemployed workers on different projects. This scheme was later on merged into JRY along with NREP.

7. Jawahar Rozgar Yojana (JRY):

This program came into existence in April 1989 with the merger of the NREP and the RLEGP. Under this scheme, it was expected to provide at least one member of each poor

family (BPL family) an employment for 50 to 100 days in a year at a work near his/her residence.About 30 per cent of the jobs under this program were reserved for women.

8. Antyodaya Yojana:

The Hindi word 'antyodaya' is a combination of two words - 'ant' meaning end or bottom level and 'udaya' meaning development. Thus, as a whole, it implies the development or welfare of a person standing at the end of the queue (lowest level), that is, the poorest of the poor. This program was initiated by the Government of Rajasthan on 2nd October, 1977 for special assistance to persons living below the poverty line (BPL). It was later on picked up by the then Janata government at the centre in 1978. The idea was to select five of the poorest families from each village every year and help them in their economic betterment.

9. Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS): This scheme was initially started in 200 districts of the country from February 2006 and from April 2008, it has been extended to cover all the districts of the country. The main objective of the scheme is to provide 100 days employment to rural unemployed people. In this scheme, employment to women is also provided.

Projects / Schemes by Private sector

The following organizations are active in rural and renewable energy services:

- Bosch India Under its CSR wing, Bosch is looking into implementing Photovoltaic projects in rural India. Together with Husk Power, Bosch has implemented a 5-kW solar mini grid in Bihar.
- D.Light private company ("Silicon Valley Venture") manufacturing 3 types of small off grid lighting products. D.Light has received start-up financing by Shell Foundation and the Acumen Fund.
- Envirofit is a private company selling improved cooking stoves in India as well as East Africa.
- EnviTec Biogas is a joint venture of German biogas plant manufacturer with a local Indian biogas company is involved in setting up several biogas projects all over India.
- GreyMatter Technologies in Bangalore, is the manufacturing company contracted by iSquareD to manufacture the Chulika stove. The plant has 14 staff. The manufacturing unit has a capacity of 300 stoves per day (1 shift).
- Greenleaf is a private company involved in Biodiesel production from mainly Pongamia plantations in Bihar.

CHAPTER 3 - SMART (CITIES/ VILLAGE) CONCEPT AS PER YOUR IDEA AND ITS VISIT (CIVIL & ELECTRICAL CONCEPT)

3.1 Introduction Concepts, Definitions and Practices

A smart city is an urban area that uses different types of electronic data collection sensors to supply information used to manage assets and resources efficiently.

As the term "smart city" gains wider and wider, there is still confusion about what a smart city is, especially since several similar terms are often used interchangeably. The different metrics of urban smartness are reviewed to show the need for a shared definition of what constitutes a smart city, what its features are, and how it performs in comparison to traditional cities. Furthermore, performance measures and initiatives in a few smart cities are identified.

3.2 Vision-Goals, Standards and Performance Measurement Indicators

1. Economy

- Gross Domestic Product (GDP) for the City (Core Indicator)
- GDP Per capita (Core Indicator)
- Gini's coefficient (Supporting Indicator)
- City's Unemployment Rate (Core Indicator)
- Assessed Value of Commercial and Industrial Properties as a Percentage of Total assessed value of all Properties (Core Indicator)
- Number of Businesses per 100000 Population (Supporting Indicator)

2. Education

- Percentage of Female School-aged Population Enrolled in Schools (Core Indicator)
- Percentage of Students Completing Primary Education: Survival Rate (Core Indicator)
- Percentage of Students Completing Secondary Education: Survival Rate (Core Indicator)
- Primary Education Student/Teacher Ratio (Core Indicator)
- Percentage of School-aged Population Enrolled in Schools (Supporting Indicator)

3. Energy

- The Percentage of Total Energy Derived from Renewable Sources, as a Share of the City's Total Energy Consumption (Core Indicator)
- Total Residential Electrical Energy use per Capita (kWh/year) (Core Indicator)
- Total Electrical Energy Use per Capita (kWh/year) (Supporting Indicator)
- Average Number of Electrical Interruptions per Customer per Year (Supporting Indicator)
- Average Length of Electrical Interruptions (in Hours) (Supporting Indicator)

4. Environment

- Fine Particulate Matter ($PM_{2.5}$) Concentration (Core Indicator)
- Particulate Matter (PM_{10}) Concentration (Core Indicator)
- NO_2 (Nitrogen Dioxide) & SO_2 (Sulphur Dioxide) Concentration (Supporting Indicator)
- O_3 (Ozone) Concentration (Supporting Indicator)
- Green House Gas Emissions Measured in Tones per Capita (Core Indicator)
- Air Quality Index and Noise Pollution (Core Indicator)
- Quality of Public Water Bodies (Core Indicator)

5. Finance

- Debt Service Ratio (Debt Service Expenditure) (Core Indicator)
- Capital Spending as a Percentage of Total Expenditures (Supporting Indicator)
- Own-Source Revenue as a Percentage of Total Revenues (Supporting Indicator)
- Tax Collected as a Percentage of Tax Billed (Supporting Indicator)

6. Fire and Emergency Response

- Number of Professional Fire Fighters per 100000 Population (Core Indicator)
- Number of Volunteer and Part-time Firefighters per 100000 Population (Supporting Indicator)
- Number of Fire Related Deaths per 100000 Population (Core Indicator)

3.3 Technological Options

1. Smart energy

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

2. Smart transportation

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

3. Smart data

The massive amounts of data collected by a smart city must be analyzed quickly in order to make it useful. Open data portals are one option that some cities have chosen in order to publish city data online, so that anyone can access it and use predictive analytics to assess future patterns. Companies such as Community Logic are working with cities to help them an

analyze data, and they're in the Startup in Residence (STiR) program.

4. Smart infrastructure

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

5. Smart mobility

Smart mobility strives to find more sustainable transport options. Deloitte reported that an average American is stuck about 34 hours in traffic every year. With rapidly growing cities, new transportation solutions need to be developed to keep mobility dynamic.

6. Smart infrastructure

Smart infrastructure creates the fundament for all smart solutions. By using new technology to convert raw data into information, urban and regional development can be planed and designed to fit future demand.1 Also existing systems can be improved by analyzing data from sensors, traffic patterns and tracking systems.

3.4 Road Map and Safe Guards

Figure 32 - Roadmap for Smart Cities

3.5 Issues & Challenges

The prospect of heavy sums of private sector finance, either domestic or foreign will be a challenge. These concerns mean many projects may not be commercially viable at the starting time. The failure of a PPP is often due to due to lack of realistic objectives, financial management, project governance, and equality in risk management. The establishments that help cities manage electricity, water, waste, traffic flows, municipal operations, and city services are becoming increasingly complex and can be expensive.

To develop smart cities in India, there is a need to address challenges relating to political alliance, financing and stakeholder management. Greater alignment between and within government agencies will be required. A conductive policy and investment environment for private investors is imperative. It will also have to be ensured that all stakeholders have been included in the decision-making process. Clear lines of accountability will have to be established.

Building new cities and upgrading existing ones are fraught with challenges pertaining to integrated master planning, political alignment, financing and stakeholder management. An enabling policy framework and better alignment of government agencies between and within all levels will be required. It is easier to build new ones rather than transform old ones into smart cities. But upgrading cities are also as imperative and it takes anything from two to three decades to do so. In such cases the work has to be undertaken area wise. Other challenges for India include merging technology with law enforcement. There is no point in installing high tech traffic signals if its implementation cannot be enforced. India will also have to find ways of encouraging private investment for infrastructure required for a smart city.

3.6 Smart Infrastructure - Intelligent Traffic Management

'Smart infrastructure' responds intelligently to changes in its environment, including user demands and other infrastructure, to achieve an improved performance. A smart system uses a feedback loop of data, which provides evidence for informed decision-making. The system can monitor, measure, analyze, communicate and act, based on information captured from sensors. Different levels of smart systems exist. A system may collect usage and performance data to help future designers to produce the next, more efficient version; collect data, process them and present information to help a human operator to take decisions. Use collected data to take action without human intervention.

Applications of smart infrastructure

1. Energy

For the National Grid, smartness is all about the timely use of information – getting that information at the right time and place so that informed decisions can be made. And work to be done in a good and smart manner and fast.

2. Water

Smart water systems are important in delivering more integrated and resilient water, wastewater and flood protection infrastructure to meet the current and emerging global sustainability and climate change challenges.

3. Transportation

Transport being smart does not necessarily solve all problems because the infrastructure operators have no control over when people want to use the network – smartness needs to reach user level.

4. Communications

Most communications devices and networks are relatively smart already, however other smart infrastructure depends upon communications.

5. The Built Environment

Smartness is increasingly seen as the ability of buildings and systems within buildings to talk to each other.

3.7 Cyber Security

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

Elements of cyber security include:

- Application security
- Information security
- Network security
- Disaster recovery / business continuity planning
- Operational security
- End-user education

3.8 Retrofitting- Redevelopment- Greenfield Development District Cooling

District Cooling and Heating

District energy, both heating and cooling, tie together the energy generating sources in a city with buildings and facilities having a need of heating and/or cooling. Instead of each building having its own heating or cooling system, the energy is delivered to several buildings in a larger area from a central plant. The water based distribution system guarantees that heat and cooling arrive safely to the end users. With district heating, energy is saved overall, as it takes advantage of resources that would otherwise not be have been used, making it an efficient and sustainable solution to satisfy the local heat and cooling demand in a city.

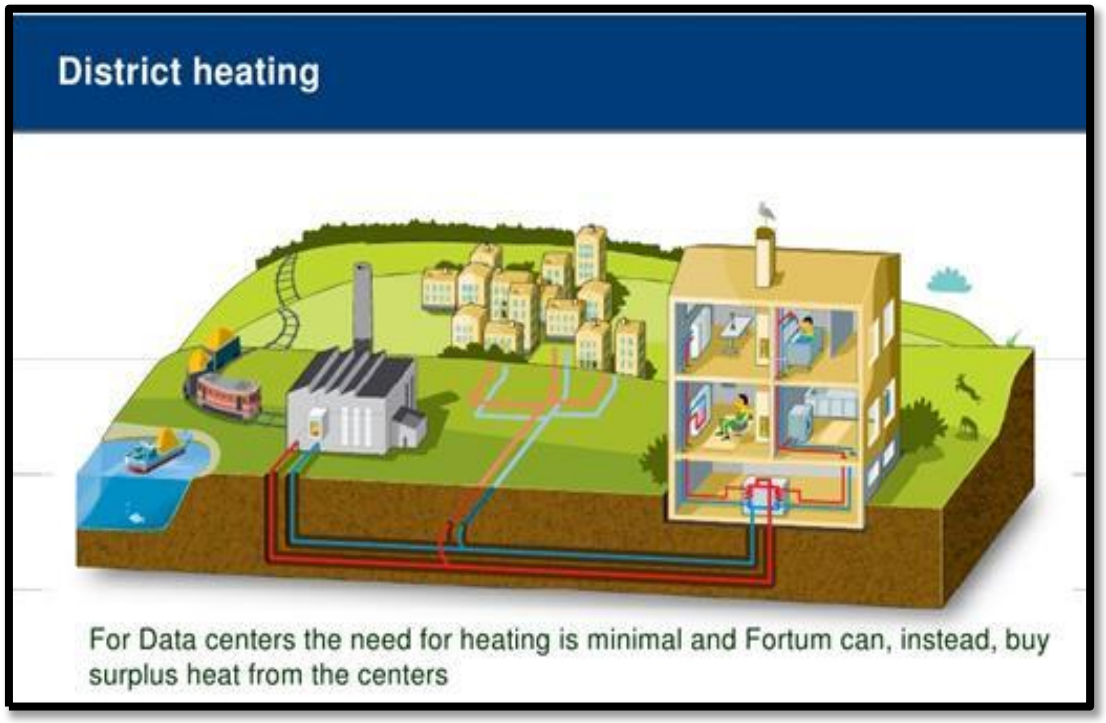

Figure 33 - District Heating

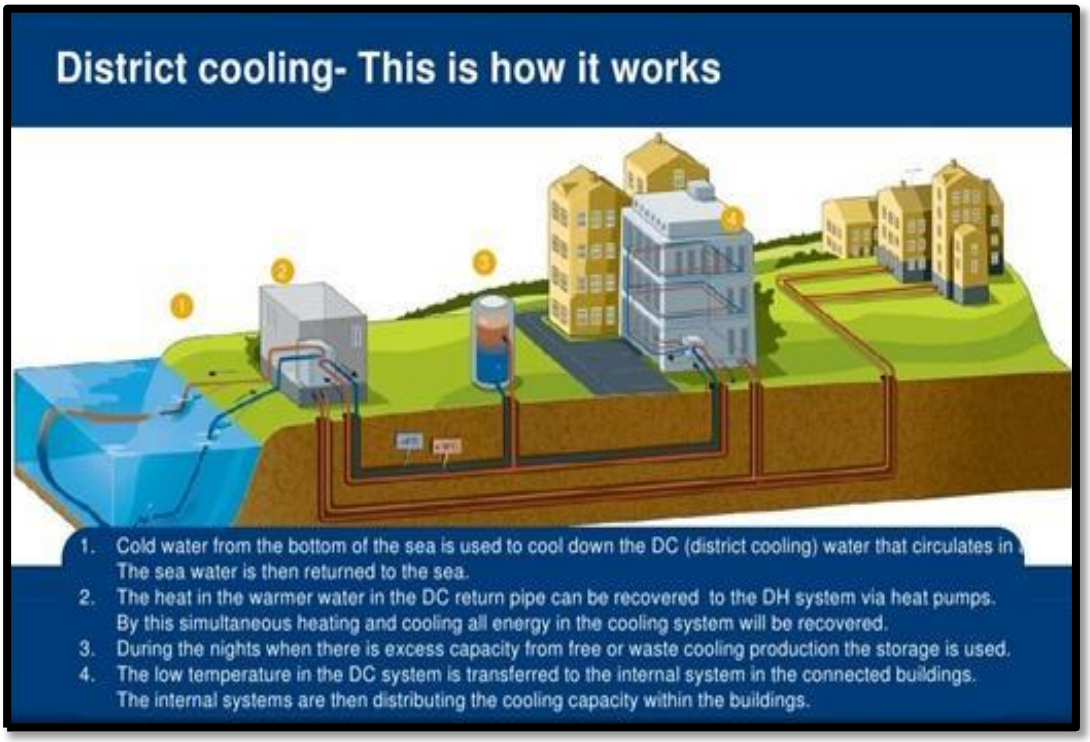

Figure 34 - District Cooling

Green Building

A Green Building, also known as a sustainable building, is a structure that is designed, built, renovated, or re-used in an ecological and resource efficient manner. Sustainable development is maintaining a delicate balance between the human need to improve lifestyles and feeling of well-being on one hand, and preserving natural resources and ecosystems, on which we & future generations depend.

Objectives of a green building are :

Protecting occupant health.
Improving employee productivity.
Using energy, water and other resources more efficiently.
Reducing overall impact to the environment.
Optimal environmental and economic performance.
Satisfying and quality indoor spaces.

Benefits of green buildings :

- Environmental Benefits - Reduce the impacts of natural resource consumption
- Economic Benefits-
    - Reduced operating costs
    - Marketing advantages.
    - Increased building value.
    - Optimizes life-cycle performance cost
- Health and Safety Benefits - Enhance occupant comfort and health
- Community Benefits - Minimize strain on local infrastructure and improve quality of life.

3.9 Strategic Options for Fast Development

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

1. Revaluate the Role of The City And Its Administration

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

2. Involve Citizens and Other Stakeholders

Before you begin to define your smart city strategy, you must understand the needs of your target group. Getting citizens and other stakeholders from civil society, NGOs, business, etc. on board right from the start is essential. It enables you to define the added value that your smart city concept should provide to end users.

3. Avoid Isolated Solutions – Look Beyond E-Government and Actively Apply Best Practices

Many smart city concepts today focus on individual and not integrated solutions. Think about the whole range of action fields in your city and ensure that the interfaces between the different sectors are digital in order to foster cross-sector activities. Actively look for best practices and apply them.

4.Encourage Initiatives, Self-Sustaining Business Models and Other Contributions From The Private Sector

Businesses increasingly see themselves as both global and local citizens. They are willing to engage in activities that strengthen their local environment and will often invest significantly in them. Draw on this support. Not everything has to be financed from the public pocket – many smart city solutions, such as parking guidance and information (PGI) systems, can be financed by the private sector.

5. Create a Comprehensive Data Strategy and Data Platforms

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

6. Set up Innovation Labs To Foster An Inspiring Ecosystem

Create an ecosystem for innovation and entrepreneurship by providing facilities such as "maker spaces", "living labs", or "business incubators". Importantly, ensure that these facilities have the necessary regulatory room to maneuver. Provide technical and financial support wherever possible.

7. Ensure Data Security

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

8. Involve Infrastructure Operators In Designing, Financing And Implementing Initiatives

Most major cities own and operate their infrastructure via intermediary companies, such as public utilities, public transit operators, and so on. These players have an important role in designing, financing and implementing smart city concepts. They can also help to develop smart city business models.

9. Gain Political Backing and Integrate Public Feedback

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

10. Establish a Coordinating Body and a Dedicated Planning System

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

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

India's urban water and sanitation challenges

In India, virtually all water and waste water systems are currently managed by the public sector, and most fail to meet the needs of the citizens or businesses they serve. Enlisting the private sector in the water sector in the water sector brings finance, reduces waste, and lowers costs when supported by effective governance and transparency.

Virtually no single city or utility in India has the capacity to manage a comprehensive programmer to reduce leakages or lost revenues. A number of utilities continue to lose close to 50 per cent of their water to leaky pipes, illegal connections, and unbilled or unpaid for water. Not only is the water itself wasted, so is the energy required to treat and pump the water. By using performance-based management contracts to draw on the technical and managerial skills of the private sector, public utilities can enhance their ability to tackle such operational and maintenance problems and improve service to their customers.

New Mumbai near Mumbai has shown how to improve water and sanitation services by using performance-based contracts to manage its water distribution and transmission system. The results are astonishing. Revenues were increased by almost 45 per cent the year following the introduction of the new contracts! The city was also able to reduce unnecessary expenditures over a two-year period the city reduced its annual energy consumption by rs.45 lakh on sewerage contracts alone. Significantly, customer complaints to the utility decreased to almost zero. Performance based contracts allowed the utility not only to provide better service to its customers, but also at lower operational costs.

Role of Indigenous Technology

1. Indigenous water purification technologies:

These 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.

2. Environment friendly Plasma technologies:

Solid waste dumping sites or landfill sites need more amount of land which is not available in urban areas. Incineration of solid waste pollutes the environment if the incinerators are not designed or operated properly. Thermal Plasma Technology is ideally suited for waste treatment.

By plasma technology Hazardous & toxic compounds are broken down to elemental constituents at high temperatures; Inorganic materials are converted to Vitrified Mass; and Organic materials are Pyrolyzed or Gasified, converted to flue gases (H2 & CO) & Lower hydrocarbon gases when operated at low temperature (500 – 6000C). Disposal of carcass is also being thought of using plasma pyrolysis.

3. Unique Multi Stage Biological Treatment Solution:

Role of environmental isotope techniques in the water resources development and management: There are two types of isotopes, stable isotopes and radioactive isotopes. Isotope techniques are used to find out the type of contamination in surface water and ground water, the sources and origin of contamination, pollutant dispersion in surface water bodies, to assess the groundwater salinity, to assess the changes due to long-term exploitation of groundwater, for hydro-chemical investigation and to carry out geochemical evolution of groundwater.

4. The BARC UF Membrane Technology for Domestic Water Purifiers:

Water filters manufactured by Sondhka based on membrane water Purification Technology has been developed by BARC. Benefits of BARC Polysulfone Membrane are high tech 0.02micron or 20nm, simple form factor, rugged (life of more than 1 year) and low maintenance (about Rs. 500 per year). It is very easy to use and very low-cost solution for the water contamination.

5. 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 byproduct. In Radiation Hygienization process dry sludge generated at STP's is hygienized using radiation technology using standard Gamma facility at a Dose of 10 kgs. Such radiation plants are operating in India for sterilizing medical products.

6. 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, Size reduction and Palletization.

3.11 Initiatives in village development by local self-government

Local Self-Government

The functioning of a Government can be categorized into National, State and Local. Local Self-Governments are those bodies that look after the administration of a area or small community such as village, town or a city. These bodies are appointed by the Government representing the local inhabitants, which raises its revenue partially through local taxation and other means. The Local Self- Government can be divided into various classes like Corporations,

Cities, Town Municipalities and Town Panchayat on the basis of population. The administration system has 3 levels: village, block and district. Panchayat operate at the village level.
The Local Self Government is entitled to discharge certain compulsory functions like:

- Supplying safe and clean drinking water
- Imparting and maintaining proper drainage and sewage systems
- Providing public street lighting
- To keeps up sanitation and hygiene of public places
- Building and maintenance of bus terminals, roads ,culverts and bridges
- Preservation of public parks and gardens
- To make sure that the urban or rural growth is systematic and planned
- Preparing guidelines for building construction
- Issuing Licenses for Trade activities
- Issuing and maintaining Birth and Death records.

3.12 Smart Initiatives by District Municipal Corporation

Managing solid waste is a daunting task for every urban local body (ULB) inIndia. The irony is such that out of 400 municipal corporations and councils in India, only a handful of ULBs are managing their solid waste management, while reinventing some of the age-old garbage disposal methods with a touch of new technologies. The Council has listed some of the proven examples that can be considered for tackling such a sensitive issue. Take example of pune city. The city has managed to tackle the waste of over 1,700 tones that it generates daily, while ensuring minimization of land fill, freeing up urban land for more productive purposes. At present, the Pune Municipal Corporation (PMC) has combined an integrated approach with decentralized waste management by installing 25 bio-methane plants that produce 600 kW of electricity and compost as a by-product.
The 300 TPD plant by Noble Exchange Environment Solutions Pvt. Ltd (NEX) that converts food waste to bio-CNG, is a 300 tpb (total plumbum) vermi-compost project by Ajinkya Biofert and Disha. It uses the Rochem Separation System that processes mixed waste to produce 300 TPD of refuse derived fuel (RDF). This DBOT project by NEX, which converts food waste into valuable bio fuel, has already started producing 45 TPD of bio-CNG and 150 tons of organic manure, based on the anaerobic digestion system. At maximum capacity, it can process 300 tons of waste, making it the largest biogas plant in India. Another example is Jabalpur. With the installation of a 600 tons per day (TPD) municipal solid waste plant, the Jabalpur Municipal Corporation has become India's first to install a Smart WTE facility producing 11 MW of energy. The plant, installed by Council's lead partner Essel Infra projects Ltd, has used refuse-derived fuel (RDF), bio-methanisation and an advanced technology called combustion. Although these technologies work differently, all of them eliminate waste and produce energy. That apart, although technology has played a major role in arresting the waste menace, some manual intervention has come in handy as well. To

cite an example, Alleppey Municipal Corporation in Kerala, which was grappling with a garbage dumping issue, has now transformed the city's waste disposal scenario. The focus of the initiative was segregation and treatment of wet waste at source. The pilot project, which was started in just 12 wards, has now spread over 52 wards, covering 40,000 households. The corporation has installed biogas plants, both portable and fixed, with a pipe composting system.

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

Government projects

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

NGO list

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

Digital country concept

Digital India is a campaign launched by the Government of India in order to ensure the Government's services are made available to citizens electronically by improved online infrastructure and by increasing Internet connectivity or by making the country digitally empowered in the field of technology. The initiative includes plans to connect rural areas with high-speed internet networks. Digital India consists of three core components: the development of secure and stable digital infrastructure, delivering government services digitally, and universal digital literacy, Launched on 1 July 2015 by Indian Prime Minister Narendra Modi, it is both enabler and beneficiary of other key Government of India schemes, such as Bharat Net, Make in India, Startup India and Standup India, industrial corridors, Bharatmala, Sagarmala. As of 31 December 2018, India had a population of 130 crore people (1.3 billion), 123 crores (1.23 billion) Aadhaar digital biometric identity cards, 121 crore (1.21 billion) mobile phones, 44.6 crore (446 million) smart phones, 56 crore (560 million) internet users up from 481 million people (35% of the population) in December 2017, and 51% growth in e-commerce.

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

After the Prime Minister Narendra Modi-led government at the Centre announced its plans to develop 100 smart cities, various countries have been lining up to help India achieve the target. While 98 cities have so far been shortlisted to be developed, the names of the other two are to be announced at a later stage. Of those, 20 cities are selected in 2015-16 are to be provided funding in the first phase.

The countries that have pledged their support to make Indian cities smart:

Singapore has shown its interest in helping India in realizing its ambitious dream of developing all the 100 smart cities. It has offered to help develop Amravati, the new state capital of Andhra Pradesh as a smart city. The country is also looking at re-engineering and upgrading the transportation sector and retro-fitting the older Indian city. Canada has offered to help in providing solution to residential problem by providing wooden multi-story housing complexes. Japan has signed a memorandum of understanding with India to develop Varanasi as a smart city. Germany has signed up with India to develop Bhubaneswar (Odisha), Kochi (Kerala) and Coimbatore (Tamil Nadu). The US' United States Trade and Development Agency (USTDA) has signed an agreement to develop Visakhapatnam (Andhra Pradesh), Allahabad (UP) and Ajmer (Rajasthan) as smart cities. Spain has proposed to cooperate with India in developing smart cities. The Barcelona Regional Agency of Spain has shown interest in exchanging technology with India. France has announced an investment of 2 billion euros in India to develop three cities -- Chandigarh, Puducherry and Nagpur -- as smart cities. The UAE has committed itself to investing in the Smart City Project of India. An MoU has been signed between FICCI and the Federation of UAE for industrial and other ties between India and the UAE. China has shown interest in developing Pune as a smart city. It will be investing $2.5 billion in the city's security solutions and services. Sweden, Israel, the Netherlands, United Kingdom and Hong Kong have also shown interest in investing in India for developing smart cities.

3.15 Electrical concept

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

CHAPTER - 4. ABOUT NARTHAN

4.1 Introduction – Narthan

4.1.1 Introduction About : Narthan Village details

Area Located in rural region of Surat district of Gujarat. According to the administration records, the village code of Narthan is 523774. The village has 288 households. According to Census 2011, Narthan's population is 1237. Out of this, 634 are males whereas the females count 603 here. This village has 138 kids in the age group of 0-6 years. Narthan is a Village in Olpad Taluka in Surat District of Gujarat State, India. The native language of Narthan is Gujarati and Sindhi, most of the village people speak Gujarati. Narthan village is located 20 KM towards west from District head quarter Surat. 11 KM from Olpad. It is located in the UTC +5.30 time zones and it follows Indian standard time (IST).

4.1.2 Justification/ need of the study

By this Vishwakarma Yojana project, government wants technical solution of the problem of villages at the engineering point of view. In this project, the common problems of village are solved by the engineering students. The basic need of rural development program have been alleviation of poverty and unemployment through creation of basic social and economic infrastructure, provision of training to rural unemployed youth and providing employment to marginal Farmers/Laborers to discourage seasonal and permanent migration to urban areas. Through various government departments are involved in various infrastructural development works, a holistic view and modern solutions (Aesthetic, Vastu shastra, etc.) can be provided by new engineers under Vishwakarma Yojana. Study of villages is done by the students with this view. 54% of India's population is below 25 years and most of them live in rural areas with very little employment opportunities. Literacy is the major problem in rural development program. Everyo ne wants to go to the cities, so that rural people's remains as ignores part by the policy makers also. Privatization concept is useful for rural development but, government not paying much attention to this aspect. To reduce this migration in this area focus is essential.

4.1.3 Study Area

Narthan is a Village in Olpad Taluka in Surat District of Gujarat State, India. The native language of Narthan is Gujarati and Sindhi, most of the village people speak Gujarati. Narthan village is located in the UTC +5.30 time zone and it follows Indian standard time (IST). Area Located at 19 metres above sea level in rural region of Surat district of Gujarat. According to the administration records, the village code of Narthan is 523774. Its geographical coordinates are 21° 16' 25.1" North 72° 42' 30.4" East. The latitude 21.273 and longitude 72.708 are the geo-coordinate of the Narthan. The other nearest state capital from Narthan is Surat and its distance is 20 KM. Total Area of village is 577.59 hectares.

4.1.4 Objectives of the study

To fulfill common requirement like drinking water, drainage system, transport system, improve living standards of people. To manage growth through good planning and appropriate development controls, reduce migration from rural to urban areas due to lack of basic services and sufficient economic activities in rural areas. Electricity connections like street lighting that is energy efficient and eco-friendly. Health and Education facilities should be provided and ensure proper delivery of facilities to village dwellers. Repair & maintenance of Existing Public Buildings like Gram Panchayat, Public Library, School Buildings, Health Center, public Toilet Block & Other.

4.1.5 Scope of the Study

Rural development aim at improving rural people's livelihoods in an equitable and sustainable manner, both socially and environmentally, through better access to assets (natural, physical, human, technological and social capital), and services, and control over productive capital (in its financial or economic and political forms) that enable them to improve their livelihood on a sustainable and equitable basis.

Design, develop and provide more efficient and sustainable electricity in rural area for providing better connection of electricity in rural areas by Utilizing each resources maximum which comes with Developing and Using Sustainable and Economical Planning and Designing.

4.1.6 Methodology Frame Work for development of your village

Collection of Data

- Population data (as per census)
- Literacy or illiteracy
- Socio-economic status
- Family composition

Household Information

- Occupation data
- Basic amenities
- Family composition
- Facility of water

Solid Waste Management

- Disposal of the waste
- Amount of waste generated.
- Method of collection of solid waste

Transportation Data

- No of Main Roads
- No of Approach Road
- Types of Road

4.1.7 List of Objects Available related to Civil Methodology

- Roadways
- Gram panchayat
- Lake
- Canal
- Bus stop
- School
- Water tank

4.2 Narthan Study Area Profile

4.2.1 Study Area Location with brief History land use details

Area Located in rural region of Surat district of Gujarat. According to the administration records, the village code of Narthan is 523774. Its geographical coordinates are 21° 16' 25.1" North 72° 42' 30.4" East. The latitude 21.273 and longitude 72.708 are the geo-coordinate of the Narthan. The other nearest state capital from Narthan is Surat and its distance is 20 KM. Total Area of village is 577.59 hectares.

4.2.2 Base Location map, Land Map, Gram Tal Map

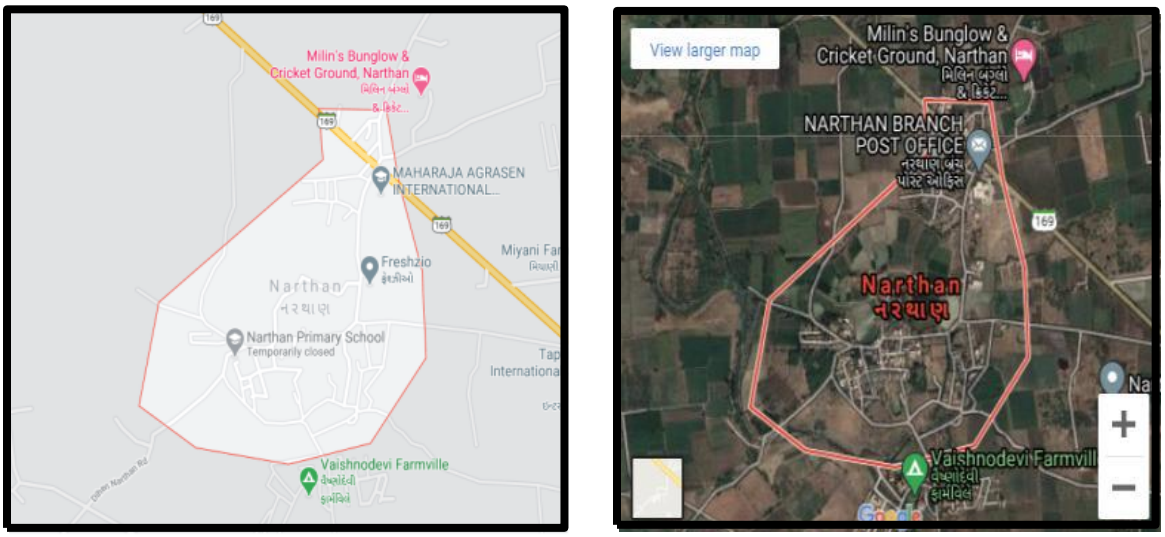

Figure 35 - satellite map and base map of village Narthan

4.2.3 Physical & Demographical Growth

Narthan is a medium size village located in Olpad of Surat district, Gujarat with Total 328 families residing. The Narthan village has population of 1237 of which 634 are males while 603 are females as per Population Census 2011. In village population of children with age 0-6 is 138. Narthan village has higher literacy rate compared to Gujarat. In 2011, literacy rate of Narthan village was 85.71 % compared to 78.03 % of Gujarat. In Narthan Male literacy stands at 90.09 % while female literacy rate was 81.09 %.

4.2.4 Economic generation profile / Banks

In the past years of Narthan village, very less no. of infrastructure facilities were available. From the government schemes and development programs the conditions of the village improved by the governing steps. Narthan was the locality of schedule tribes and remains same till date. The tribe cultural still remains in village.

4.2.5 Actual Problem faced by Villagers and smart solution

Due to lack of infrastructure facilities like health services, sustainable development programs and economic facilities. People are not getting work in village and due to insufficient facilities people are migrating from village to other cities.

By providing the basic infrastructure facilities like Health centre, Goverment schools, Water harvesting system, ATM and provision of scope of work. This will help to minimize the problems faced by villagers.

Social scenario

In social infrastructure health and education facilities are provided to ensure the proper delivery of facilities to village dwellers.

Educational facilities

Primary school -1 to 8 standards only
Higher secondary – No College

Health facilities

No Primary health centers

4.2.6 Social scenario -Preservation of Traditions, Festivals, Cuisine

Traditions

- Marriage songs (lagan geet)

Festivals

- All hindu festivals
- Vishwa adivasi divas
- Adivasi yatra

Cuisine

- Dhokla
- Bhadku
- Bafanu

4.2.7 Migration Reasons / Trends

Due to lack of infrastructure facilities like health services, sustainable development programs and economic facilities. People are not getting work in village and due to insufficient facilities people are migrating from village to other cities.

4.3 Data Collection (Photograph/Graphs/Charts/Table)

4.3.1 Describe Methods for data collection

- Direct communication
- Government websites
- Communication
- Views of Sarpanch
- Data from Talati
- Self Observation

4.3.2 Primary details of survey

No. of sub-villages - 8

Sub – villages

- Harijanvas
- Patel faliyu
- Ahir faliyu
- Pancholi faliyu
- Sidhhnathnagar
- Navapara
- Sardar Awas
- Harpativas

Health care centre (under Ayushman Bharat Yojna):

There is no health centre in village.

Primary school:

No. of students in school are 78 students. Standards – from 1 to 8

Irrigation water:

Only half of the village gets the water from dam via canal. Tube well-constructed in village.

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

- In Narthan village some houses are of the old structures with load bearing walls and some are new well-constructed RCC Structure.

4.3.4 No of Human being in One House -

- There are about 288 houses in Narthan village according to census 2011 and average human being in one house is about 4-5.

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

- **Material available locally**
  - Coarse Aggregate
  - Fine Aggregate
  - Wood
  - Cement
  - Water
  - Bricks Etc.,
- **Out sourced material**
  - Reinforcement
  - Plastic Cover

4.3.6 Geographical Detail : Narthan village

Area Located in rural region of Surat district of Gujarat. According to the administration records, the village code of Narthan is 523774. Its geographical coordinates are 21° 16' 25.1" North 72° 42' 30.4" East. The latitude 21.273 and longitude 72.708 are the geo-coordinate of the Narthan. The other nearest state capital from Narthan is Surat and its distance is 20 KM. Total Area of village is 577.59 hectares.

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

Narthan is a medium size village located in Olpad of Surat district, Gujarat with Total 328 families residing. The Narthan village has population of 1237 of which 634 are males while 603 are females as per Population Census 2011. In village population of children with age 0-6 is 138. Narthan village has higher literacy rate compared to Gujarat. In 2011, literacy rate of Narthan village was 85.71 % compared to 78.03 % of Gujarat. In Narthan Male literacy stands at 90.09 % while female literacy rate was 81.09 %.

Table 13 – Demographic Details of Narthan			
Particulars	**Total**	**Male**	**Female**
Total No. Of Houses	328	-	-
Population	1237	634	603
Child(0-6)	138	69	69
Schedule Caste	108	58	50
Schedule Tribe	382	198	184
Literacy	85.71%	90.09%	81.09%

4.3.8 Occupational Detail

In Narthan village out of total population, 621 were engaged in work activities. 100.00 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 0.00 % were involved in Marginal activity providing livelihood for less than 6 months. Of 621 workers engaged in Main Work, 105 were cultivators (owner or co-owner) while 350 were Agricultural labourer.

4.3.9 Agricultural Details / Organic Farming / Fishery

In the agriculture they grown the wheat, rice and vegetables majorly.

4.3.10 Physical Infrastructure Facilities - Manufacturing HUB / Ware Houses

- Village roads
- Water tanks – overhead (40,000 litre capacity – 2 numbers)
- Gram panchayat
- Post office
- Village doesn’t have any manufacturing hub or ware house.

4.3.11 Tourism development available in the village for attracting the tourist

In village there is 2 Private clubs are available.

4.4 Infrastructure Details

4.4.1 Drinking Water / Water Management Facilities

Pipe water supplying system is a one of an infrastructure facility, which delivers the water to every individual house for domestic use and drinking. There is 2 Lake which is not a part of a surface water supply but it used for washing Clothes and animals. An Overhead water tank of capacity 40,000 Litre is a main storage unit of water for Narthan village.

4.4.2 Drainage Network / Sanitation Facilities

In village there is underground drainage network but it is covered 70-80 % of village.

Sanitary Facility:

The villagers don't have a good sanitary facility. No public toilet, Community toilet, is the drawback of village.

4.4.3 Transportation & Road Network

The village approach road is pucca road. The main roads are made of from Bituminous roads and internal streets are kuchha roads and Block roads

Figure -36 Road Network of Narthan village

Transportation facilities:

There is a no local bus station which provide transportation outside the village. There are chhakdo ,rikshaw and private vehicles are used for internal transportation.

4.4.4 Housing condition: (60% kaccha & 40% pacca)

Figure -37 Housing Condition

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

- There is Primary school available and in that library is located. In Library there are 600 books available.
- There are two ponds available.

Table -14 Social Infrastructure Facility	
Infrastructure facilities	**Details**
Health	No
Education	1 Primary school & No play group
Community Hall	No
Library	No

4.4.6 Existing Condition of Public Buildings & Maintenance of Existing Public Infrastructure

Water Management system

Panchayat Building

Post office

Aanganwadi

Primary School

LED Street lights

Figure 38 - Existing condition of public infrastructure

4.4.7 Technology Mobile/ WIFI / Internet Usage Details

There is personal Wi-Fi in the village. From the total population 50% people are used mobile phone and used their own internet. There is no any other Wi-Fi facility available for public usage.

4.4.8 Sports Activity as Gram Panchayat

There is no sports activity in the village. Sometimes cricket match is organized by Gram Panchayat in their cricket ground.

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

- Public Library: There is Library in primary school of the village.
- Public Garden: There is no Public Garden in the village.
- Village Pond: There is two pond or lake in the village.
- Community Hall: There are no community hall in the village.
- Playground: There is a rural playground available in village.
- Park: There is no park available in village.
- Temple: There is two- three temples available,

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

Footpath development: A block Footpath is available in different roads of village

4.4.11 Any other details

There are temples, private clubs are available.

Figure -39 Block Footpath

Figure -40 Temple

4.5 Electrical Concept

4.5.1 Renewable energy source planning particularly for villages

There is no renewable energy source available in village.

4.5.2 Irrigation Facilities

Rise, vegetables & wheat are agriculture commodities grow in this village. Villagers depend on pond and rainwater for irrigation.

4.5.3 Electricity Facilities with Area

Village has the 24*7 electricity in the all the houses of the village, and electricity is provided by the GEB.

4.6 Existing Institution like - Village Administration – Detail Profile

4.6.1 Bachat Mandali

There is no bachat mandali in village.

4.6.2 Dudh Mandali

There is one Dudh mandali available in village.

4.6.3 Mahila forum

There is no Mahila forum in village.

4.6.4 Plantation for the Air Pollution

For reducing pollution panchayat has stated planting trees over the areas on which plantation is possible.

4.6.5 Rain Water Harvesting - Waste Water Recycling

- Rainwater harvesting required in village and also we proposed that design in this semester.
- There is no wastewater recycling is available, so we recommend wastewater drainage system (sewage disposal) design in next semester.

4.6.6 Agricultural Development

- No Agricultural Development like organization available in village, But there is many farms and they produce sugarcane & vegetables.
- Sometimes sarpanch is arrange the meeting.

4.6.7 Any Other

- Village has two tanks of water each capacity is 40,000 liter.
- Village has two-three temples.
- Private clubs are available in the village and near the village.

CHAPTER 5. TECHNICAL OPTIONS WITH CASE STUDY

5.1 Concept (Civil)

5.1.1 Advance Sustainable construction techniques / Practices and Quantity Surveying

The adoption of advanced construction technology requires an appropriate design, commitment from the whole project team, suitable procurement strategies, good quality control, appropriate training and careful commissioning. Advanced construction technologies are commonly described as including (amongst many others) advanced forms of:

- Computer aided design and computer aided manufacturing (CAD/CAM).
- Building information modeling (BIM)
- 3D printing

5.1.2 Soil Liquefaction

Soil liquefaction occurs when a saturated or partially saturated soil substantially loses strength and stiffness in response to an applied stress such as shaking during an earthquake or other sudden change in stress condition, in which material that is ordinarily a solid behaves like a liquid. If the pressure of the water in the pores is great enough to carry all the load, it will have the effect of holding the particles apart and of producing a condition that is practically equivalent to that of quicksand. the initial movement of some part of the material might result in accumulating pressure, first on one point, and then on another, successively, as the early points of concentration were liquefied.

The phenomenon is most often observed in saturated, loose (low density or uncompacted), sandy soils. This is because a loose sand has a tendency to compress when a load is applied. Dense sands, by contrast, tend to expand in volume or 'dilate'. If the soil is saturated by water, a condition that often exists when the soil is below the water table or sea level, then water fills the gaps between soil grains ('pore spaces'). In response to soil compressing, the pore water pressure increases and the water attempts to flow out from the soil to zones of low pressure (usually upward towards the ground surface). However, if the loading is rapidly applied and large enough, or is repeated many times (e.g. earthquake shaking, storm wave loading) such that the water does not flow out before the next cycle of load is applied, the water pressures may build to the extent that it exceeds the force (contact stresses) between the grains of soil that keep them in contact. These contacts between grains are the means by which the weight from buildings and overlying soil layers is transferred from the ground surface to layers of soil or rock at greater depths. This loss of soil structure causes it to lose its strength (the ability to transfer shear stress), and it may be observed to flow like a liquid (hence 'liquefaction').

5.1.3 Sustainable Sanitation

Sustainable sanitation recognizes that in order to be sustainable, a sanitation approach must be socially acceptable and economically viable. In this way, sustainable sanitation is a loop- based approach that differs fundamentally from the current linear concepts of waste water management, and that does not only recognize technology, but also social, environmental and economic aspects. Sustainable sanitation is an approach that considers sanitation holistically. It recognizes that human excreta and wastewater are not waste product, but valuable resources. This view is based on the fact that wastewater and excreta contain significant amount of energy plant nutrients and also water that can be recycled and reused, thus protecting natural resources. The main objective of a sanitation system is to protect and promote human health by providing a clean environment and breaking the cycle of disease. In order to be sustainable, a sanitation system has to be not only economically viable, socially acceptable, and technically and institutionally appropriate, it should also protect the environment and the natural resources.

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

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

Figure – 41 Sustainable Sanitation

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

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

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

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

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

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

5.1.4 Transport Infrastructure / system

An intelligent transportation system (ITS) is an advanced application which aims to provide innovative services relating to different modes of transport and traffic management and enable users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks. Some of these technologies include calling for emergency services when an accident occurs, using cameras to enforce traffic laws or signs that mark speed limit changes depending

on conditions.Intelligent transport systems vary in technologies applied, from basic management systems such as car navigation; traffic signal control systems; automatic number plate recognition or speed cameras to monitor applications, such as security CCTV systems; and to more advanced applications that integrate live data and feedback from a number of other sources.

Available transport Infrastructure in village

There are Roads are available. The condition of roads are good and it is pucca type road. There are transportation done by rickshaw, chhakdo and private vehicle.

5.1.5 Vertical Farming

Vertical farming is the practice of growing crops in vertically stacked layers. It often incorporates controlled-environment agriculture, which aims to optimize plant growth, and soilless farming techniques such as hydroponics, aquaponics, and aeroponics. Some common choices of structures to house vertical farming systems include buildings, shipping containers, tunnels, and abandoned mine shafts. As of 2020, there is the equivalent of about 30 ha (74 acres) of operational vertical farmland in the world. The modern concept of vertical farming was proposed in 1999 by Dickson Despommier, professor of Public and Environmental Health at Columbia University. Despommier and his students came up with a design of a skyscraper farm that could feed 50,000 people. Although the design has not yet been built, it successfully popularized the idea of vertical farming. Current applications of vertical farming coupled with other state-of-the-art technologies, such as specialized LED lights, have resulted in over 10 times the crop yield than would receive through traditional farming methods.

The main advantage of utilizing vertical farming technologies is the increased crop yield that comes with a smaller unit area of land requirement. The increased ability to cultivate a larger variety of crops at once because crops do not share the same plots of land while growing is another sought-after advantage. Additionally, crops are resistant to weather disruptions because of their placement indoors, meaning less crops lost to extreme or unexpected weather occurrences. Because of its limited land usage, vertical farming is less disruptive to the native plants and animals, leading to further conservation of the local flora and fauna.

Vertical farming technologies face economic challenges with large start-up costs compared to traditional farms. In Victoria, Australia, a “hypothetical 10 level vertical farm” would cost over 850 times more per cubic meter of arable land than a traditional farm in rural Victoria. Vertical farms also face large energy demands due to the use of supplementary light like LEDs. Moreover, if non-renewable energy is used to meet these energy demands, vertical farms could produce more pollution than traditional farms or greenhouses.

In this village no vertical farming is available.

5.1.6 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure

Corrosion Mechanism, Prevention & Repair Measures of RCC Structure Though concrete is quite strong mechanically, it is highly susceptible to chemical attack and thus structure gets damaged and even fail unless some preventive measures are adopted to counteract this and thereby increasing the durability of structure. Overall, there is very little published empirical evidence that provides insight into the durability of silane treatments and their long-term residual protection (i.e. following at least 10 years of service). Such a gap in knowledge is undesirable given the scale of infrastructure treated with hydrophobic treatments such as silanes.

5.1.7 Sewage treatment plant

Sewage treatment is the process of removing contaminants from municipal wastewater, containing mainly household sewage plus some industrial wastewater. Physical, chemical, and biological processes are used to remove contaminants and produce treated wastewater (or treated effluent) that is safe enough for release into the environment. A by-product of sewage treatment is a semi-solid waste or slurry, called sewage sludge. The sludge has to undergo further treatment before being suitable for disposal or application to land.

Sewage treatment may also be referred to as wastewater treatment. However, the latter is a broader term that can also refer to industrial wastewater. For most cities, the sewer system will also carry a proportion of industrial effluent to the sewage treatment plant that has usually received pre-treatment at the factories to reduce the pollutant load. If the sewer system is a combined sewer, then it will also carry urban runoff (stormwater) to the sewage treatment plant. Sewage water can travel towards treatment plants via piping and in a flow aided by gravity and pumps. The first part of the filtration of sewage typically includes a bar screen to filter solids and large objects that are then collected in dumpsters and disposed of in landfills. Fat and grease are also removed before the primary treatment of sewage.

5.2 Concept (Electrical)

5.2.1 Programmable Load Shedding

Programmable load shedding time management system is a reliable circuit that takes over the manual task of switch ON/OFF the electrical devices with respect to time. It uses real time clock (RTC) interfaced to a microcontroller of 8051 family. Multiple ON/OFF time entry is the biggest advantage with this project. The demand for electrical energy is increasing. Today over 21% of the total electrical energy generated in Nigeria is lost in transmission (4-6%) and distribution (15-18%). The electrical power deficit is currently about 18% in the country. Clearly, reduction in distribution losses can reduce this deficit by significantly. Its possibility to bring down the distribution losses to a 6-8 % level in India with the help of newer technological option

(including information technology) in the electrical power distribution sector which will enable better monitoring and control. The project "Electricity and load shedding monitoring" are designed such that distribution point or grids monitored and load shedding from one central location.

Load shedding in electrical supply networks is a controlled process in which the utility company drops off part of the load in order to balance the demand and the generated capacity. This is often done whenever there is excess load on the system. In standby generators, it involves disconnecting or shedding some circuits to prevent an overload condition. The main aim of this work is to build a microcontroller based device the on/off a power supply whenever there is excess load on the system.

5.2.2 Railway Security System using IoT

The objective of this project is to create a Security System for the goods that are carried in open top freight trains. The most efficient way to secure anything from thieves is to have a continuous observation. So for continuous observation of the open top freight train, Camera module2 has been used. Passive Infrared Sensor (PIR) 1 has been used to detect the motion or to sense movement of people, animals, or any object. So whenever a motion is detected by the PIR sensor, the Camera takes a picture of that particular instance. That picture will be send to the Raspberry PI which does Skin Detection Algorithm and specifies whether that motion was created by a human or not. If a human makes it, then that picture will send to the drop box. Any Official can have a look at the same. The existing system has a CCTV installed at various critical locations like bridges, railway stations etc. but they does not provide a continuous observation. This paper describes about the Security System that provides continuous observation for open top freight trains so that goods can be carried safely to its destination.

5.2.3 Management through Energy Harvesting Concept

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

Collections of tiny, inexpensive wireless sensor nodes (modules), organized in clusters and networks deployed over a geographical area, capable to integrate continuous and unobtrusive measurement, computing and wireless communication, have attracted much attention during the last decade in forming the concept of smart spaces. One of the many challenges associated with sensing multiple parameters from the environment, by using wireless sensor networks, is to how to transmit data and power the sensors. Batteries provide the most obvious power source of sensor nodes. In spite of the fact that battery technology is mature, extensively commercialized, and completely self-contained, even for relatively large battery capacity and moderate communication traffic requirements, the mean time to replacement or recharging is only two or

three years. For deployment with hundreds of sensors, this means that a battery will need a replacement every few days, what represents an unsuitable rate for many applications. Several solutions to the power problem exist, such as reducing power consumption to the point where batteries can elongate the sensor module's lifetime.

5.2.4 Moisture Monitoring System

Planting a tree in an environment where the seed or the plant would not get water adequately through natural sources like rain or ground water in its initial phases has been always a matter of concern for tree planters. This is where an autonomous moisture monitor for plants system can help. The system timely monitors the moisture level of the soil. If at the time of monitoring it comes to know that the moisture level of the soil is lower than recommended then it will raise an audio visual alert. This alert is then received by the care taker of the plant. When the care taker waters the plant the alarm goes off and the monitoring cycle continues.

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

5.2.5 Home Automation using IoT/Any other methodology

IoT and home automation: What does the future hold?

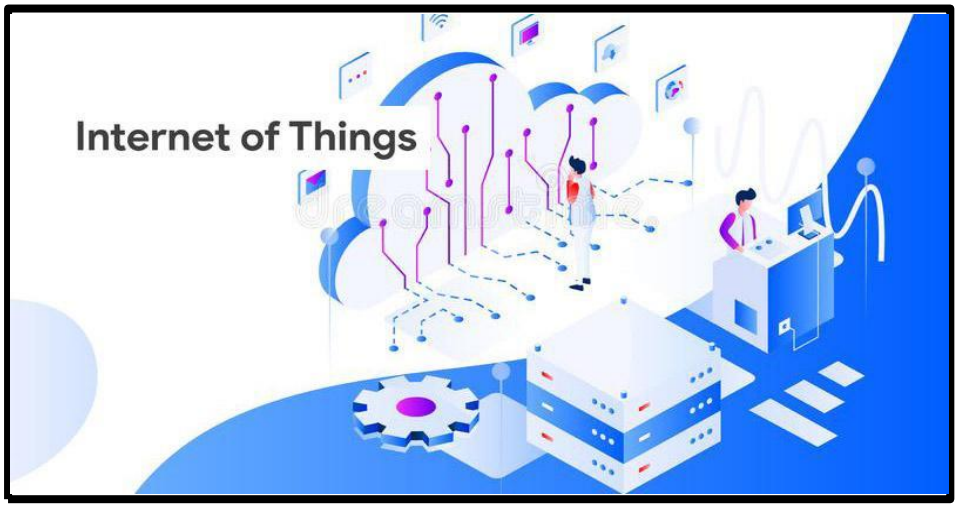

Figure - 42 Internet of things

Once a dream, IoT home automation is slowly but steadily becoming a part of daily lives around the world. In fact, it is believed that the global market for smart home automation will reach $40 billion by 2020. This shouldn't be surprising when you consider the convenience and ease that smart home devices offer. Since these IoT devices are interconnected, it becomes easier to

manage multiple operations. In fact, IoT home devices also help in reducing costs and energy, not to mention time as well.

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IoT home automation – Smart homes and Internet of Things

Before proceeding any further, let's take a closer look at IoT. 'Internet of Things' an umbrella term used for all technologies that enable the connection of a device to the Internet. Such systems depend on the collection of data. The data is then used for monitoring, controlling and transferring information to other devices via the internet. This allows specific actions to be automatically activated whenever certain situations arise. In a simple example, consider a smart kettle. The kettle can be programmed to automatically turn off once it reaches a specific temperature. It might also send a notification to the user on the same. Now apply the same concept to the entire home and all the devices present. That is a smart home powered by IoT. Instead of manually going up to the device and taking action, those actions can be taken at the press of a button. These days, most smart IoT home automation devices allow you to control them via an app or even via voice commands.

Now imagine if you did not even need to undertake such actions. In other words, the smart home will know when to take certain actions and automatically take them. This is where the future of home automation and IoT lies. Here are some possible scenarios that we may see in future.

Lighting

These days, smart lighting is all the rage. They can be scheduled to turn on/off and change their intensity. However, in future, it is possible for this to be taken a step further. With IoT enabled across the home, the lights can respond to other actions you take.

For example, the lights can respond to your home cinema. They can turn off or dim whenever you start watching a movie. Going further, they may even react to the type of movie. For example, they can turn off completely if the lights sense that you are watching a horror movie, giving you the proper atmosphere.

Doors

In the future, doors can become smarter as well. Imagine them opening only when you enter or close. This may be made possible via a smart device or facial recognition. This can be taken to the next step by getting the rest of the house take actions in tandem with your entry.

For example, the lights can turn on as soon you as enter through the door. Alternatively, if you are leaving, they can turn off.

Windows

Windows can become smarter as well. Imagine them automatically open the shutters when the sun rises and close at sunset. You may even be able to program them to close automatically when it rains. Consider the previous example of a home movie. Your curtains can lower whenever you are watching a movie.

Thermostat

These days, you can control your home thermostat remotely via apps. In the future, you may not even need to do that. The thermostat will be able to recognize if you are nearing your home. It will then check the room and external temperature and set the right one for you. It may even recognize when you are taking certain actions and adjust accordingly such as when you are showering or exercising.

Gardens

Even your gardens can become smarter in the future with IoT. You will be able to place IoT sensors in the garden. If these sensors detect dryness in the soil, they can trigger the irrigation system. Robotic lawnmowers can be automatically deployed if the grass exceeds a certain height.

Applications and Technologies

Home automation is prevalent in a variety of different realms, including:

- **Heating, ventilation and air conditioning (HVAC):** It is possible to have remote control of all home energy monitors over the internet incorporating a simple and friendly user interface.
- **Lighting control system:** A "smart" network that incorporates communication between various lighting system inputs and outputs, using one or more central computing devices.
- **Occupancy-aware control system:** It is possible to sense the occupancy of the home using smart meters and environmental sensors like CO2 sensors, which can be integrated into the building automation system to trigger automatic responses for energy efficiency and building comfort applications.
- **Home robots and security:** A household security system integrated with a home automation system can provide additional services such as remote surveillance of security cameras over the Internet, or access control and central locking of all perimeter doors and windows.
    - Leak detection, smoke and CO detectors and Indoor positioning systems (IPS).
    - Home automation for the elderly and disabled.
    - Pet and Baby Care, for example tracking the pets and babies' movements and controlling pet access rights.
    - Air quality control. i.e, Air Quality Egg is used by people at home to monitor the air quality and pollution level in the city and create a map of the pollution.
    - Smart Kitchen and Connected Cooking.
    - Voice control devices like Amazon Alexa used to control home systems.

Home automation has three major parts:

- Hardware
- Software/Apps
- Communication Protocols

Home automation components

- IoT Sensors
- IoT Gateways
- IoT Protocols
- IoT Firmware
- IoT Cloud and Databases
- IoT Middleware (if required)

Advantages of IoT Devices

- IoT encourages the interaction between devices called as a machine-to-machine interaction.
- It provides good automation and control.
- Integrated with more technical information, so it is better to operate.
- IoT possesses strong monitoring feature.
- It saves a lot of time.
- IoT helps to save more money by reducing manual task and time.
- Automating daily life tasks makes good monitoring of devices.
- Increased efficiency and time-saving.
- With good features make a better quality of life.
- As the devices of IoT interact and communicate with each other and do lot of task for us, then they minimize the human effort.

Disadvantages of IoT Devices

- Internet of Things devices does not have any international compatibility standard.
- They may become highly complex resulting in failure.
- Internet of Things devices may get affected by privacy and security breach.
- Reduced safety for users.
- Reduction in the employment of manual tasks thus resulting in job reductions.
- The designing, developing, and maintaining and enabling the large technology to IoT system is quite complicated.
- Internet of Things device may take control of life in due course of time with increasing AI technology.

Table - 15 Costing of IOT Devices		
SR. NO.	**DEVICES**	**COST**
1.	AMAZON ECHO PLUS (2^{ND} GEN)	Rs. 14,000
2.	AUGUST SMART LOCK PRO	Rs. 36,999
3.	NEST PROTECT SMOKE PLUS	Rs. 25,999
4.	PHILIPS HUE BULBS AND LIGHTING SYSTEM	Rs. 9,995
5.	RING VIDEO DOORBELL PRO	Rs. 30,999
6.	ECOVOT DEEBOT N79S	Rs. 30,999
7.	BLOSSOM SMART WATERING CONTROLLER	Rs. 8,665
8.	ERRO HOME WI-FI SYSTEM	Rs. 35,820
9.	LOGITECH CIRCLE 2	Rs. 23,617
10.	IOT BASED SINGLE PHASE SUB METER	Rs. 6,792-7,592

5.2.6 PC Based Electrical Load Control

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

The aim of this project is to control the electrical appliances through a personal computer (PC). For example, theatre lighting can be centrally controlled form the PC for better stage management. The aim of this project is to control the electrical appliances through a personal computer (PC). For example, theatre lighting can be centrally controlled form the PC for better stage management. Presently, they are manually managed which makes it difficult to coordinate the lighting with the respective scene. With this system, one can control the electrical appliances ON/OFF by just being seated at one place using a PC. This system is integrated with the electrical loads and also connected to the PC where centralized control takes place. It uses an RS-232 protocol from the microcontroller to communicate with the PC. To turn on/off the

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

5.2.7 Electrical Parameters Measurement

Electrical measurements are the methods, devices and calculations used to measure electrical quantities. Measurement of electrical quantities may be done to measure electrical parameters of a system. Using transducers, physical properties such as temperature, pressure, flow, force, and many others can be converted into electrical signals, which can then be conveniently measured and recorded. High-precision laboratory measurements of electrical quantities are used in experiments to determine fundamental physical properties such as the charge of the electron or the speed of light, and in the definition of the units for electrical measurements, with precision in some cases on the order of a few parts per million. Less precise measurements are required every day in industrial practice. Electrical measurements are a branch of the science of metrology.

CHAPTER - 6 SWATCHH BHARAT ABHIYAN (CLEAN INDIA)

6.1 Swatchhta needed in allocated village -Existing Situation with photograph

Sanitation:

As there is lack of toilet available which create unhygienic environment in village. cleanliness must be maintained and proper toilet facilities must be provided.

Drainage facility:

In Narthan, there is major issue of drainage. As we know, if we have excess or standing water, it can choke our crops. Drainage reduces soil and nutrient loss from runoff and can help avoid soil erosion.

Figure -43 Area of village which need swatchhta

6.2 Guidelines - Implementation in allocated village with Photograph

- To establish local environmental safeguard measures.
- To facilitate participation of local communities in improving water and sanitation management.
- All the remaining drainage work should be properly covered.
- The drainage should be connected with the municipal sewage and drainage system.

6.3 Actual Activity Done by Students for allocated village with Photograph

- Students create awareness among people about management of waste and how it is important.
- Students help all the villagers in cleaning up their respective areas and also cleaning up the garden area.
- They also help in keeping dustbins at regular junctions for a healthy environment.

CHAPTER - 7 VILLAGE CONDITION DUE TO COVID-19

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

The village follows stringent Covid-19 guidelines of the government. Nishaben Umeshbhai Patel, village sarpanch, said, she has given uniform, sticks and shoes to 14 volunteers to guard the village. Entry of any outsiders including labours is strictly prohibited. We don't allow even vegetable vendors, villagers eat vegetables which are grown inside the village.

7.2 Activities Done by Students for allocated village with Photograph

We interact with villagers and awakened them about covid-19 disease and their guidelines, and explain prevention of covid-19 as below.

- 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.

7.3 Any other steps taken by the students / villagers

We showed the video of spreading rate of covid-19 to the villagers and We also followed the all guidelines and use prevention of covid-19 during entire visit.

CHAPTER - 8 SUSTAINABLE DESIGN PLANNING PROPOSAL (PROTOTYPE DESIGN)- PART- I

8.1 Design Proposal:

8.1.1 DESIGN 1: Design of Public Latrine Block (PLB)

There is no public toilet block in the village rather there are individual toilet blocks for each house, so form hygiene point of view we have considered public toilet as the key requirement and have proposed the design for the same.

• **Design details:** Total area: 5.5m x 3.4m

It is a load bearing structure and as masonry foundation is provided, it requires only basic design criteria's such as width of foundation, depth of foundation etc. Light weight concrete blocks (12cm thick) are used for masonry in superstructure which reduces the overall weight transferring on the foundation and strength gained is more than ordinary brick masonry hence, it is feasible and economical too. Roof truss is provided instead of slab to reduce the overall cost of the structure. Total 4 urinals and 3 water closets are provided for male block and 3 water closets are provided for female blocks.

Proposed site: A vacant land is available in harpatiwas of village for construction of public latrine block. Detailed drawings of public latrine block are given below.

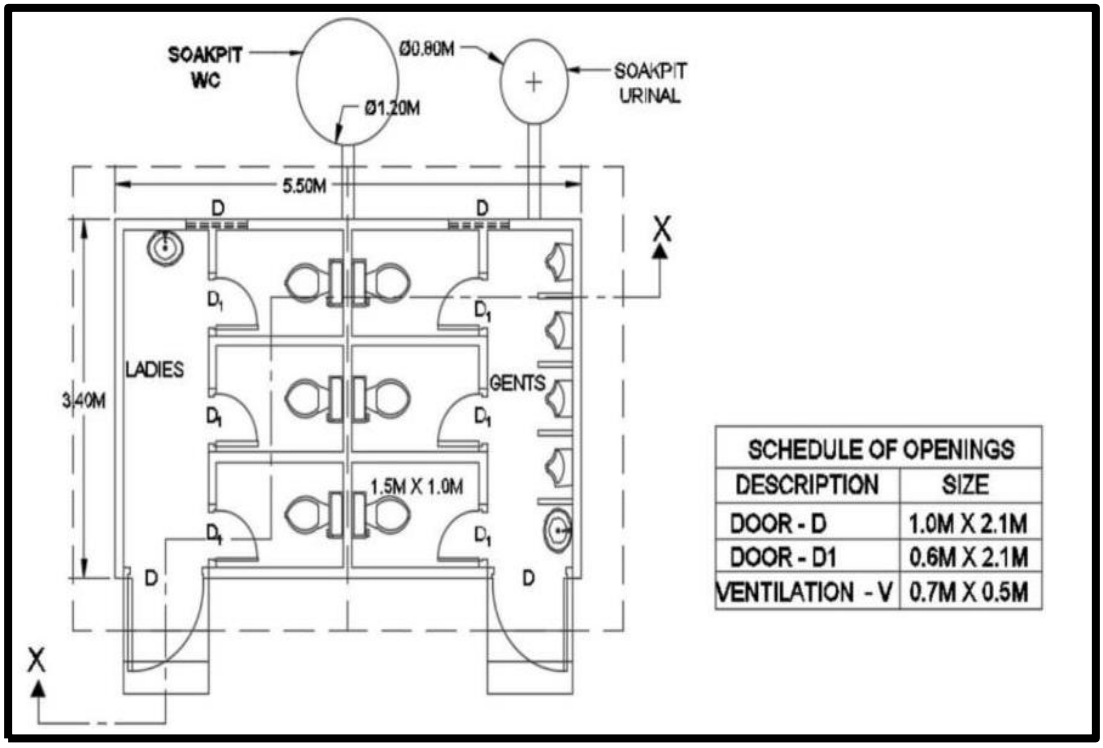

Figure -44 Plan of Public Latrine Block

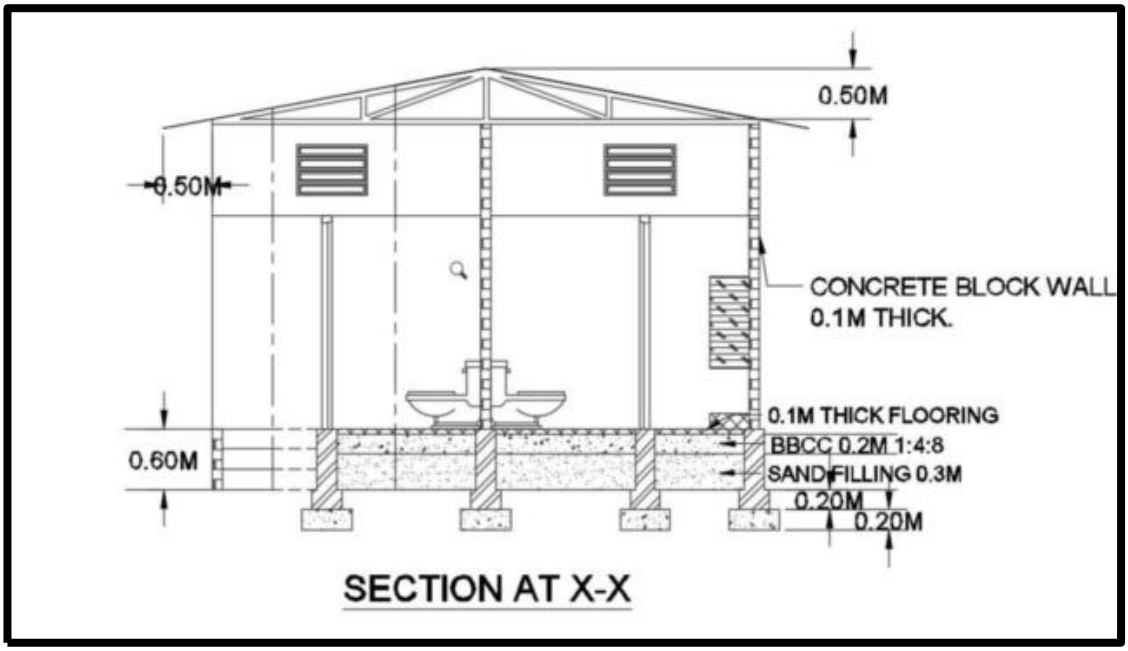

Figure -45 Section of Public Latrine Block

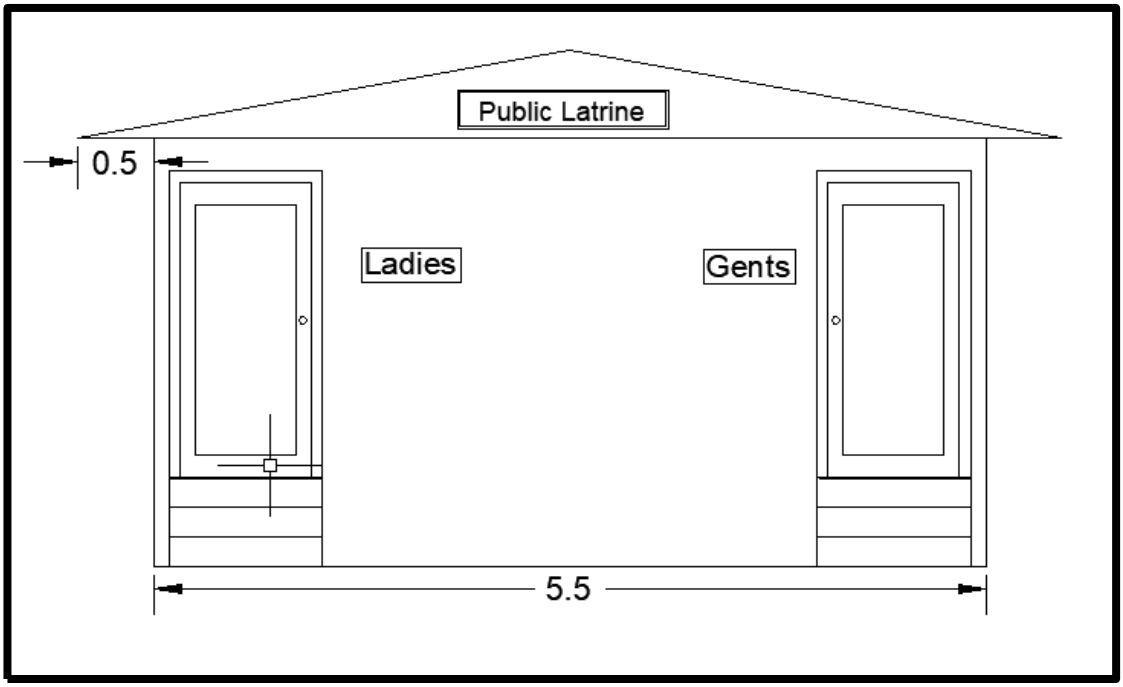

Figure -46 Elevation Of Public Latrine Block

Table 16 Measurement Sheet of Public Latrine Block							
Sr no	Description	NO	L	B	H	Quantity	Total
1	Excavation for foundation						
	Long Wall 1	2	6	0.5	1	6m³	
	Long Wall 2	2	4	0.5	1	4m³	
	Short Wall	5	2.9	0.5	1	7.25m³	
	Excavation for steps	2	1.2	0.6	0.2	0.28m³	
	Excavation for soak pit	1	1.2		2	2.26m4³	
	Excavation for soak pit	1	0.8		2	1.00m³	
						Total	20.7m³
2	PCC for foundation (1:6)						
	Long Wall 1	2	6	0.5	0.2	1.2m³	
	Long Wall 2	2	4	0.5	0.2	0.8m³	
	Short Wall	5	2.9	0.5	0.2	1.45m³	
	PCC for soak pit 1	1	3.76	0.2	0.2	0.15m³	
	PCC for soak pit 2	1	2.51	0.2	0.2	0.1m³	
	PCC for steps	2	1.2	0.6	0.2	0.28m³	
						Total	3.98m³
3	Brick Masonry in foundation (1:4)						
	Step:1						
	Long Wall	2	6	0.3	0.2	0.72m³	
	Long Wall 2	2	4	0.3	0.2	0.48m³	
	Short Wall	5	2.9	0.3	0.2	0.87m³	
	Step:2						
	Long Wall	2	6	0.2	0.6	1.44m³	
	Long Wall 2	2	4	0.2	0.6	0.96m³	
	Short Wall	5	2.9	0.2	0.6	1.74m³	
	Step 1	2	1	0.6	0.2	0.24m³	

	Step 2	2	1	0.4	0.2	0.16m³	
	Step 3	2	1	0.2	0.2	0.08m³	
	Brick Masonry for soak pit 1	1	1.2	0.1	2	0.24m³	
	Brick Masonry for soak pit 2	1	0.8	0.1	2	0.16m³	
						Total	7.09m³
4	Sand filling	1	5.3	3.2	0.3	5.089m³	
						Total	5.08m³
5	B.B.C.C (1:4:8)	1	5.3	3.2	0.2	3.39m³	
						Total	3.39m³
6	IPS Flooring (10 MM thick)	1	5.3	3.2		16.96m²	
	Flooring (Steps)	10	1.2	0.2		2.4m²	
						Total	19.3m²
7	Dado						
	Long Wall	6	5.3		1.2	38.16m²	
	Short Wall	8	3.2		1.2	23.04m²	
						Total	61.2m³
8	CLC Blocks in superstructure						
	Long Wall	2	5.5	3	0.1	3.3m³	
	Long Wall 2	2	3.5	3	0.1	2.1m³	
	Short Wall	5	3.2	3	0.1	0.48m³	
	Deduction						
	Door D	2	1	2.1	0.1	0.42m³	
	Door D1	6	0.6	2.1	0.1	0.75m³	
	Ventilator	2	0.7	0.5	0.1	0.07m³	
						Total	4.64m³
9	Door D (1m*2.1m)	2				2 Nos	2 Nos
	Door D1 (0.6m*2.1m)	6				6 Nos	6 Nos
	Ventilator (0.7m*0.5m)	2				2 Nos	2 Nos

10	RCC cover 1 (10cm)	1				1.2m	1.2mϕ
	RCC cover2 (10cm)	1				0.8m	0.8mϕ
11	WC Block	6				6 Nos	6 Nos
	Urinal Block	4				4 Nos	4 Nos
	WC basin	2				2 Nos	2 Nos
12	Outside Plaster (1:4)	1	16.8		3	50.4m²	
	Deduction						
	Door D	2	1		2.1	4.2m²	
	Ventilator	2	0.7		0.5	0.7m²	
						Total	45.5m²
13	Outside color	1	16.8		3	50.4m²	
		2	1		2.1	4.2m²	
		2	0.7		0.5	0.7m²	
						Total	45.5m²
14	Urinal division plate	4	0.5		0.5	1m²	
						Total	1m²

Table 17 Abstract Sheet of Public Latrine Block

Sr.no	Description	Rate	Quantity	Per	Amount
1	Excavation for foundation	80	20.79m³	m³	1663.20
2	PCC for foundation (1:3:6)	3500	3.98m³	m³	13930.00
3	Brick Masonry in foundation (1:4)	3450	7.09m³	m³	24460.50
4	Sand filling	644	5.089m³	m³	3277.32
5	B.B.C.C(1:4:8)	2705	3.39m³	m³	9169.95
6	IPS Flooring (10 MM thick)	353	19.36m²	m²	6834.08
7	Dado	532	61.2m³	m³	32558.40
8	CLC Blocks in superstructure	2650	4.64m³	m³	12296.00

9	Aluminum paneled Door D (1m*2.1m)	5880	2 Nos	Nos	11760.00
	PVC Door D1 (0.6m*2.1m)	1382	6 Nos	Nos	8292.00
	Ventilator (0.7m*0.5m)	1054	2 Nos	Nos	2108.00
10	Soak-pit	-	-		14780.00
11	WC Block	3525	6 Nos	Nos	21150.00
	Urinal Block	1200	4 Nos	Nos	4800.00
	WC basin	2897	2 Nos	Nos	5794.00
12	Outside Plaster (1:4)	132	45.5m²	m²	6006.00
13	Outside color	130	45.5m²	m²	5915.00
14	Urinal di vision plate	2200	1m²	m²	2200.00
			Total Cost Rs. 1,86,994.45/-		

8.1.2 Design 2 : Public Health Centre

There is no Public Health Centre in the village ,so villagers have to go other village for the treatment and checkup, so from health point of view we have considered public health centra as the key requirement and have proposed the design for the same.

Design details:

Total area: 6.87m x 8.35m
It is a load bearing structure and as masonry foundation is provided, it requires only basic design criteria's such as width of foundation, depth of foundation etc. There is simple structure of three room with partition wall of 0.2 m and exterior wall of 0.3 m. The area covered by three room which are Doctor's cabin a size of 3.53 m x 2.8 m, Patient waiting area size of 3.53 m x 3.07 m , Ward size of 3.2 m x 2.47 m and water closet of 3.2 m x 1.2 m. Verandah is also given size of 2.15 m x 3.2 m.

Proposed site:

A vacant land is available in Navapara area of village for construction of public Health centre. Detailed drawings of public health centre are given below.

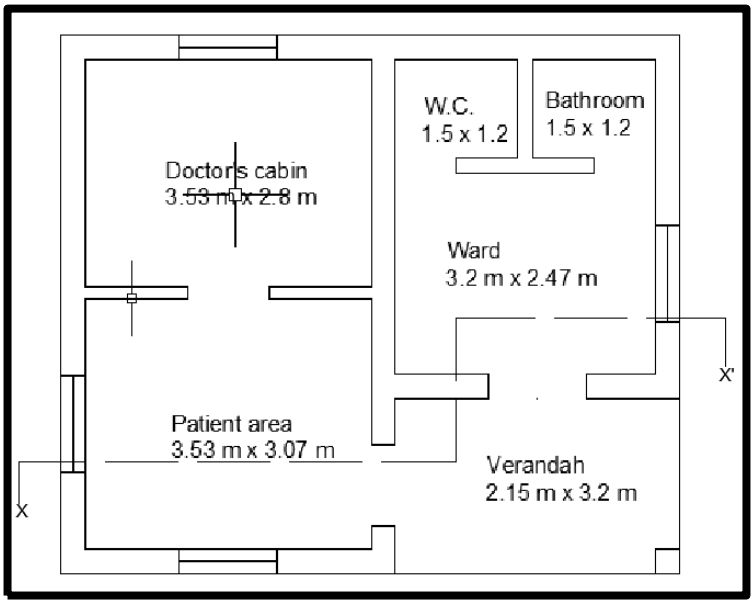

Figure -47 Plan of Public Health Centre

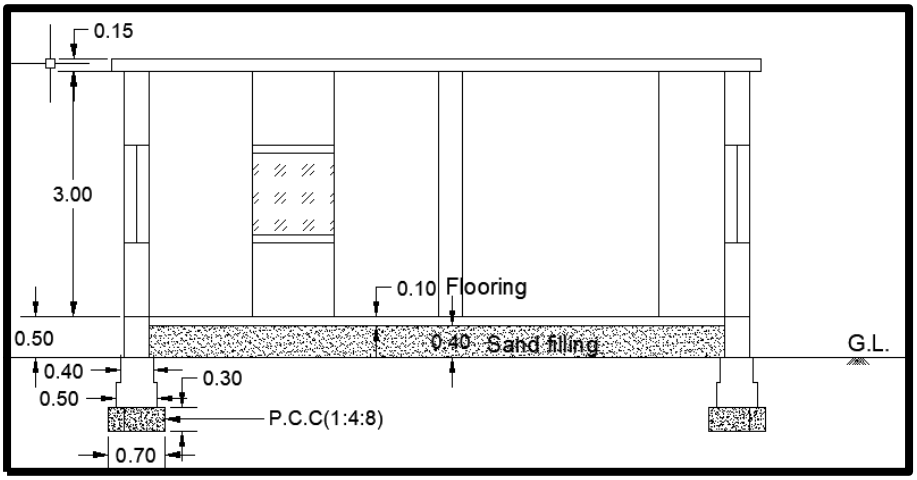

Figure -48 Section of Public Health Centre

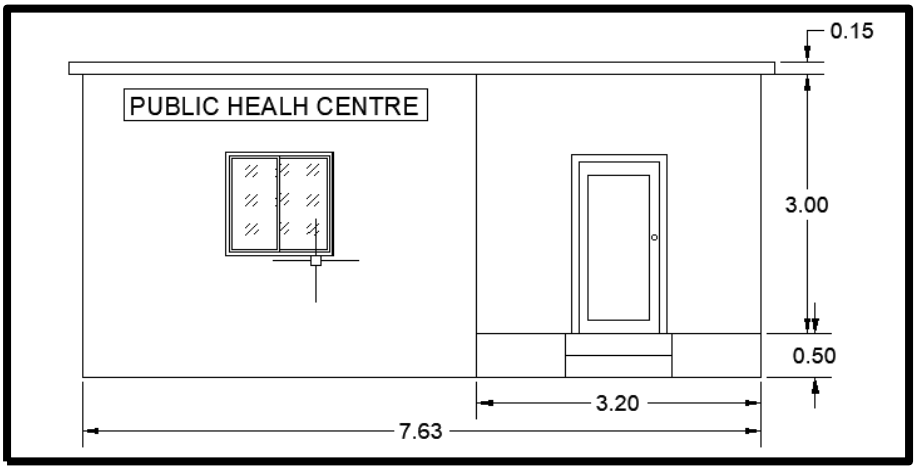

Figure -49 Elevation of Public Health Centre

Table -18 Quantity Sheet of PHC						
Sr. no.	Description Of Items	No	Length (M)	Width (M)	Height (M)	Quantity (M^3)
1	Excavation In Foundation	1	38.85	0.7	0.9	24.47
	L = Centre Line- Width of T Junction = 38.85 M					
2	P.C.C. In Foundation	1	38.85	0.7	0.3	8.158
	L = Centre Line- Width of T Junction =38.85					
3	Brickwork In Foundation					
	Step -1	1	39.45	0.5	0.3	5.9
	L = 40.95 - 0.5x3 = 39.45					
	Step- 2	1	39.75	0.4	0.3	4.77
	L= 40.95 - 0.4x3 = 39.75					
					Total = 10.67 m^3	
4	Brickwork From Ground Level to Plinth Level	1	39.75	0.4	0.5	7.95
	L = 40.95 - 0.4x3 = 39.75					
					Total = 7.95 m^3	
5	Earth Filling in Plinth					
	Doctor's Cabin	1	3.53	2.8	0.4	3.954
	Patient Area	1	3.53	3.07	0.4	4.335
	Ward	1	3.87	3.2	0.4	4.954
	Verandah	1	3.2	2.15	0.4	2.75
					Total =15.995 m^3	
6	Brickwork In Superstructure					
	L = 40.95 - 0.3x 3 = 40.05	1	40.05	0.3	3	36.04
	Partition Wall					
	L = 3.2 + 1.2 = 4.4	1	4.4	0.2	3	2.64
					Total = 38.68 M^3	
	Deduction					
	Door:					
	D 1	1	1.2	0.3	2.1	0.756
	D 2	2	1	0.3	2.1	1.26
	D 3	2	0.75	0.3	2.1	0.945
	Window:					
	W1	4	1.8	0.3	1.2	2.59
	Lintel:					
	D1	1	1.5	0.3	0.1	0.045
	D2	2	1.3	0.3	0.1	0.078
	W1	4	2.1	0.3	0.1	0.63

	Verandah:					
	Long Wall	1	3.2	0.3	3	2.88
	Short Wall	1	1.85	0.3	3	1.665
					Total =10.849 M^3	
	Total Brickwork in Superstructure = 38.68 -10.849 = 28.031 M^3					
7	Plastering Work					
	Inner Plaster:					
	Doctor's Room:					
	Long Wall	2	3.53	-	3	21.48
	Short Wall	2	2.8	-		16.8
	Patient Area:					
	Long Wall	2	3.53	-	3	21.18
	Short Wall	2	3.07	-	3	18.42
	Ward:					
	Long Wall	2	3.2	-	3	19.2
	Short Wall	2	2.47	-	3	14.82
	Verandah:					
	Long Wall	1	3.2	-	3	9.6
	Short Wall	1	2.15	-	3	6.45
	W. C.:					
	Long Wall	2	1.5	-	3	9
	Short Wall	2	1.2	-	3	7.2
	Deduction:					
	D1	1	1.2	-	2.1	2.52
	D2	2	1	-	2.1	4.20
	D3	2	0.75	-	2.1	3.15
	W1	2	1.8	-	1.2	4.32
					Total = 14.19 M^2	
		Total Inner Plaster = 160.3 - 14.2 = 146.16 M^2				
	Outer Plaster	1	22.85	-	3.75	85.6 M^2
	Deduction: W1	4	1.8		1.2	8.64 M^2
		Total Outer Plaster = 85.69 - 8.64 = 77.05 M^2				
	Total Plaster Work = 146.16 + 77.05 = 223.21 M^2					
8	2 Cm Thick Marble Flooring					
	Doctor's Cabin	1	3.53	2.8	-	9.884
	Patient Area	1	3.53	3.07	-	10.84
	Ward	1	3.2	2.47	-	7.91
	Verandah	1	3.2	2.15	-	6.88
	W.C.	2	1.5	1.2	-	3.6
	Door Sills :					
	D1	1	1.2	0.3	-	0.36
	D2	2	1	0.3	-	0.6
	D3	2	0.75	0.3	-	0.45
					Total = 40.52 M^2	

Table - 19 Abstract Sheet Of Health Centre					
Sr. No.	Description	Rate	Quantity	Per	Amount
1	Excavation For Foundation	85	24.47	M^3	2079.90
2	PCC In Foundation (1:3:6)	3200	8.158	M^3	26192.00
3	Brickwork In Foundation (1:4)	3200	10.67	M^3	34144.00
4	Brickwork In Superstructure	3500	28.031	M^3	98110.90
5	Earth filling In Plinth	50	15.995	M^3	799.75
6	2 Cm Marble Flooring	500	40.52	M^2	20260.00
7	Plaster Work	150	223.21	M^2	33481.50
8	Brickwork From Ground Level To Plinth Level	3500	7.95	M^3	27825.00
		Total = Rs. 242893			
		Add 1.5 % Water Charge = Rs. 3643			
		Add 10 % Profit = Rs. 24289.3			
		Total = Rs. 270825.3			

8.1.3 Design 3 : General Market

There is no General market in the village which cause unviability of food and other materials. So we take general market as the key requirement and have proposed the design for the same.

• Design details:

Total area: 9.5 m x 10.06 m
It is a load bearing structure and as masonry foundation is provided, it requires only basic design criteria's such as width of foundation, depth of foundation etc. The Market consist of 4 stalls a size of 3.89 m x 3.06 m, storage room a size of 2.44 m x 1.52 m , water closet 1.83 m x 1.52 m and an open space of 5.11 m x 2.82 m for future changes.

Proposed site:

A vacant land is available in Navapara area of village for construction of General market. Detailed drawings of General market are given below.

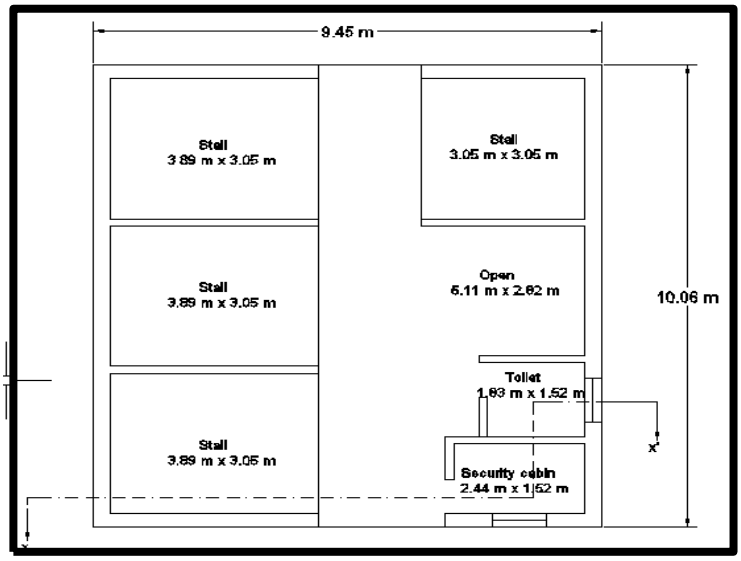

Figure -50 Plan of General Market

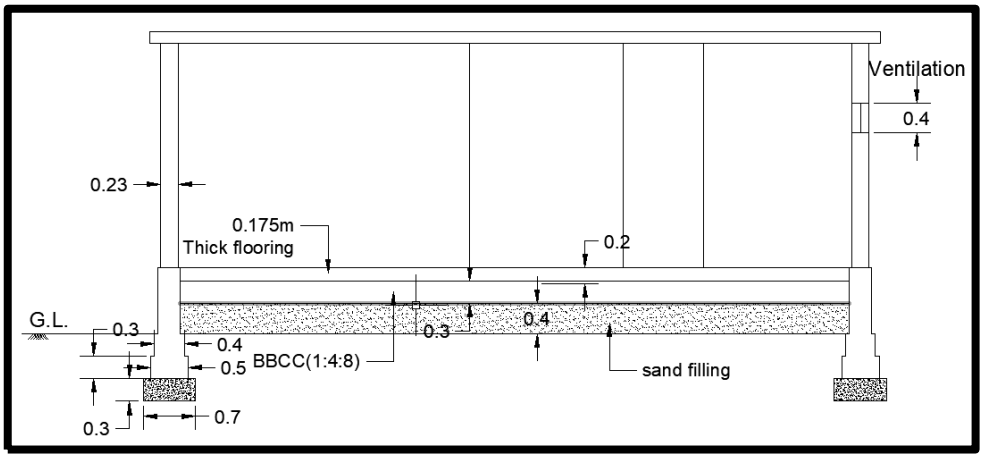

Figure -51 Section of General Market

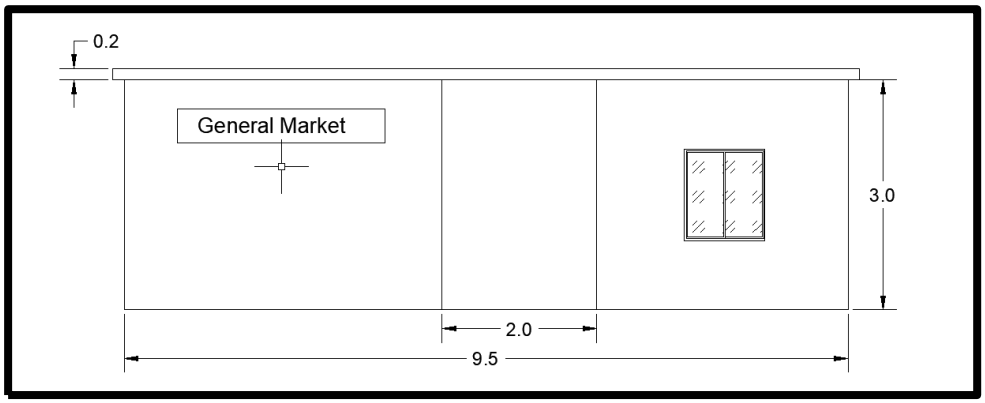

Figure -52 Elevation of General Market

Table -20 Measurement Sheet of General Market						
Sr. no.	Item description	Nos.	Length (m)	Width (m)	Height (m)	Quantity
1.	Excavation in foundation	1	52.53	0.7	0.9	33.10 m3
2.	P.C.C. (1:4:8)	1	52.53	0.7	0.3	11.03 m3
3.	Brick masonry in foundation and plinth in C.M. (1:6)					
	Step-1	1	53.23	0.5	0.3	7.98 m3
	Step-2	1	53.58	0.4	0.3	6.43 m3
	Step-3 (up to plinth)	1	54.93	0.3	0.4	6.59 m3
				Total Quantity = 21 m3		
4.	Sand filling in plinth = 16.76 m3	1	Total Quantity= 16.76 m3			
5.	Brickwork in superstructure	1	54.175	0.23	3	37.38 m3
6.	Deduction for Door and Window					
	D	2	0.6	0.23	2.1	0.58 m3
	W	1	1	0.23	1.2	0.276 m3
	V	1	0.4	0.23	0.4	0.037 m3
				Deduction = 0.893 m3		
	Deduction for lintels above door & windows with 15 cm bearing at each side					
	D1	1	0.9	0.23	0.15	0.0621 m3
	W	1	1.3	0.23	0.15	0.045 m3
	V	1	0.7	0.23	0.15	0.024 m3
				Deduction = 0.131 m3		
	Net Quantity =37.38-0.893-0.131= 36.35 m3					
7.	Inside Plaster (1:4) 12mm thick					
	Stall-1	2	3.89		3	23.34 m2
		1	3.05		3	9.15 m2
	Stall-2	2	3.89		3	23.34 m2
		1	3.05		3	9.15 m2
	Stall-3	2	3.89		3	23.54 m2
		1	3.05		3	9.15 m2
	Stall-4	2	3.05		3	18.3 m2
		1	3.05		3	9.15 m2
	Open space	1	3.05		3	9.15 m2
		1	2.82		3	8.46 m2
		1	2.06		3	6.18 m2
	Toilet	2	1.83		3	10.98 m2
		2	1.52		3	9.12 m2
	Storage room	2	2.44		3	14.64 m2
		2	1.52		3	9.12 m2

	Ceiling plaster					
	Toilet	1	1.83	1.52		2.78 m2
	Storeroom	1	2.44	1.52		3.71 m2
				Total quantity = 199.06 m2		
	Deduction					
	D	1	0.6		2.1	1.26 m2
	W	0.5	1		1.2	0.6 m2
	V	0.5	0.4		0.4	0.08 m2
					Deduction = 1.94 m2	
	Net Quantity=199.06-1.94= 197.06 m2					
8.	Outside plaster (1:6) 20mm thick					
	Long wall					
	Long side	2	10.06		3.5	70.42 m2
	Short side	1	9.45		3.5	33.075 m2
	Short wall-1	1	4.12		3.5	14.42 m2
	Short wall-2	1	2.9		3.5	10.15 m2
				Total quantity = 128.06 m2		
	Deduction					
	W	0.5	1		1.2	0.6
	V	0.5	0.4		0.4	0.08
	Deduction = 0.68 m2					
	Net Quantity=128.06-0.68= 127.38 m2					

Table -21 Abstract sheet of General Market

Sr. No	Particular	Quantity	Rate (Rs.).	Per	Amount (Rs.)
1. Earthwork in excavation up to 1.5m depth					
1.	Labor				
	Male Coolie	4	200	Day	800
	Female Coolie	2	180	Day	360
	Sundries				20
			Total cost Rs.1180		
2. Sand filling in foundation and plinth					
1.	Materials				
	Sand	16.76 m3	800	m3	13408
	Sundries				20
				Material cost Rs.13428	
2.	Labor				
	Male coolie	2	200	Day	400
	Female coolie	1	180	Day	180
	Bhistie	0.5	200	Day	100
	Sundries				20
				Labor cost Rs.700 Total cost Rs.14128	

3. P.C.C. (1:4:8) in Foundation					
1.	Materials				
	Cement	37 m3	280	Bag	10360
	Sand	5.157 m3	800	m3	4125.6
	Aggregate	10.314 m3	1000	m3	10314
	Sundries				50
				Material cost Rs.24850	
2.	Labor				
	Mistry	0.5	400	Day	200
	Mason	1	300	Day	300
	Male coolie	7	200	Day	1400
	Female coolie	11	180	Day	1980
	Bhistie	2.5	200	Day	500
	Sundries				50
				Labor cost Rs. 4430 Total cost Rs.29280	
4. Brick masonry in foundation (1:6)					
1.	Materials				
	Brick (19cmx9cmx9cm	14415 Nos.	4000	1000 Nos.	57660
	Cement	39	280	Bag	10920
	Sand	8.115	800	m3	6524
	Sundries				50
				Material cost Rs.75172	
2.	Labor				
	Mason	2	300	Day	600
	Male coolie	3	200	Day	600
	Female coolie	2	180	Day	360
	Bhistie	1	200	Day	200
	Sundries				50
				Labor cost Rs.1810 Total cost Rs.76782	
5. Brickwork in superstructure (1:6)					
1.	Materials				
	Brick (19cmx9cmx9cm)	18175 Nos.	4000	1000 Nos.	72700
	Cement	49	280	Bag	13720
	Sand	10.286	800	m3	82288
	Sundries				50
				Material cost Rs.168758	
2.	Labor				
	Mistry	0.5	400	Day	200
	Mason	7	300	Day	2100
	Male coolie	7	200	Day	1460

	Female coolie	7	180	Day	1260
	Bhistie	2	200	Day	400
	Sundries				50
				Labor cost Rs.5410 Total cost Rs.174168	
6. 12 mm thick cement plaster in C.M. 1:4					
1.	Materials				
	Cement	23	280	Bag	6440
	Sand	3.152	800	m3	2522
	Sundries				50
				Material cost Rs.9012	
2.	Labor				
	Mistry	0.25	400	Day	100
	Mason	10	300	Day	3000
	Male coolie	10	200	Day	2000
	Female coolie	10	180	Day	1800
	Bhistie	2	200	Day	400
	Sundries				50
				Labor cost Rs.7350 Total cost Rs.16362	
7. 20 mm thick plaster in C.M. 1:3					
1.	Materials				
	Cement	28	280	Bag	7840
	Sand	2.865	800	m3	2292
	Sundries				50
				Material cost Rs.10182	
2.	Labor				
	Mistry	0.25	400	Day	100
	Mason	10	300	Day	3000
	Male coolie	10	200	Day	2000
	Female coolie	10	180	Day	1800
	Bhistie	2	200	Day	400
	Sundries				50
				Labor cost Rs.7350 Total cost Rs.17532	
8. R.C.C. work for slab and lintel (1:1.5:3)					
1.	Materials				
	Cement	12 bags	280	Bag	3360
	Sand	0.64 m3	800	m3	512
	Aggregate	3.93 m3	1000	m3	3930
	Steel (1%)	117 kg	45	Kg	5265
	Binding wire	2 kg	50	Kg	100
	Sundries				50
				Material cost Rs.13217	

2.	Labor				
	Labor for mixing, transporting and placing concrete including curing	1.53 m3	300	m3	459
	Cost of hiring mixture and vibrator			L.S.	1000
	Labor for bending, cutting and placing reinforcement steel	118 kg	5	Kg	590
	Labor for centering and shuttering			L.S.	2000
	sundries				50
				Labor cost Rs.4099 Total cost Rs.17316	
					Total cost Rs.3,46,748 1.5% water charge Rs.5201 10% contractor's profit Rs.34674 Total cost = Rs. 3,86,623

8.1.4 Design 4 : Community Hall

There is no Community Hall in the village. There is no such place where the function, gathering or any other event can be held. So we take community hall as the key requirement and have proposed the design for the same.

• Design details :

Total area: 16 m x 11 m

It is a load bearing structure and as masonry foundation is provided, it requires only basic design criteria's such as width of foundation, depth of foundation etc. The community hall is G+1 structure, it consists of passage a size of 7.4 m x 3 m, hall size of 10.7 m x 9.2 m, Stage size of 8.3 m x 3.4 m and Store room size of 2.4 m x 3.4 m. Staircase is also provided a size of 3.3 m x 2.7 m.

Proposed site :

A vacant land is available in Navapara area near the pond of village for construction of Community Hall. Detailed drawings of Community Hall are given below.

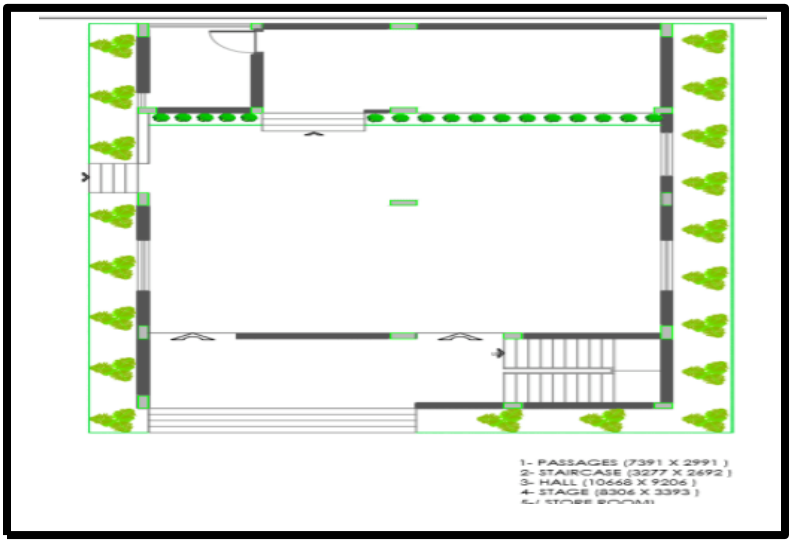

Figure -53 Ground floor of Community Hall

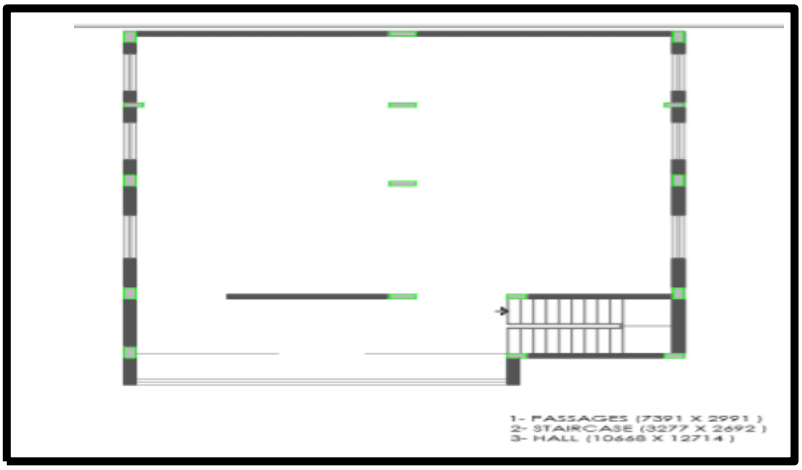

Figure -54 First Floor of Community Hall

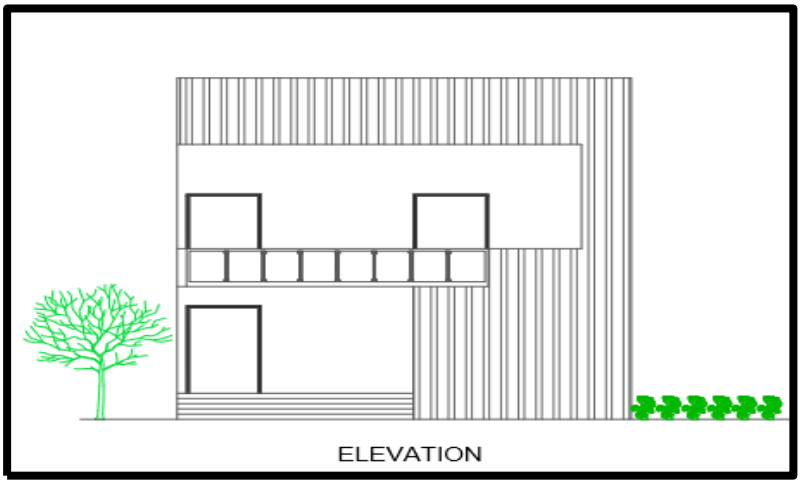

Figure -55 Elevation of Community Hall

Table -22 Quantity sheet of community hall						
Sr. No.	**Item Description**	**No.**	**Length (m)**	**Width/ Breadth (m)**	**Height/ Depth (m)**	**Quantity (CU M)**
1	Earthwork in Excavation in Foundation:					
	L1 =11	3	11	1	1.5	49.50
	L2 =4.50	1	4.5	1	1.5	6.75
	S1 =15.5	2	15.5	1	1.5	46.50
	S2 =4	1	4	1	1.5	6.00
	S3 =5	1	5	1	1.5	7.50
				Total Qty.		108.75
2	Pad footing up to plinth to Foundation					
	L1 =10.7	3	10.7	1	0.3	9.63
	L1 =4.2	1	4.2	1	0.3	1.26
	S1 =11.9	2	11.9	1	0.3	7.14
	S1 =12.9	2	12.9	1	0.3	7.74
	S2 =4.5	1	4.5	1	0.3	1.35
	S2 =4.8	1	4.8	1	0.3	1.44
	S3 =5.5	1	5.5	1	0.3	1.65
	S3 =5.5	5.5	5.5	1	0.3	9.08
				Total Qty.		12.18
3	P.C.C Foundation:					
	L1 =11	3	11	1	0.2	6.60
	L2 =4.5	1	4.5	1	0.2	0.90
	S1 =15.5	2	15.5	1	0.2	6.20
	S2 =4	1	4	1	0.2	0.80
	S3 =5	1	5	1	0.2	1.00
				Total Qty.		14.50
4	B.B.C.C Foundation:					
	L1 =11	3	11	1	0.2	6.60
	L2 =4.5	1	4.5	1	0.2	0.90
	S1 =15.5	2	15.5	1	0.2	6.20
	S2 =4	1	4	1	0.2	0.80
	S3 =5	1	5	1	0.2	1.00
				Total Qty.		14.50

5	Brick Masonry above plinth up to slab (1:6)					
	L=11m	3	11	0.2	4	26.40
	L=4.5m	1	4.5	0.2	4	3.60
	S1=11.4m	2	15.5	0.2	4	24.80
	S2=4m	1	4	0.2	4	3.20
	S3=5m	1	5	0.2	4	4.00
				Total Qty.		84.55
6	Deduction for Door and window					
	D1	2	3.5	0.2	3.5	4.90
	D2	1	1.2	0.2	3.5	0.84
	W1	4	1.2	0.2	1.4	1.34
	V1	2	0.6	0.2	0.6	0.14
				Total Qty.		1.49
7	Deduction for lintel					
	Window & Door					
	D1	2	3.5	0.2	0.15	0.21
	D2	1	1.2	0.2	0.15	0.04
	W1	4	1.2	0.2	0.15	0.14
	V1	2	0.6	0.2	0.15	0.04
				Total Qty.		0.18
				Net Qty.(M2)		82.88
8	1:3 Plaster for wall					
	Hall	2	10.6	3.5		74.20
		2	9.2	3.5		64.40
	Store Room	2	2.1	3.5		14.70
		2	3.3	3.5		23.10
	Stage	2	8.3	3.5		58.10
		2	3.3	3.5		23.10
	Celling Plaster					
	Hall	1	10.6	9.2		97.52
	Store Room	1	2.1	3.3		6.93
	Stage	1	8.3	3.3		27.39
				Total Qty.		389.44
	Deduction for Door and Window					
	D1	2.5	3.5	0.2	3.5	6.13
	D2	2	1.2	0.2	3.5	1.68

	W1	1	1.2	0.2	0.4	0.10
	V1	2	0.6	0.2	0.3	0.07
				Total Qty.(M2)		7.97
				Net Qty.(M2)		381.47
9	Inside Paint on Wall			Total Qty.(M2)		381.47
10	Outside Paint on Wall					
	HALL	2	16.1	9.2	11.1	296.24
				Total Qty.(M2)		677.71
	Deduction for Door and Window & Lintel			Net Qty.(M2)		669.73
11	Paint work (white wash)			Total Qty.(M2)		669.73
12	Paint work on outer wall			Net Qty.(M2)		670.00
13	Brick Masonry Parapet wall					
	L1 =16	2	16	0.2	1.5	9.60
	S1 =11.1	2	11.1	0.2	1.5	6.66
				Total Qty.(M2)		16.26

Table -23 Abstract Sheet of Community hall

Sr.no	ltem Description	Quantity	Rate	Per	Amount (Rs.)
1	Earthwork in excavation in foundation	108.0 CU.M	90	CU.M	9720
2	Earth filling in plinth	126.0 CU.M	2700	CU.M	340200
3	Brick masonry up to plinth in CM (1:6)	84.0 CU.M	3500	CU.M	294000
4	Smooth plaster inside rooms & ceiling	82.9 SQ.M	150	SQ. M	12432
5	Smooth plaster on outer wall	381.4 SQ.M	150	SQ.M	57210
6	Paint work (white wash)	669.1 SQ.M	5	SQ.M	3345.5
7	Paint work on outer wall	667.0 SQ.M	5	SQM	3335
8	Brick work for parapet wall	16.3 CU.M	3500	CU.M	56910
			Total		Rs. 777152.5
		Add 1.5% Water Charge			Rs. 11657
		Add 10% Charge			Rs. 7771.525
		Total Estimate Cost			**Rs. 796581**

8.1.5 Design 5 : Entrance Gate

There is no Entrance gate in the village. for identifying the village or any route or location, the gate is very helpful and it increase the aesthetic looks of village and makes a good impression on visitors. So we take entrance gate as the key requirement and have proposed the design for the same

Design details: Total area: 9.3 m x 1.6 m

It is a RCC structure and as masonry foundation is provided, it requires only basic design criteria's such as width of foundation, depth of foundation. A two foundation depth of 1.8 m is constructed and RCC column is constructed for safety against the wind load.

Proposed site: A proper land is available for entrance gate at the entry road the of the village. Detailed drawings of Entrance gate are given below.

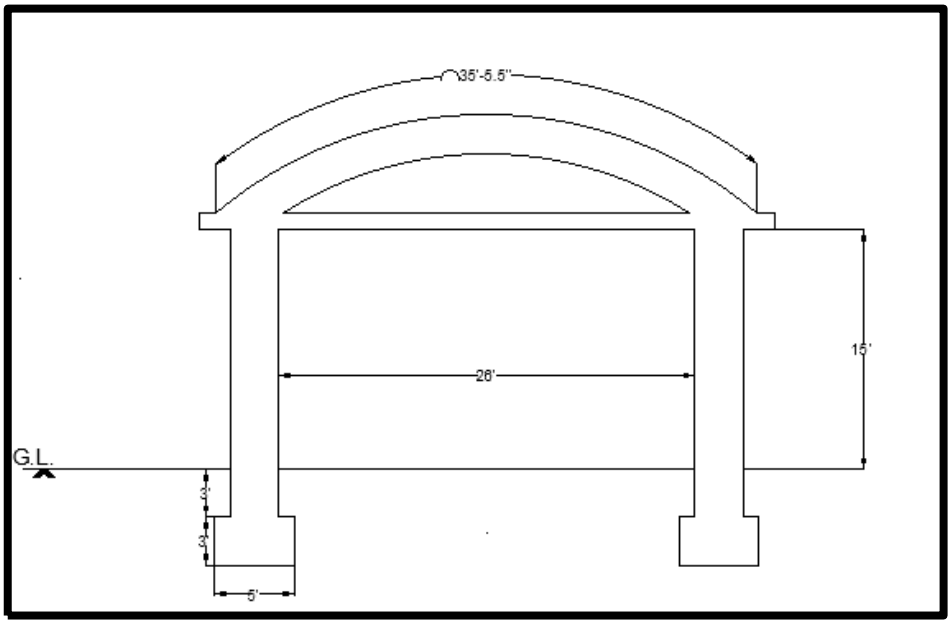

Figure -56 Section of Entrance Gate

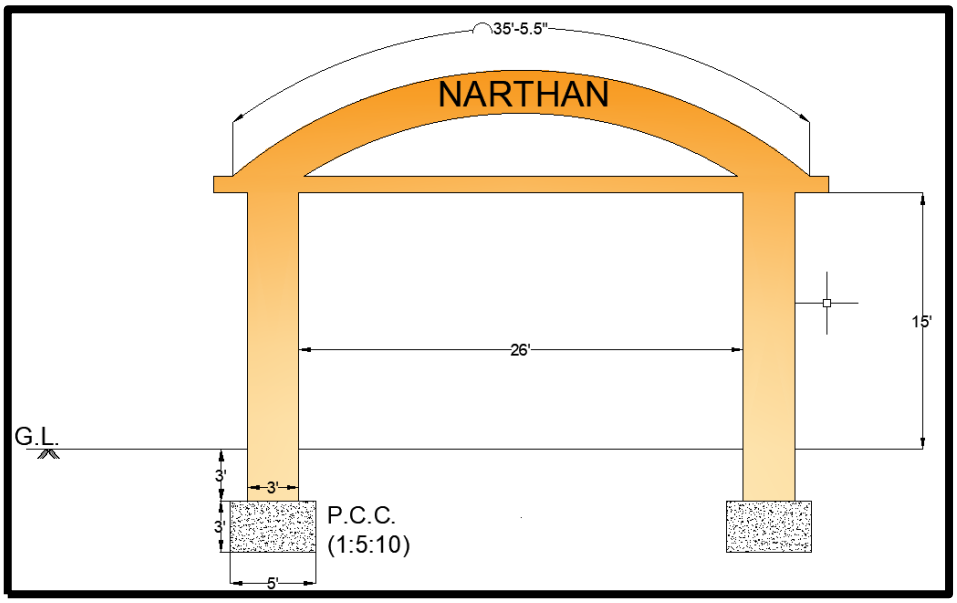

Figure – 57 Sectional Elevation of Entrance Gate

Table -24 Quantity sheet of Entrance Gate						
Sr. no	**Description**	**No.**	**Length (m)**	**Width (m)**	**Height (m)**	**Quantity (m3)**
1	Excavation in Foundation	2	1.6	1.6	0.9	4.6
2	P.C.C in Foundation (1:5:10)	2	1.6	1.6	0.9	4.6
3	R.C.C Column	2	0.6	0.6	5	3.6
4	Beam	1	0.6	0.6	9.6	3.46
5	Brickwork in circular part	1	4.2	0.6	1	2.52
6	Plaster work					
	Column	8	0.6	-	5	19.2 m2
	Beam	4	0.6	-	9.4	22.56 m2
	Circular area	2	4.2	-	1	8.4 m2
					TOTAL =	50.16 m2

Table -25 Abstract sheet of Entrance Gate					
Sr no	**Item description**	**Quantity**	**Rate**	**per**	**Amount**
1	Excavation in Foundation	4.6	110	m^3	506
2	Cement Concrete in foundation (1:5:10)	4.6	3887	m^3	17880
3	R.C.C Column and Beam (1:1.5:3)	7.06	8880	m^3	62693
4	Brickwork in Circular Part (1:6)	2.52	3500	m^3	8820
5	Plaster Work (1:6)	50.16	180	m^2	9028
6	Painting Work	50.16	150	m^2	7524
				TOTAL =	Rs. 106451
				5 % Contractor Profit =	Rs. 5322
				1.5 % Water Charges =	Rs. 1597
				Total Cost =	Rs. 113369
				Approximate =	**Rs. 113500**

8.1.6 Design 6: Rain Water Harvesting with Ground Water Recharge

Design of storage tanks

The volume of the storage tank can be determined by the following factors:

- Number of persons in the household: The greater the number of persons, the greater the storage capacity required to achieve the same efficiency of fewer people under the same roof area.
- Per capita water requirement: This varies from household to household based on habits and also from season to season. Consumption rate has an impact on the storage systems design as well as the duration to which stored rainwater can last.
- Period of water scarcity: Apart from the total rainfall, the pattern of rainfall -whether evenly distributed through the year or concentrated in certain periods will determine the storage requirement. The more distributed the pattern, the lesser the size.
- Type and size of the catchment: Type of roofing material determines the selection of the runoff coefficient for designs. Size could be assessed by measuring the area covered by the catchment i.e., the length and horizontal width. Larger the catchment, larger the size of the required cistern (tank)

Calculation

Let the system has to be designed for meeting drinking water requirement of a five-member family living in a building with a rooftop area of 100 sq. m. The average annual rainfall in the region is 600 mm (assume). Daily drinking water requirement per person (drinking and cooking) is 10 liters.

Following details are available:
Area of the catchment (A) = 100 sq. m.
Average annual rainfall (R) = 611 mm (0.61 m)
Runoff coefficient (C) = 0.85

1. Calculate the maximum amount of rainfall that can be harvested from the rooftop:
Annual water harvesting potential = 100 x 0.6 x 0.85 = 51 cu. m. (51,000 liters)

2. Determine the tank capacity: This is based on the dry period, i.e., the period between the two consecutive rainy seasons. For example, with a monsoon extending over four months, the dry season is of 245 days.

3. Calculate drinking water requirement for the family for the dry season = 245 x 5 x 10 = 12,250 liters.

As a safety factor, the tank should be built 20% larger than required, i.e., 14,700 liters. This tank can meet the basic drinking water requirement of a 5-member family for the dry period. A typical size of a rectangular tank constructed in the basement will be about 4.0 m x 4.0 m x 1.0 m.

Design of groundwater recharge structures

The capacity of the tank should be enough to retain the runoff occurring from conditions of peak rainfall intensity. The rate of recharge in comparison to runoff is a critical factor. However, since accurate recharge rates are not available without detailed geo-hydrological studies, the rates have to be assumed. The capacity of recharge tank is designed to retain runoff from at least 15 minutes rainfall of peak intensity. (Assume, peak hourly rainfall is 90 mm (based on 25 year frequency) and 15 minutes peak rainfall is 22.5 mm/hr, say, 25 mm, according to CGWB norms).

Calculation

For an area of 100 sq. m.,

Volume of desilting tank required = 100 x 0.025 x 0.85 = 2.125 cu. m. (2,125 litres)

Design of a Recharge Trench

In this the water-holding capacity of a recharge trench is less than its gross volume because it is filled with porous material. A factor of loose density of the media (void ratio) has to be applied to the equation. The void ratio of the filler material varies with the kind of material used, a void ratio of 0.5 may be assumed.

Using the same method as used for designing a settlement tank:

Assuming a void ratio of 0.5, the required capacity of a recharge tank

= (100 x 0.025 x 0.85)/0.5

= 4.25 cu. m. (4,250 litres)

Filter Tank:

Let, Dimension of filter tank is 1m x 1m x 0.7 m &

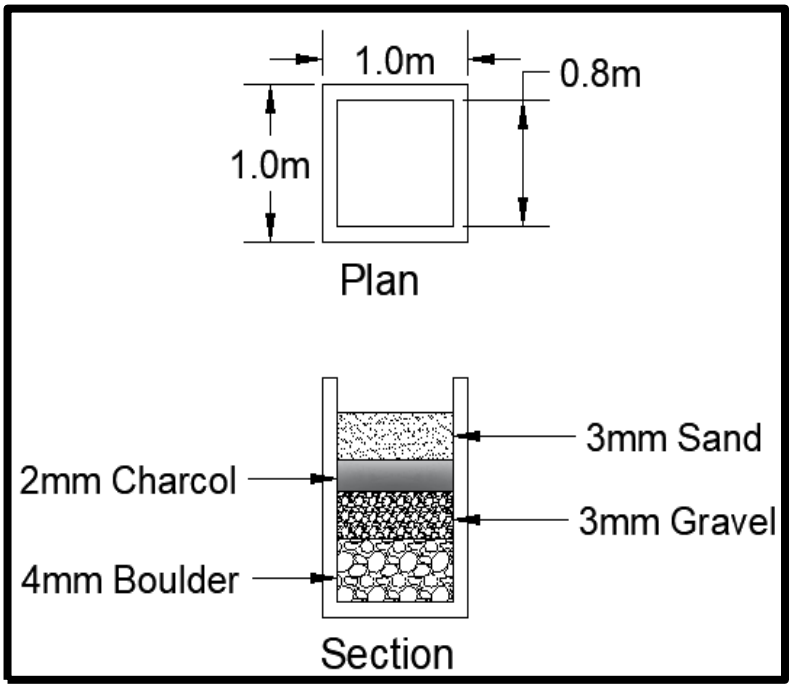

Figure -58 Plan & Section of Filter Tank

- **Recharge Tank:**
  Dimension of Recharge tank is 2m x 2m x 1.2m

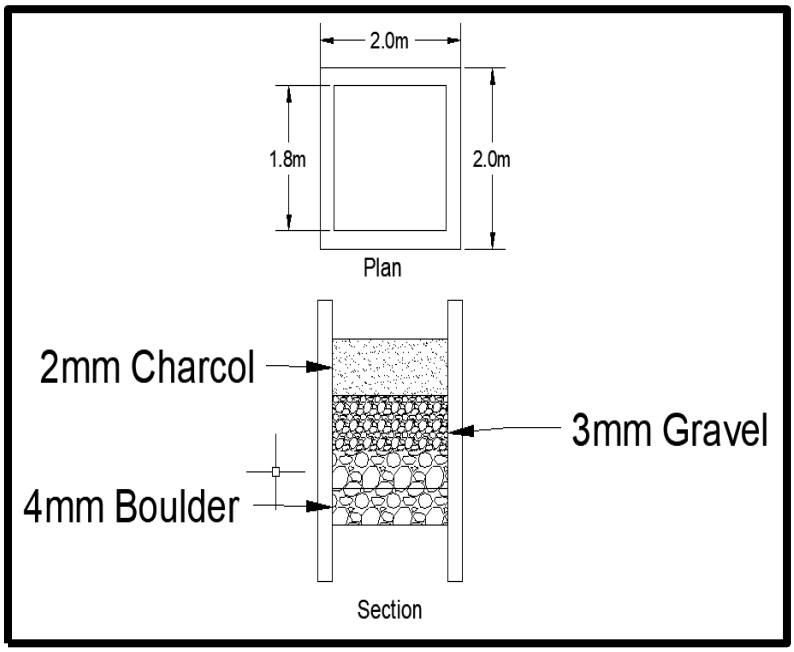

Figure -59 Plan & Section of Recharge Tank

- **Storage Tank :**
  Size of tank is 4m x 4m x 1m.

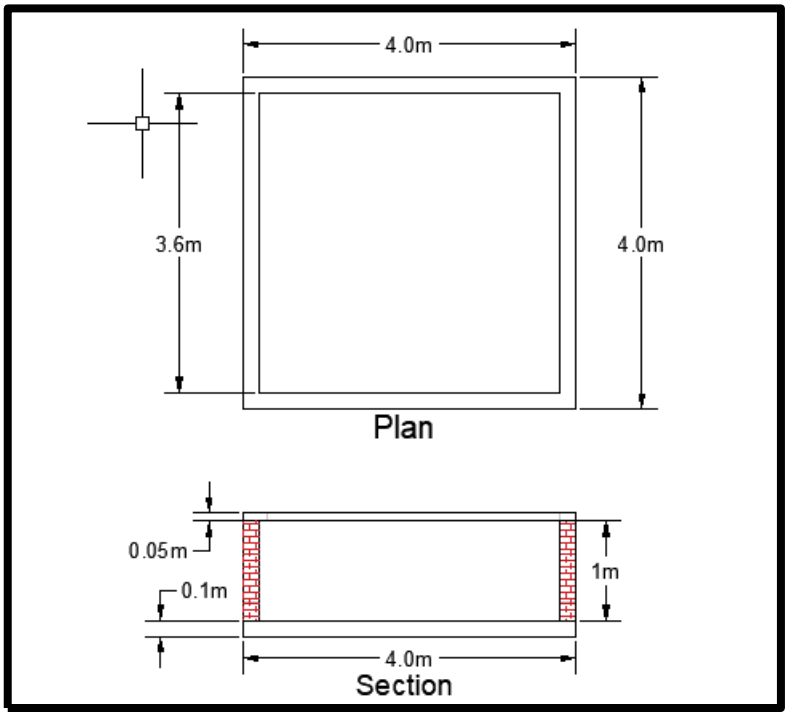

Figure -60 Plan & Section of Storage Tank

System of Rainwater Harvesting with Ground recharge

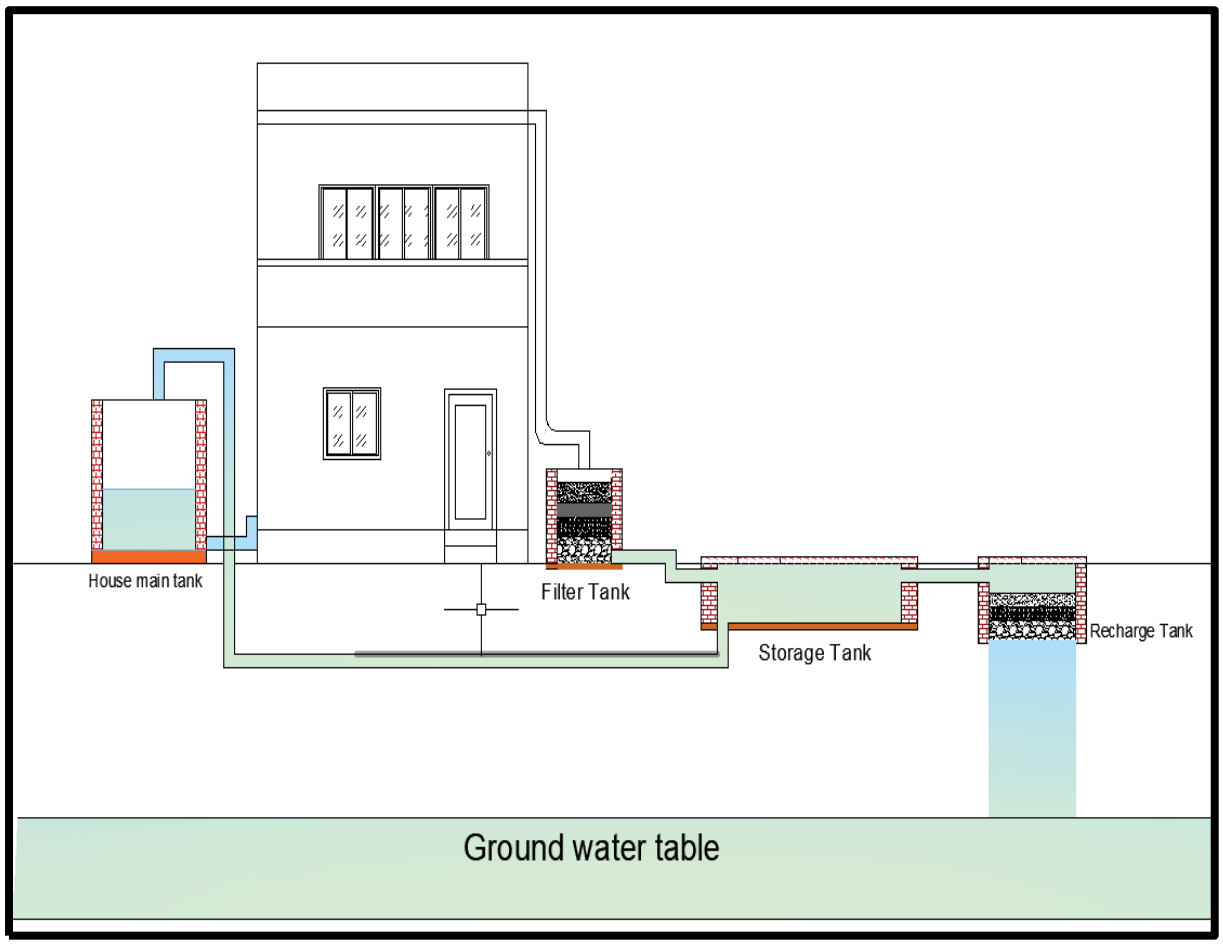

Figure -61 System of Rainwater harvesting with recharge ground water

Table -26 Quantity sheet of Rainwater Harvesting							
Sr. no	**Description**	**No.**	**L (m)**	**W (m)**	**H (m)**	**Quantity**	**Total quantity**
1	Earthwork in excavation for storage tank	1	5	5	1	25	25m^3
2	Earthwork in excavation for Recharge tank	1	3	3	1.2	10.8	10.8m^3
3	Earthwork in excavation for filter tank	1	1.2	1.2	0.7	1	1m^3
						Total =	36.8m^3
4	Brick Bat Cement Concrete (1:4:8) for Storage tank	1	4	4	0.1	1.6	1.6m^3

5	Brick Bat Cement Concrete (1:4:8) for Filter tank	1	1	1	0.1	0.1	0.1m^3
						Total =	1.7 m^3
6	Brick Masonry for Storage tank	1	14.2	0.3	1	4.26	4.26m^3
7	Brick Masonry for Filter Tank	1	3.2	0.2	0.7	0.45	0.45m^3
8	Brick Masonry for Filter Tank	1	7.2	0.2	1.2	1.73	1.73m^3
							Total Brick Work = 6.44 $m3$
9	Smooth plaster on inside wall						
	Storage Tank	4	4		1	16	16
	Filter Tank	4	1		0.7	2.8	2.8
	Recharge Tank	4	2		1.2	9.6	9.6
						Total =	28.4m^2
10	Smooth plaster on outer side						
	Storage Tank	4	4		1.1	17.6	17.6
	Filter Tank	4	1		0.8	3.2	3.2
	Recharge Tank	4	2		1.2	9.6	9.6
							30.4m^2
12	Painting on walls						
	Storage Tank	4	4		1.1	17.6	17.6
	Filter Tank	4	1		0.8	3.2	3.2
	Recharge Tank	4	2		1.2	9.6	9.6
						Total =	30.4m^2

Table 27- Abstract sheet of rain water harvesting system

Sr.no	Item description	Quantity	Rate	per	Amount
1	Earthwork in excavation	36.8	90	m^3	3312
2	Brick Bat Cement concrete (1:4:8)	1.7	2700	m^3	4590
3	Brick Masonry in all tanks	6.44	3500	m^3	22540
4	Smooth plaster on inside wall	28.4	150	m^2	4260

5	Smooth plaster on outer wall	30.4	150	m^2	4560
6	Paint work on outer wall	30.4	50	m^2	1520
7	10 m long PVC pipe	15	85	m	1275
				Total=	**Rs.42,057**

8.1.7 Electrical Design 1 : Auto Electronic School Bell

School Bell is conventionally rung by a person who has been designated to do it. This is done on a periodic basis. With the advent digital electronics, this task can be automated by this project that has been specially designed for this scenario. It can be used in School for ringing class timeout bells as well as in factories and industries for various purposes. A Bell can be connected at the output side of the project board. This bell will be rung by the system on a periodic basis to signify to the persons around it to start a task or about timeout of a task. This feature is helpful for teachers in school to timely take classes. It can be useful in factories to start work, indicate breaks as well as closing of the factory. The design of the circuit makes this project possible to count periods of 45 minutes and a lunch break of 30 minutes.

In order to count time of 30 minutes and 45 minutes two-decade counter in conjunctions with 555NE timer are used. When the respective timing signals have reached the time set in it they fire an SCR which enables AC power output at the Bell connector. The start and end of the sequence of Bells are controlled by a push button that is interfaced to the circuitry.

Figure -62 Automatic School Bell

Hardware Specifications:

- IC 555
- IC CD4017
- IC CD4081
- Resistors
- Capacitors
- Transistors
- SCR
- LED

Circuit Diagram:

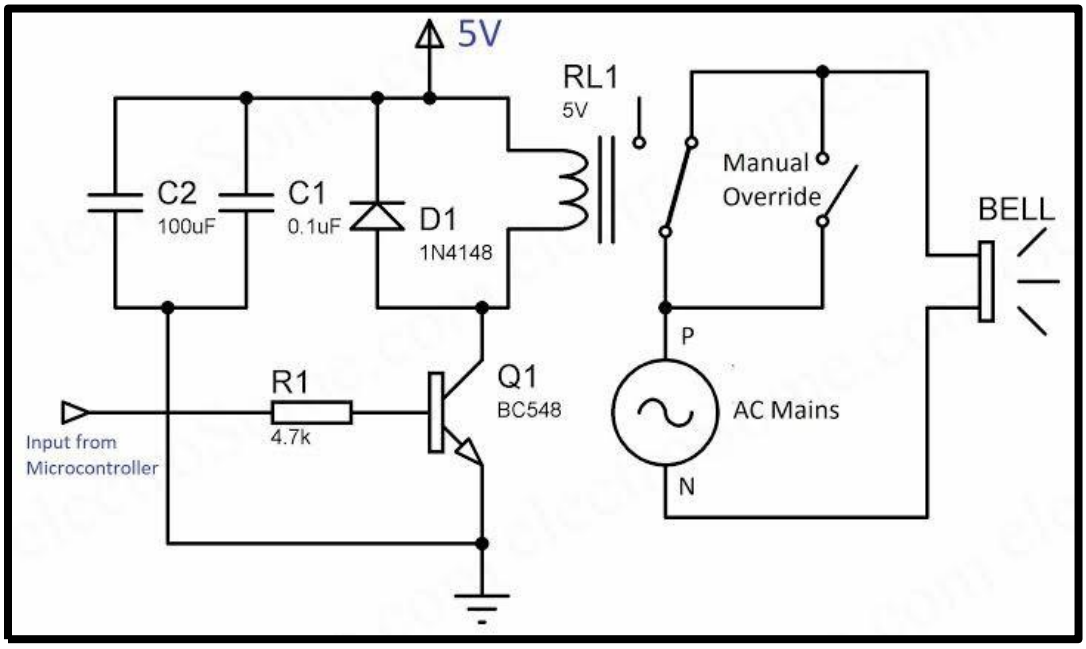

Figure -63 Circuit Diagram of Auto electronic School Bell

On the power supply of the circuit the bridge circuit converts the ac supply in to dc supply and voltage regulator regulates the supply. We are using IC 7805 which will gives output as 5V This voltage is used to display the LCD. On the LCD we can able to view time format as HH:MM: SS and DAY Number. We programmed this project as to hear the Buzzer sound every after one hour and we can display as per the schedule in the program.

Advantages

- This project can be used in educational institutes, colleges, schools.
- This project can also be used in industries.
- It is an automatic system.
- Human errors can be avoided.
- Safety is assured

Applications

- Colleges, Schools.
- Washing machine.
- Microwave ovens.
- Video recorders.
- Security system.
- Digital watches.

Table -28 Estimation For Auto Electronic School Bell		
Sr. No.	**Components**	**Cost**
1	555 TIMER IC	Rs. 55
2	IC CD4017	Rs. 199
3	IC CD4081	Rs. 89
4	RESISTORS	Rs. 70
5	CAPACITORS	Rs. 180
6	TRANSISTORS	Rs. 215
7	SCR	Rs. 20
8	LED	Rs. 81
9	LABOUR	Rs. 2500
Total	**-**	**Rs. 3409**

Future Scope

Automatic college bell system using Lab VIEW can be extended for further development as there can be many departments in a university at a distance in the same campus and want to synchronize all department bells.

8.1.8 Electrical Design 2 : Automated Night Lighting System

Here we put forth a fully automated night lighting system that detects light condition and switches on or off a load/bulb based on the light intensity. The system uses a LDR along with 555 timer and relay based circuitry with AC load connection in order to achieve this result. As soon as the light intensity falling on the LDR drops below a certain level, the circuitry uses a 555 timer based circuit to drive a relay for specific time duration. This process keep happening over time and the load is switched on through a relay as long as there are night/low light conditions. As soon as lighting increases the system switched off the load to turn of the lighting. Thus we have a fully automated night lighting system.

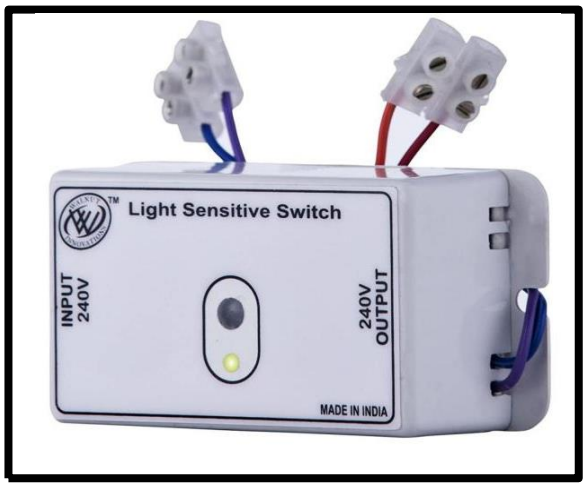

Figure -64 Light Sensitive Switch

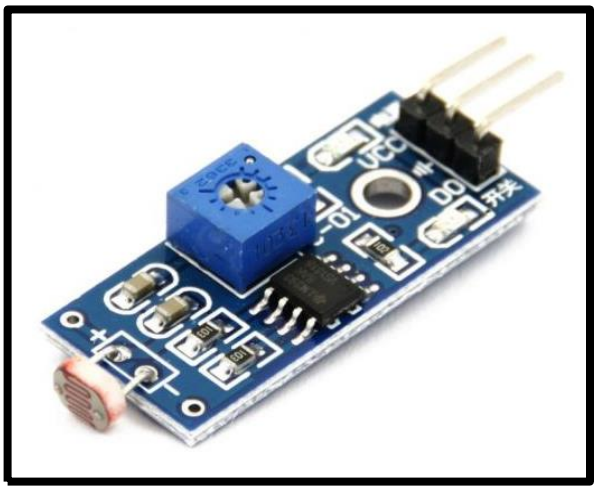

Figure -65 LDR Module

Circuit Diagram:

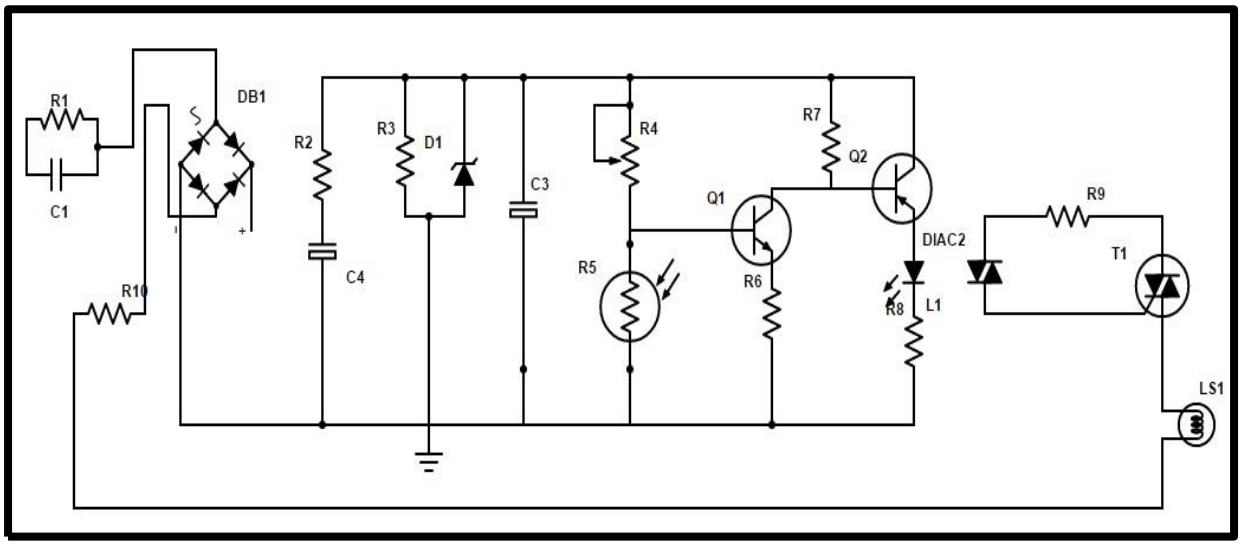

Figure -66 Circuit diagram of Automated Night Lighting System

Hardware Specifications:

- Relay
- LDR
- 555 Timer IC
- Connectors
- Resistors & Capacitors
- Cables &Wires
- Diodes

Features

- High reliability & Light weight.
- Wide spectral response.
- Wide ambient temperature range.

Advantages of LDR

- LDRs are very low-cost devices.
- LDRs are very smaller in sizes.
- LDR is a very simple device.
- The connection of LDR is also very simple.

Disadvantage of LDR

- LDR is not so much sensitive device.
- LDR gives inaccurate result if working temperature changes.

Table -29 Estimation of Automated Night Lighting System

Sr. No.	Components	Cost
1.	Relay	Rs. 250
2.	Ldr	Rs. 80
3.	555 Timer Ic	Rs. 55
4.	Connectors	Rs. 200
5.	Resistors	Rs. 70
6.	Capacitors	Rs. 180
7.	Diodes	Rs. 215
8.	Cables & Wires	Rs. 150
9.	Labour	Rs. 2500
Total	**-**	**Rs. 3700**

8.1.9 Electrical Design 3

Solar Powered Battery Charging With Reverse Current Protection

Solar energy is a very efficient source of green energy that is available for free. But it needs to be coupled with proper storage for best use. Also to store it we need to use charge controlling circuitry to protect panel from reverse currents as well as to charge the battery efficiently. So we demonstrate this concept by using a mini solar panel to charge a rechargeable pencil cell battery. Also we use a charge control circuit designed to stop reverse current flow and charge the battery effectively using the solar panel. Thus this allows us to effectively provide solar battery charging with reverse current protection. Solar street lights are raised light sources which are powered by

solar panels generally mounted on the lighting structure or integrated into the pole itself. The solar panels charge a rechargeable battery, which powers a fluorescent or LED lamp during the night.

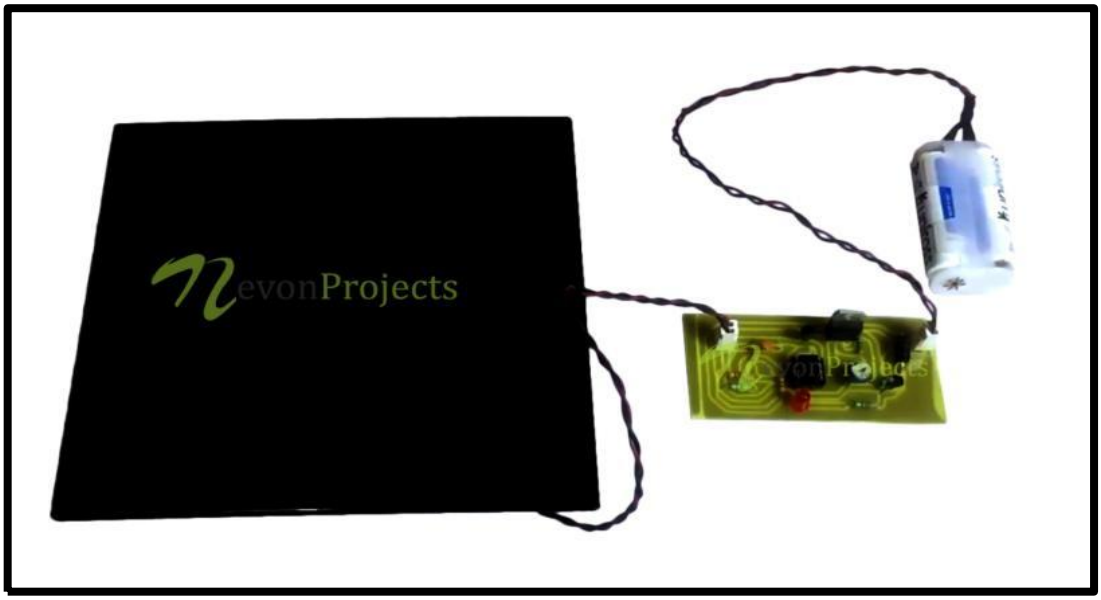

Figure -67 Solar Powered Battery Charging With Reverse Current

Hardware Specifications:

- 3W Solar Panel
- AA Rechargeable Battery
- Resistors
- Capacitors
- Diodes
- Charging Switch
- Connectors

Circuit Components

- Solar panel – 17V
- LM317 voltage regulator
- DC battery
- Diode – 1n4007
- Capacitor – 0.1uF
- Schottky diode – 3A, 50V
- Resistors – 220, 680 ohms
- Pot – 2K
- Connecting wires

Circuit Diagram:

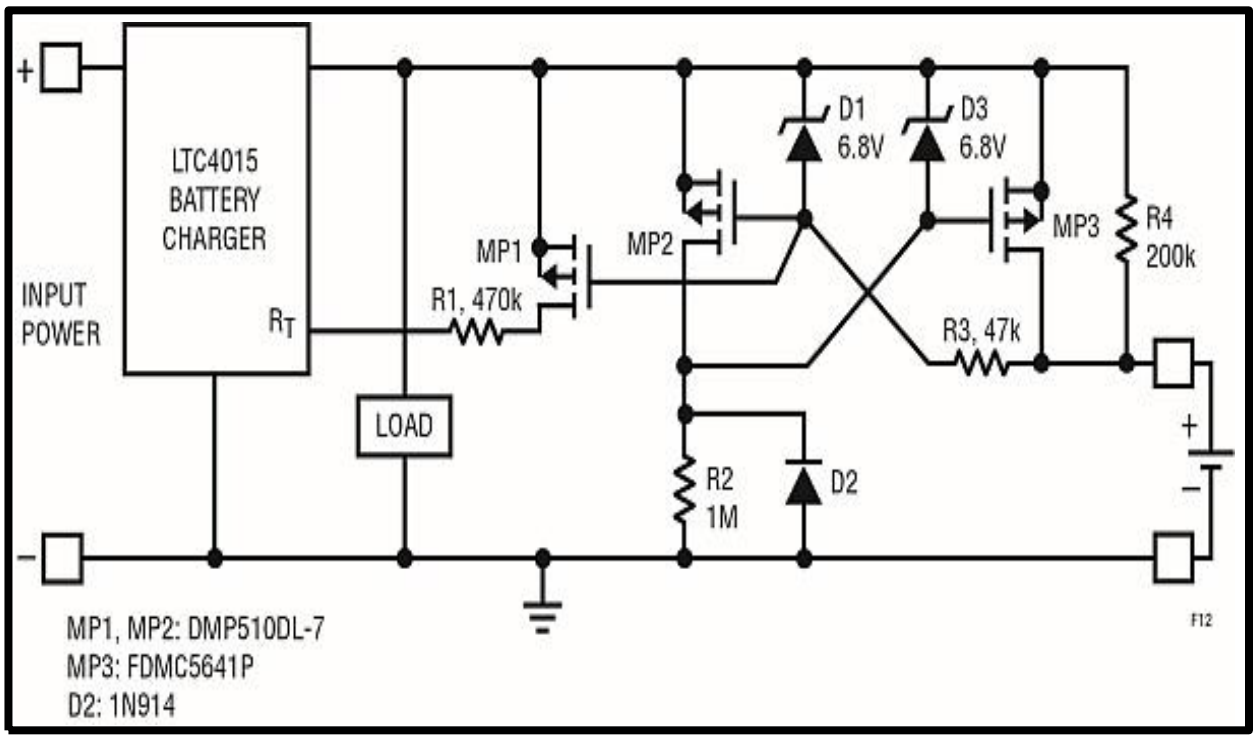

Figure -68 Circuit diagram of Solar Powered Battery Charging with Reverse Current

The solar street lights use solar energy, a form of the renewable energy. These days it is common to see the solar street lamps along the sides of roads. The solar street lights comprise of, which absorb the solar energy during daytime. The photovoltaic cells convert solar energy into electrical energy, which is stored in the battery. At the night-time the lamp starts automatically and it consumes the electricity already stored in the battery. During the day time the battery gets recharged and the process keeps on repeating every day.

Applications of Solar Energy

- Solar Water heater
- Tank collector light
- Portable solar still
- Solar Cooker
- Solar steam cooker
- Portable solar dryer
- Solar PV street light
- Solar Heating of building
- Solar Distillation

Advantages

- Solar street lights are independent of the utility grid. Hence, minimized operation costs.
- Solar street lights require much less maintenance compared to conventional street lights.
- Since external wires are eliminated, risk of accidents are minimized.
- Electricity produced from solar panels is non-pollutive.
- Separate parts of a solar panel system can easily be transported.
- Energy costs can be saved.

Disadvantages

- Initial investment is higher compared to conventional street lights.
- Risk of theft is higher as equipment costs are comparatively higher.
- Snow or dust, combined with moisture can accumulate on horizontal PV-panels and reduce or even stop energy production.
- Rechargeable batteries will need to be replaced several times over the lifetime of the fixtures adding to the total lifetime cost of the light.
- The charge and discharge cycles of the battery are also very important considering the overall cost of the project.

Table -30 Estimation of Solar Powered Battery Charging With Reverse Current Protection

Sr. No.	Components	Cost
1.	3w Solar Panel	Rs. 499
2.	Aa Rechargeable Battery	Rs. 1199
3.	Resistors	Rs. 70
4.	Capacitors	Rs. 180
5.	Diodes	Rs. 215
6.	Charging Switch	Rs. 120
7.	Connectors	Rs. 200
8.	Labor	Rs. 2500
Total	-	Rs. 4983

Future Scope

We can confidently say that solar-powered lights will inevitably be the street lights of the future. And investing and installing in these will play a major part in a clean, green environment. This will also contribute to a brighter future for the coming generations.

8.2 Reason for Students Recommending this Design

Facility Required in village

- Public Latrine Block: There is no public latrine in village. So we proposed this design for hygiene and lack of availability purposes.
- A Primary Health Center: For keeping good health of villagers and keep informing about prevention of different diseases.
- Rainwater Harvesting System: For storing rain water which is drained out.
- A Community Hall : For group activities, social gathering ,public information & other purpose
- A General Market : For goods and services
- Entrance Gate : For Prevent or control entry or exit of individuals
- Auto Electronic School Bell: The ringing of school bell announces important times to a school's students and staff.
- Automatic Night Lighting System: Light regulates our sleep and wake patterns. It automatically on or off lights.
- Solar Powered Battery Charging With Reverse Current Protection: It provides battery charging with reverse current protection.

8.3 About designs Suggestions / Benefit of the villagers

From the observations we conclude that following facilities are lacking for the development of the village.

- In our village 30% population has no own toilet in house so public latrine block is required.
- A good rain water harvesting system is essential for storing rain water which is drain off.
- A shortage of health care centre is fulfill by a design proposal of public health centre.
- For a better infrastructure and prevent of entry & exit entrance gate is required.
- Maintenance and repair work of bust stand is required.

CHAPTER 9: PROPOSING DESIGNS FOR FUTURE DEVELOPMENT OF THE VILLAGE FOR THE PART-II DESIGN

- Agro storage unit: There is a no storage for crops and also lack of fertilizer shops and equipment shops causes delay in time, therefore we proposed the agro storage unit which consist of storage of crops, fertilizer shop, farmer help center, and equipment shop.
- Drinking water facility unit: Drinking water facility in Narthan village is providing sweet and clean drinking water to everyone such as villages, travelers etc. It is low cost structure.
- WBM road: For the ease of transportation and save the time and fuel we proposed Narthan village to veluk village road. This design is also suggested by sarpanch and talati of Narthan village.
- Sustainable Design: We proposed vermicomposting unit for the produce fertilizer in village, so the farmers can easily buy that and used in their farms.
- Overhead water tank: To meet the requirement of village we proposed 100000 liter overhead rectangular water tank. It is also proposed by sarpanch and talati.
- Maintenance of bus stand: since we visited Narthan village, we show that bus stand are not used by people due to its bad condition so proposed the design of maintenance of bus stand.
- Simple Low Power Inverter: Here is a simple low power inverter that converts 12V DC into 230-250V AC.
- Remote operated domestic appliances control – to easily control domestic appliance through remote.
- Generate Power Using Microturbine: Presented here is the Hydropower Generation circuit that generates power from a water pipe in a building using a microturbine.

CHAPTER 10: CONCLUSION OF THE ENTIRE VILLAGE ACTIVITIES OF THE PROJECT

- Vishwakarma Yojana aims to the development of the villages with providing urban amenities without changing their soul. Through development of the villages we contribute to the development of the country. Until and unless the villages are not developed the country remains under developed, hence through Vishwakarma Yojana we young engineers tries to reduce the gap between urban and rural by designing proper plans and proposals.
- Village Narthan had been selected under the development of smart village initiation by Government of India and hence we have also given importance to smart village concept and had given design of Public latrine and Primary health Centre.
- Main Smart Aim: ―Developing village with a rural soul 'but with all Smart urban amenities that a city may have‖. This will help in developing Smart villages in sustainable manner, reduce migration from villages and prevent the cities from the urban pressure.
- This should lead to some rethinking about the meaning of efficiency beyond the usual conceptions of economic or technical efficiency.
- Ideal Village can solve their problem itself can become a smart village example to another village too. According to UDPFI norms, lacking in basic amenities And Smart Amenities can be suggested.
- By carrying out the gap analysis we found the gap between the existing facilities and facility actually required as per norms and will suggest sustainable plans and proposals for filling these gaps and contribute to the development of the village.

CHAPTER 11: REFERENCES REFEREED FOR THIS PROJECT

- Building Drawing by M. G. Shah, C. M. Kale and S. Y. Patki, Tata Mc Graw Hill
- National Building Code-2005
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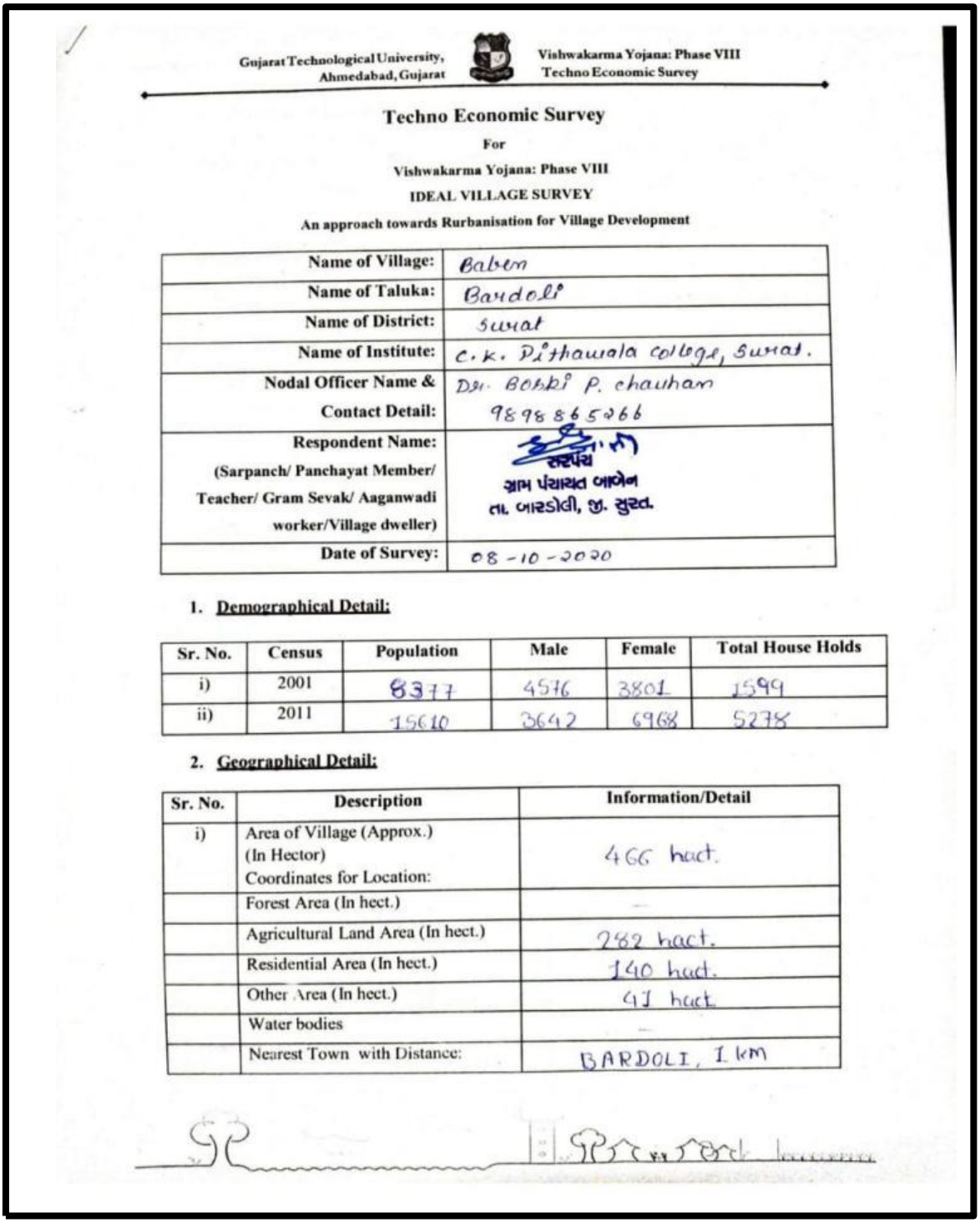
CHAPTER - 12 ANNEXURE ATTACHMENT

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:	Baben
Name of Taluka:	Bardoli
Name of District:	Surat
Name of Institute:	C.K. Pithawala college, Surat.
Nodal Officer Name & Contact Detail:	Dr. Bobbi P. chauhan 9898865266
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	સરપંચ ગ્રામ પંચાયત બાબેન તા. બારડોલી, જી. સુરત.
Date of Survey:	08-10-2020

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	8377	4576	3801	1599
ii)	2011	15610	8642	6968	5278

2. **Geographical Detail:**

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

Gujarat Technological University, Ahmedabad, Gujarat

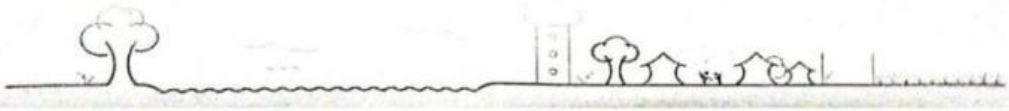
Vishwakarma Yojana: Phase VIII
Techno Economic Survey

3. Occupational Details:

Name of Three Major Occupation groups in Village	1. FARMER
	2. BUSSINESS
	3. JOB

4. Physical Infrastructure Facilities:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
	• Tap Water (Treated/ Untreated) • RO Water • Well (Covered/ Uncovered) • Hand pumps • Tube well/ Borehole • River/ Canal/ Spring/ Lake/ Pond	NO Borehole Yes	– Yes	–	– 1 Lake
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	40,000lit.	60,000 lit.	
	Underground Sump	Capacity:	–	–	
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	Yes	Yes	–	Under ground
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open				
	If Open than Pucca / Kutchcha				
	Whether drain water is discharged directly in to Water bodies/ Sewer plants				
Suggestions if any:					



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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

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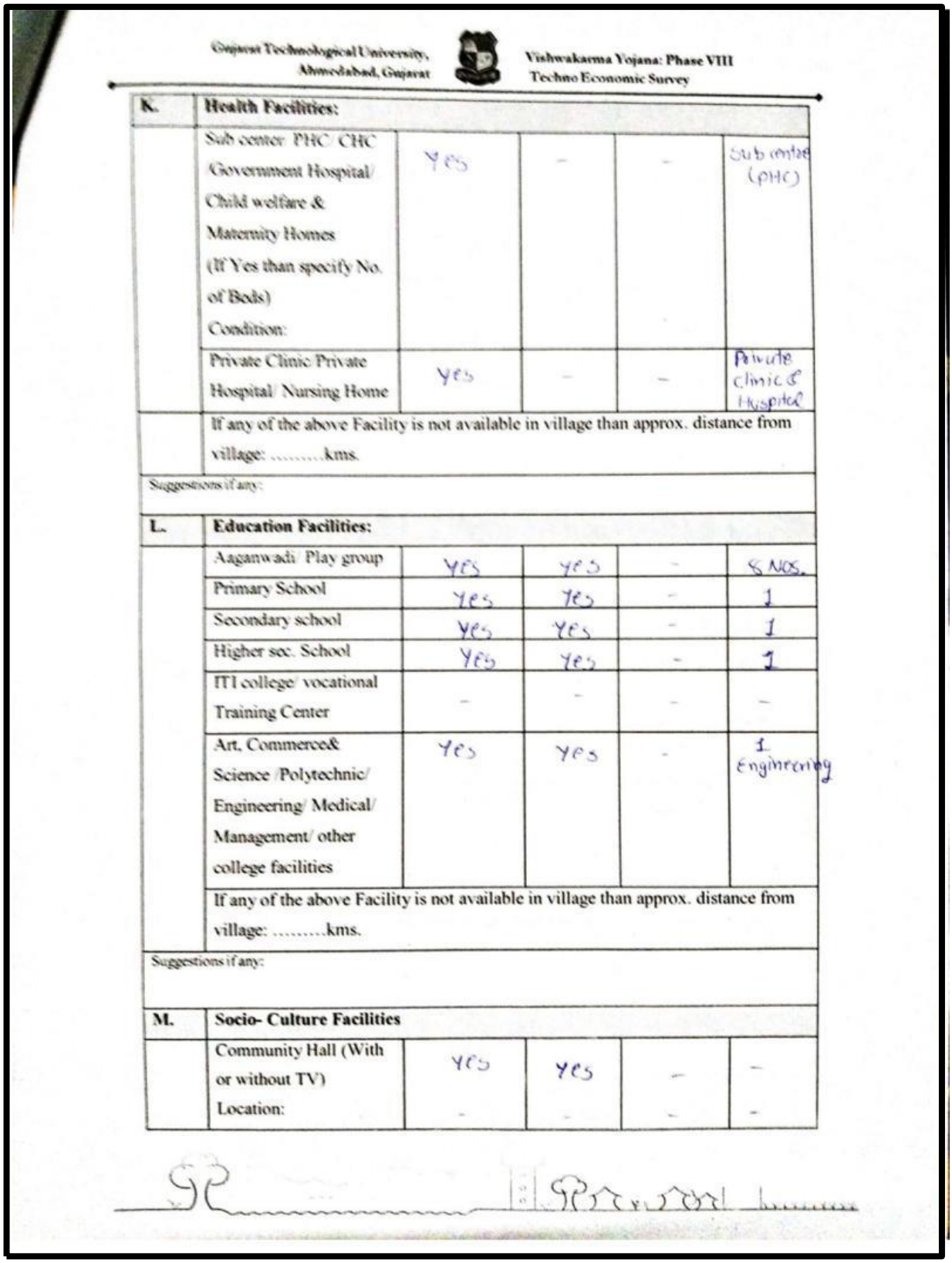
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	-	-	> 6 hrs
	Renewable Energy Source Facilities (Y/ N)	NO	-	-	>6 hrs
	LED Facilities	Yes	-	-	>6 hrs
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes	-	-	8 Nos.
	Location Condition	GOOD	-	-	-
	Community Toilet (With bath/ without bath facilities)	Yes	-	-	with bath
	Solid & liquid waste Disposal system available	NO	-	-	-
	Any facility for Waste collection from road	Yes	-	-	4 vehicles
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Yes	-	-	Paivate Bore well And from canal
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	PUCCA	-	-	Minor House has kutchha

5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks



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

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

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

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

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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

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

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

7. **Data Collection From Village**

Village Base Map Available: Hard Copy/Soft Copy	Yes (Soft copy)

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Vishwakarma Yojana: Phase VI
Techno Economic Survey

Recent Projects going on for Development of Village	Yes
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)		
2.	Additional Information/ Requirement	All facilities available	

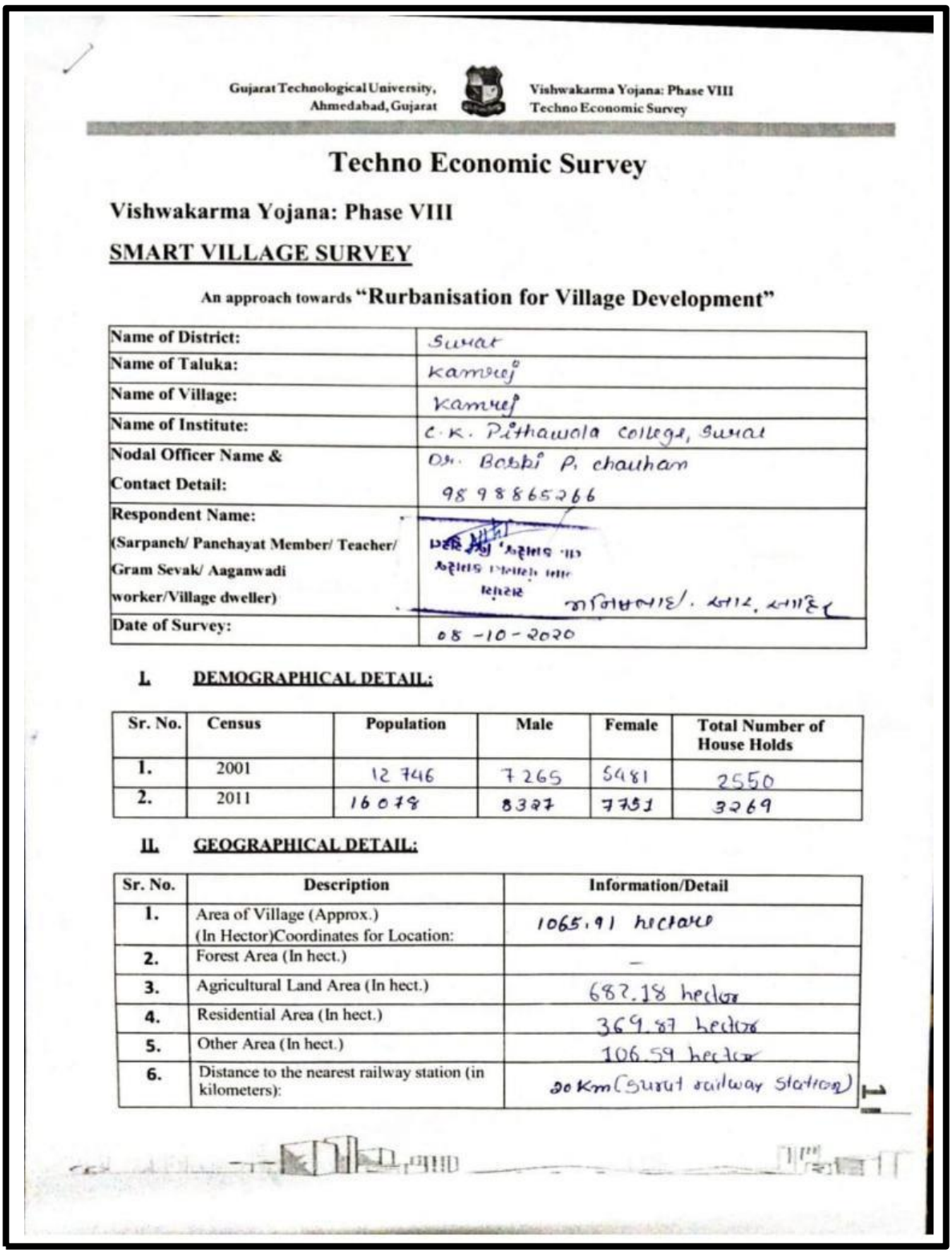
9. **Smart Village Proposal Design**

Sr. No.	Descriptions	Information/ Detail	Remarks
1.			

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

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

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



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

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

Name of District:	Surat
Name of Taluka:	Kamrej
Name of Village:	Kamrej
Name of Institute:	C.K. Pithawala college, Surat
Nodal Officer Name & Contact Detail:	Dr. Bobbi P. chauhan 9898865266
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	
Date of Survey:	08-10-2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	12746	7265	5481	2550
2.	2011	16078	8327	7751	3269

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	1065.91 hectare
2.	Forest Area (In hect.)	–
3.	Agricultural Land Area (In hect.)	687.18 hector
4.	Residential Area (In hect.)	369.87 hector
5.	Other Area (In hect.)	106.59 hector
6.	Distance to the nearest railway station (in kilometers):	20 Km (Surat railway station)

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7.	Name of Nearest Town with Distance:	Kamrej Town (3 Km)
8.	Distance to the nearest bus station (in kilometers):	2-3 Km
9.	Whether village is connected to all road for the any facility or town or City?	Yes.

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1. Agriculture 2. Labour 3. Pvt. Job
Major crops grown in the village:	1. Sugarcane. 2. Banana 3. Cotton

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	5000	MLD	15 Nos.
	Underground Sump	Capacity:			
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1 2 B. OPEN WITH OUTLET C. OPEN WITHOUT OUTLET	Yes			
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Yes			Kutchha
	Main road	Yes			All Weather
	Internal streets	Yes			WBM
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH (1.5km)	SH (2.6km)	MDR (300m)	ODR (3.6 Km)
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	Yes			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes			
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes			
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes			>6hrs

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Power supply for Domestic Use	Yes			
	Power supply for Agricultural Use	Yes			7 Cha
	Power supply for Commercial Use	Yes			
	Road/ Street Lights	Yes			
	Electrification in Government Buildings/ Schools/ Hospitals	Yes			
	Renewable Energy Source Facilities (Y/ N)	NO			
	LED Facilities	NO			
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	✓			
	Location Condition				
	Community Toilet (With bath/ without bath facilities)	✓			
	Solid & liquid waste Disposal system available	NO			
	Any facility for Waste collection from road				
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL OTHER (SPECIFY)	✓			
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	30/70			

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

V. SOCIAL INFRASTRUCTURAL FACILITIES:

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

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Suggestions if any:

L.	Socio- Culture Facilities	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	without TV		YES	1
	Public Library (With daily newspaper supply: Y/N)	Good		Yes	
	Public Garden	2 Nos		YES	
	Village Pond	-		-	
	Recreation Center	2 Nos		Yes	
	Cinema/ Video Hall				
	Assembly Polling Station				
	Birth & Death Registration				

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

Suggestions if any:

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

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

Suggestions if any:

N.	Other Facilities	Condition		Available (YES)	Available (NO)
	1. Have these programme implemented the village?	Yes			
	2. Are there any beneficiaries in the village from the following programme?	yes			
	3. Janani Suraksha Yojana				
	4. Kishori Shakti Yojana			✓	
	5. Balika Samriddhi Yojana				
	6. Mid-day Meal Programme			✓	
	7. Intergrated Child Development Scheme (ICDS)				
	8. Mahila Mandal Protsahan Yojana (MMPY)				
	9. National Food for work Programme (NFFWP)			✓	✓
	10. National Social Assistance Programme				
	11. Sanitation Programme (SP)				
	12. Rajiv Gandhi National Drinking Water Mission				
	13. Swarnjayanti Gram Swarozgar Yojana				
	14. Minimum Needs Programme (MNP)				
	15. National Rural Employment Programme			✓	
	16. Employee Guarantee Scheme (EGS)				
	17. Prime Minister Rojgar Yojana (PMRY)			✓	
	18. Jawahar Rozgar Yojana (JRY)				
	19. Indira Awas Yaojna (IAY)	not well		✓	
	20. Samagra Awas Yojana (SAY)				
	21. Sanjay Gandhi Niradhar Yojana (SGNY)				
	22. Jawahar Gram Samridhi Yojana (JGSY)				
	23. Other (SPECIFY)				

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Techno Economic Survey

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

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

VII. DATA COLLECTION FROM VILLAGE

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

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks

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

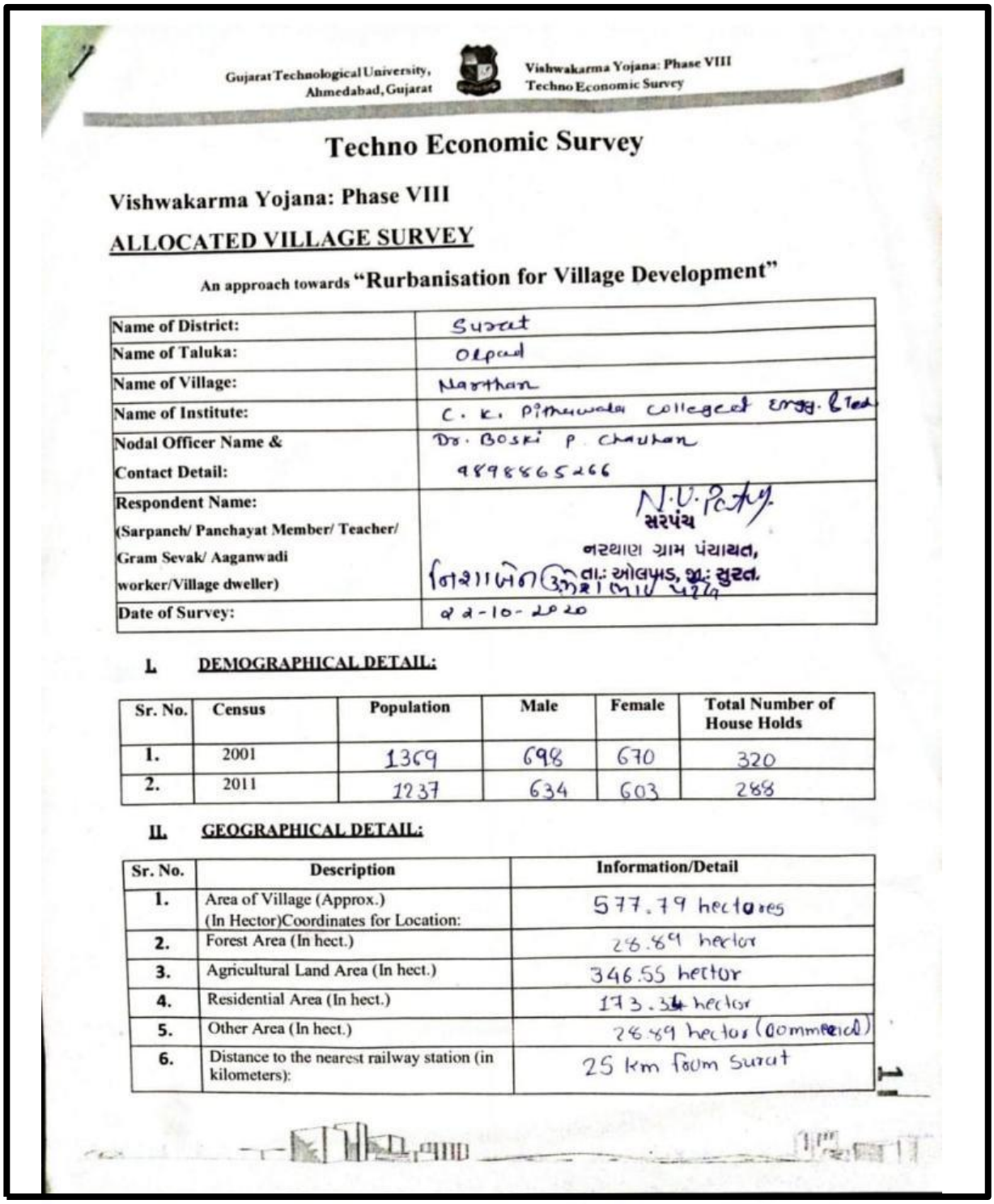
IX. Smart Village / Heritage Details

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

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

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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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

Name of District:	Surat
Name of Taluka:	Olpad
Name of Village:	Narthan
Name of Institute:	C. K. Pithawala college of Engg. & Tech.
Nodal Officer Name & Contact Detail:	Dr. Boski P. Chauhan 9898865266
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	N.V. Patel. સરપંચ નરથાણ ગ્રામ પંચાયત, તા.: ઓલપાડ, જી.: સુરત.
Date of Survey:	22-10-2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	1369	698	670	320
2.	2011	1237	634	603	288

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	577.79 hectares
2.	Forest Area (In hect.)	26.89 hector
3.	Agricultural Land Area (In hect.)	346.55 hector
4.	Residential Area (In hect.)	173.34 hector
5.	Other Area (In hect.)	26.89 hector (Commercial)
6.	Distance to the nearest railway station (in kilometers):	25 km from Surat

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Techno Economic Survey

7.	Name of Nearest Town with Distance:	Surat (20 km)
8.	Distance to the nearest bus station (in kilometers):	Masma (7.3 km)
9.	Whether village is connected to all road for the any facility or town or City?	Yes

III. OCCUPATIONAL DETAILS:

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

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

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

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	Other(Specify)Lake/ Pond	Pond			Total - 11 In Use 2
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	40,000 Ltr		Qty - 1
	Underground Sump	Capacity:	40,000 Ltr		Qty - 1
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE	Yes		✓	(80%)
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Yes			Pucca
	Main road	Yes			All weather
	Internal streets	Yes			Kutchha
	Nearest NH/SH/MDR/ODR Dist. in kms.	SH 169 (550 m)			
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	NO			Surat railway station (20 km)
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	NO			MASMA Bus stop (7.3 km)
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes			Chhakda Private vehicles
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes			DGVCL (More than 6hrs)

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	Power supply for Domestic Use	Yes	✓		60 %.
	Power supply for Agricultural Use	Yes	✓		30 %.
	Power supply for Commercial Use	Yes	✓		10 %.
	Road/ Street Lights	Yes	✓		112 street lights
	Electrification in Government Buildings/ Schools/ Hospitals	Yes			Government building
	Renewable Energy Source Facilities (Y/ N)	NO			
	LED Facilities	Yes	✓		LED Street lights
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	NO			
	Location Condition	-			
	Community Toilet (With bath/ without bath facilities)	NO			
	Solid & liquid waste Disposal system available	NO			
	Any facility for Waste collection from road	Yes			Door to door collection in tractor
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL OTHER (SPECIFY)	 ✓ ✓ 			
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Kutchha 80%. Pucca 20%.			

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	Yes	✓		Nos. 2
	Sub-Centre				
	PHC				
	BLOCK PHC				
	CHC/RH				
	District/ Govt. Hospital				
	Govt. Dispensary				
	Private Clinic				
	Private Hospital/ Nursing Home				
	AYUSH Health Facility				
	sonography /ultrasound facility				
	If any of the above Facility is not available in village than approx. distance from village: 2.5...kms.				
	Suggestions if any:				
K.	**Education Facilities:**				
	Aaganwadi/ Play group	Aganwadi	✓		Nos. 2
	Primary School	Yes	✓		
	Secondary school	Yes	✓		Private
	Higher sec. School	Yes	✓		(No govt. school)
	ITI college/ vocational Training Center	NO			-
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	NO			-

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	If any of the above Facility is not available in village than approx. distance from village: 7.1 kms.
Suggestions if any:	

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

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	Inadequate		YES	
	Telecommunication Network/ STD booth	Network		YES	
	General Market				NO
	Shops (Public Distribution System)	Adequate		YES	
	Panchayat Building	Adequate		YES	
	Pharmacy/Medical Shop				NO
	Bank & ATM Facility	Adequate		YES (Private)	
	Agriculture Co-operative Society				NO
	Milk Co-operative Soc.	-	-		NO
	Small Scale Industries	-	-		NO
	Internet Cafes/ Common Service Center/Wi Fi	-			NO
	Youth Club	-	-		NO
	Mahila Mandal	-	-		NO

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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				NO
	Other Facility				

Suggestions if any:

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

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	Adequate		soft copy
2.	Recent Projects going on for Development of Village	YES	✓		vaishnavi farmhouse (private)
3.	Any NGO working for village development	-	-		-
4.	Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS CYCLONE DROUGHT LANDSLIDES AVALANCHE OTHER (SPECIFY)	-	-	-	-

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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	Post office	
2.	Additional Information/ Requirement		
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?	NO	

IX. Smart Village / Heritage Details

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

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

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12.4 Gap Analysis of the Allocated Village

Table -31 Gap Analysis of Allocated Village					
Village Facilities	**Planning Commission/UDPFI Norms**	**Village**		**Narthan**	
		Population		**1237 (AS Per 2011)**	
		Existing	**Required as per Norms**	**Smart Village / Cities / Heritage Future Projection**	**Gap**
Social Infrastructure Facilities					
Education					
Anganwadi	Per 2500 Population	1	0	0	**0**
Primary School	Per 2500 Population	1	1	0	**0**
Secondary School	Per 7,500 population	0	0	0	**0**
Higher Secondary	Per 15,000 Population	0	0	0	**0**
College	Per 125,000 Population	0	0	0	**0**
Tech. Training	Per 100000 Population	0	0	0	**0**
Agriculture Research	Per 100000 Population	0	0	0	**0**
Skill Development	Per 100000 Population	0	0	0	**0**
Health Facility					
Govt/ Panchayat Dispensary or Sub PHC or Health Centre	Each Village	0	**1**	0	**1**
Primary Health & Child Health	Per 20,000 population	0	0	0	**0**

Child Welfare and Maternity	Per 10,000 population	0	0	0	**0**
Multispecialty Hospital	Per 100000 Population	0	0	0	**0**
Public Latrines	1 for 50 families (if toilet is not there in home, especially for slum pockets & kutcha house	0	7	0	**7**
Physical Infrastructure Facilities					
Transportation		**Adequate / Inadequate**			
Pucca Village Approach	Each village	Adequate	Adequate	0	**0**
Bus/Auto Stand provision	All Villages connected by PT (ST Bus)	Adequate	Adequate	0	**0**
Drinking Water (Minimum 70 lpcd)		**Adequate / Inadequate**			
Over Head Tank	1/3 of Total Demand	Adequate	Adequate	0	**0**
U/G Sump	2/3 of Total Demand	Adequate	Adequate	0	**0**
Drainage Network – Open		Adequate/ Inadequate		0	**Available**
Drainage Network – Cover		Adequate/ Inadequate		0	**Available**
Waste Management System		Adequate / Inadequate		0	**Available**
Socio- Cultural Infrastructure Facilities-					
Community Hall		0	1	0	**1**
Community Hall And Public		0	0	0	**0**
Cremation Ground		0	0	0	**0**
Post Office		1	1	0	**0**

Gram Panchayat		1	1	0	**0**
APMC		0	0	0	**0**
Fire Station		0	0	0	**0**
Public Garden		0	0	0	**0**
Entrance Gate		0	1	0	**1**
Police Post		0	0	0	**0**
Shopping Mall		0	0	0	**0**
General market		0	1	0	**1**
Entrance Gate		0	1	0	**1**

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

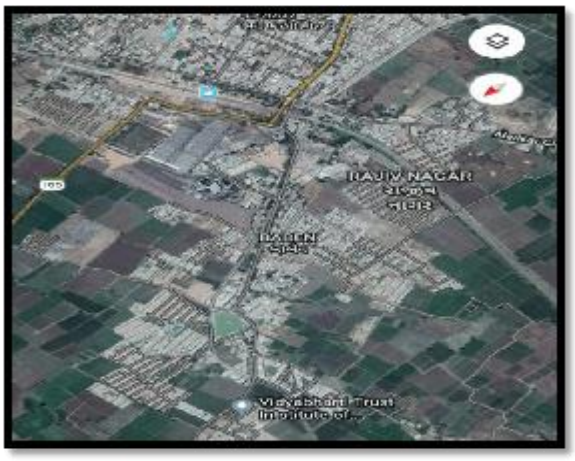
Table -32 Summary Details of All Villages

Sr. no	Village	Description	Design Proposal (Part-1)	Design Proposal (Part-2)
1	Rajgari	Civil	Sarvajanik Sauch Griha	Bus stand
			Public Dispensary	Chabutra
			Police Outpost	Pravesh Dwar
			Solar Field	Public distribution system shop
			Csc Centre	Swimming pool
			Rain Water Harvesting	Door to door waste collection system
		Electrical	Automatic Plant Watering System	Automatic light: DIM and DIP control
			Temperature Control System	Overspeed indication and accident prevention system
			Smoke Detector System	Wireless mobile charging using inductive coupling
2	Tenarang	Civil	Library	Pucca house
			Public latrine	Community hall
			Clinic	Biogas plant

			Lake Beautification	Gram panchayat
			Bank	Police station
			Vertical Farming	Entrance gate
		Electrical	Hybrid Street Light	Footsteps power generation
			Solar Powered Charger	Biogas generator
			Replacement of Light Source	FPC solar water heater
3	Kunkni	Civil	Anganwadi	Reconstruction of panchayat
			Clinic	Market
			Sprinkler Irrigation	Reconstruction of milk dairy
			Solid Waste Disposal	Bus stand
			Water Tank	Computer class with cyber cafe
			Sewage Treatment Plant	Agricultural cooperative society
		Electrical	Smart Power Theft Detection system	Automated solar grass cutter
			Short circuit protection	Smart street light
			Vertical axis wind turbine	LPG leakage detector
4	Narthan	Civil	Public Latrine Block	Agro Storage Unit
			Public Health Centre	Drinking Water Facility
			Community Hall	WBM Road
			Rain Water Harvesting with Ground Water Recharge	Overhead Water Tank
			General Market	Vermicomposting Unit
			Entrance Gate	Maintenance of Bus Stand
		Electrical	Auto Electronic School Bell	Generate power using microturbine
			Automated Night Lighting	Simple low power inverter
			Solar Powered Battery Charging With Reverse Current Protection	Remote operated home appliances control

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

Table -33 Summary of Good Photographs



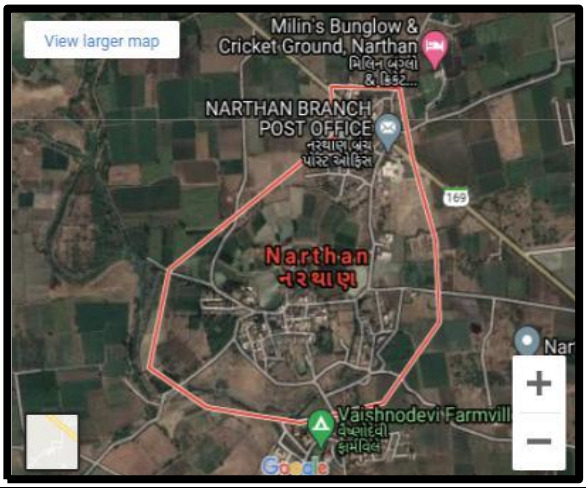
Map of Baben

Sugar factory of Baben

Primary School And Anganwadi

Solid Waste Disposal

Overhead Water Tank



Map of Narthan

Water Management Facilities

Lake

Meeting with Sarpanch

	
Transportation	Housing Condition
	
Social Infrastructure Facilities	Education System

12.8 Village Interaction with sarpanch Report with the photograph

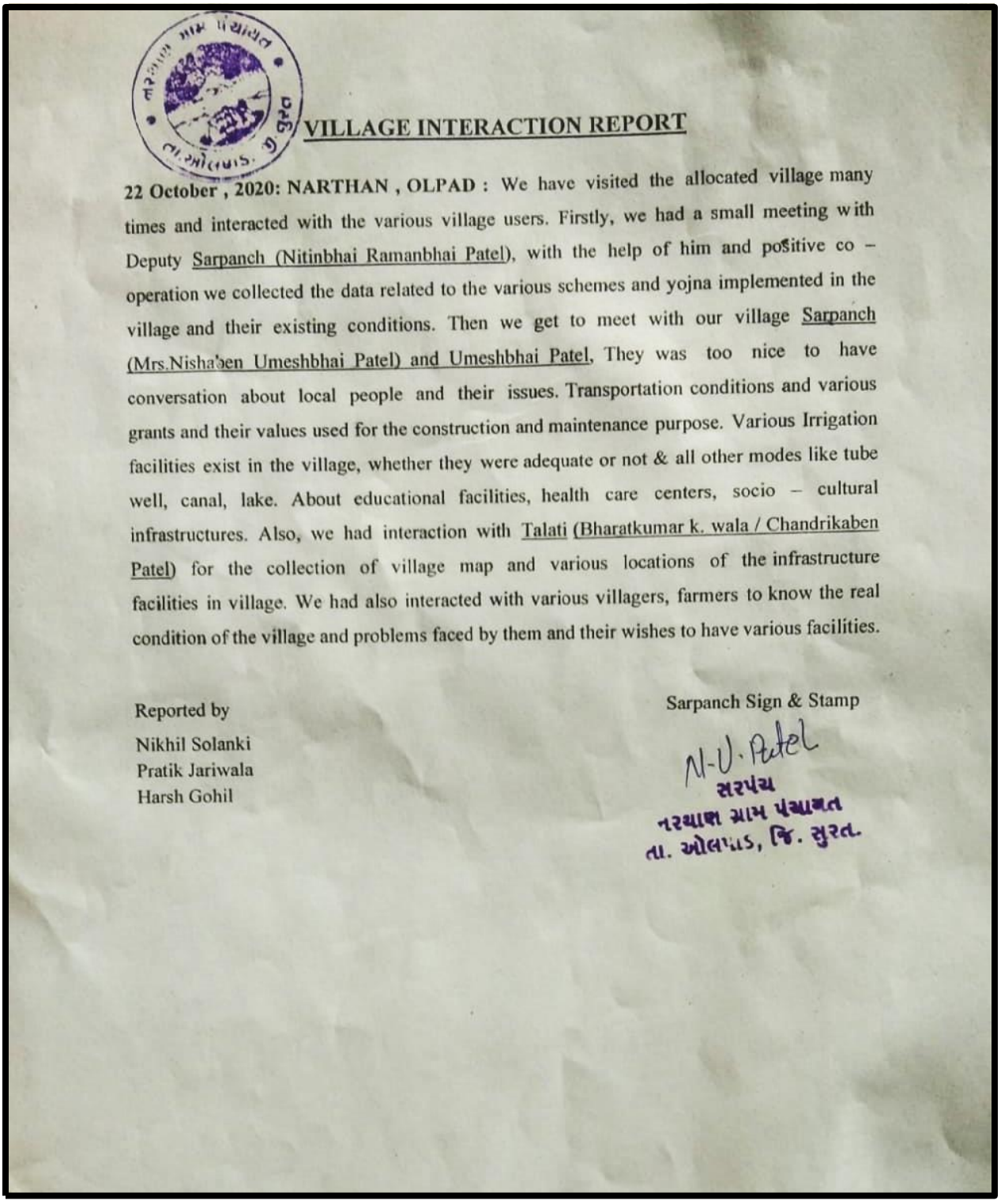
VILLAGE INTERACTION REPORT

22 October , 2020: NARTHAN , OLPAD : We have visited the allocated village many times and interacted with the various village users. Firstly, we had a small meeting with Deputy Sarpanch (Nitinbhai Ramanbhai Patel), with the help of him and positive co – operation we collected the data related to the various schemes and yojna implemented in the village and their existing conditions. Then we get to meet with our village Sarpanch (Mrs.Nishaben Umeshbhai Patel) and Umeshbhai Patel, They was too nice to have conversation about local people and their issues. Transportation conditions and various grants and their values used for the construction and maintenance purpose. Various Irrigation facilities exist in the village, whether they were adequate or not & all other modes like tube well, canal, lake. About educational facilities, health care centers, socio – cultural infrastructures. Also, we had interaction with Talati (Bharatkumar k. wala) for the collection of village map and various locations of the infrastructure facilities in village. We had also interacted with various villagers, farmers to know the real condition of the village and problems faced by them and their wishes to have various facilities.

Reported by

Nikhil Solanki
Pratik Jariwala
Harsh Gohil

12.9 Sarpanch Letter giving information about the village development



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Reported by

Nikhil Solanki
Pratik Jariwala
Harsh Gohil

Sarpanch Sign & Stamp

N-U. Patel
સરપંચ
નરથાણ ગામ પંચાયત
તા. ઓલપાડ, જિ. સુરત.

12.10 Comprehensive report preparation as per format

CONCEPT

Vishwakarma Yojana is provides special scheme for development of village by GTU and Government of Gujarat in which students work together and collect data and information regards village development with the help of gram panchayat and stake holders.

Village have some basic facilities likes drinking water, drainage system, pucca road, and other facilities like primary school, primary health center, community hall, library, public latrine block, are sufficient so that village can develop. So, we will give proposal regarding sustainable energy sources and solution related to infrastructure problems.

Efforts have been made in this project work to identify and plan some of the below facilities for sustainable development of village and to meet need of future population. Vishwakarma Yojana is one of the initiatives towards Rurbanisation that is village development by the government of Gujarat, which was allotted as a real time situation type project provides to GTU.

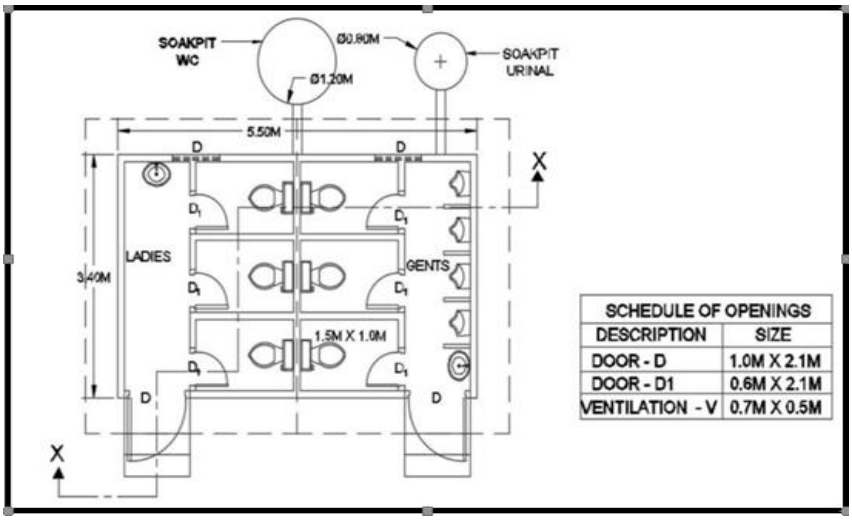
It is one of the strategies to reduce urban city pressure and lower the migration rate by developing village with a “rural soul” but with all urban amenities that a city may have. In this project the students meet the relevant citizens of village and survey the existing facilities.

Then design of the sustainable infrastructure which is to be modified is carried out for the village. This includes implementation of engineering skills to prepare detailed project reports for village as a part of the final year project work.

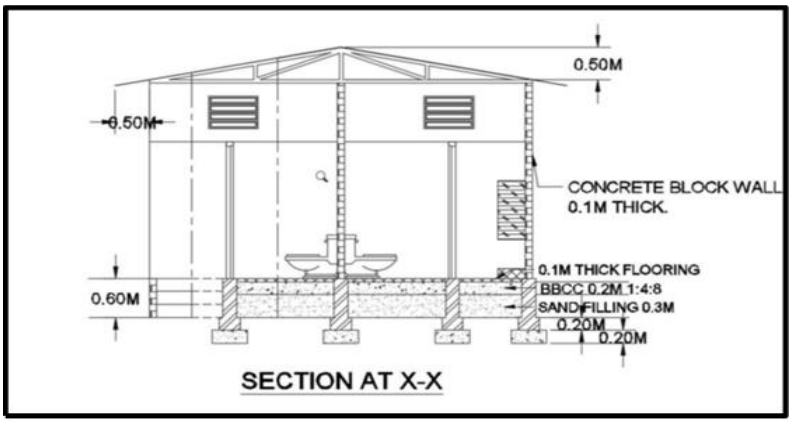
By this project certain experiences recreates a real work and need of application of an individual technical knowledge on any existing problems. Based on survey we tried to give design of basic facilities to fulfill their needs.

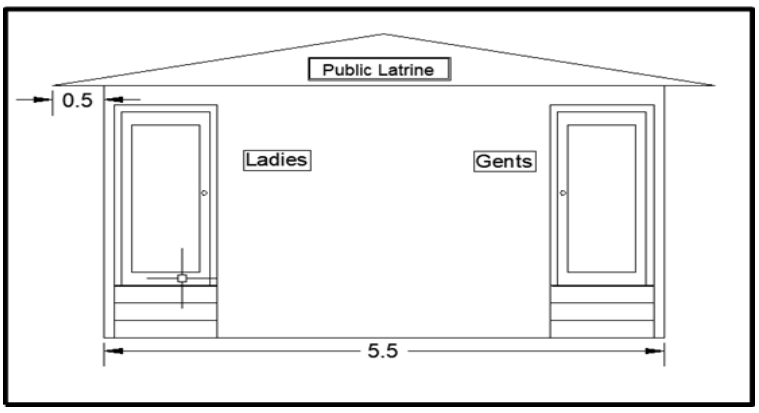
By providing these basic facilities to village for reduce urban city pressure and decrease migration rate, which is ultimate aim of Vishwakarma Yojana.

Narthan Village, Olpad, Surat



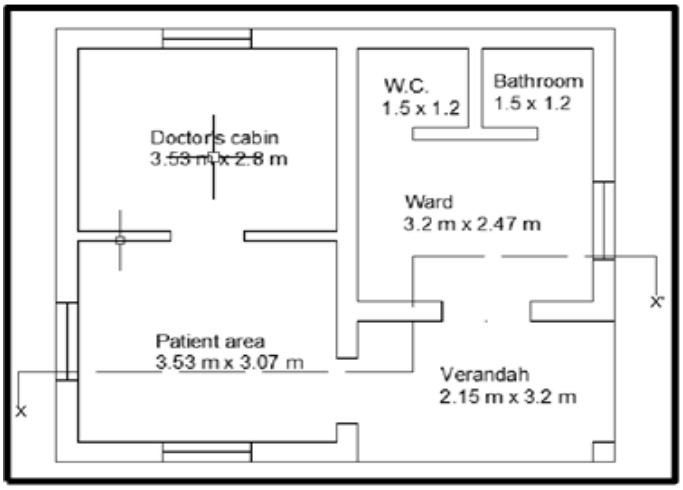
SCHEDULE OF OPENINGS	
DESCRIPTION	SIZE
DOOR - D	1.0M X 2.1M
DOOR - D1	0.6M X 2.1M
VENTILATION - V	0.7M X 0.5M

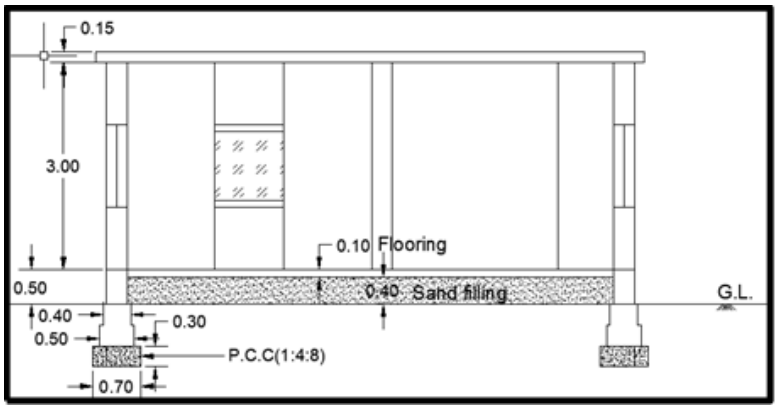


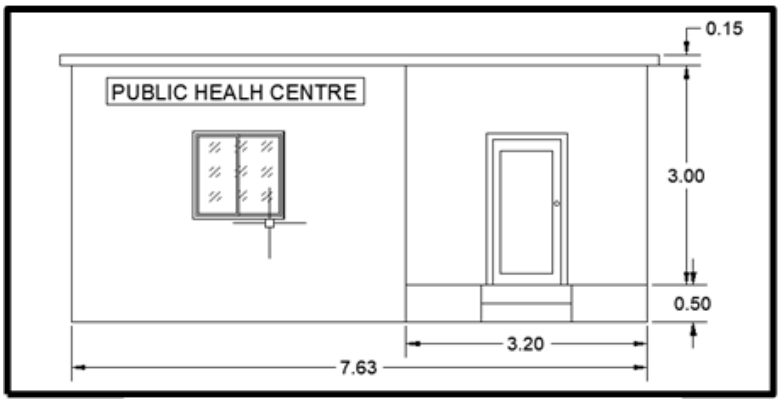


Design Infrastructure – Public Latrine Block Village – Narthan Village, Surat

Narthan Village, Olpad, Surat

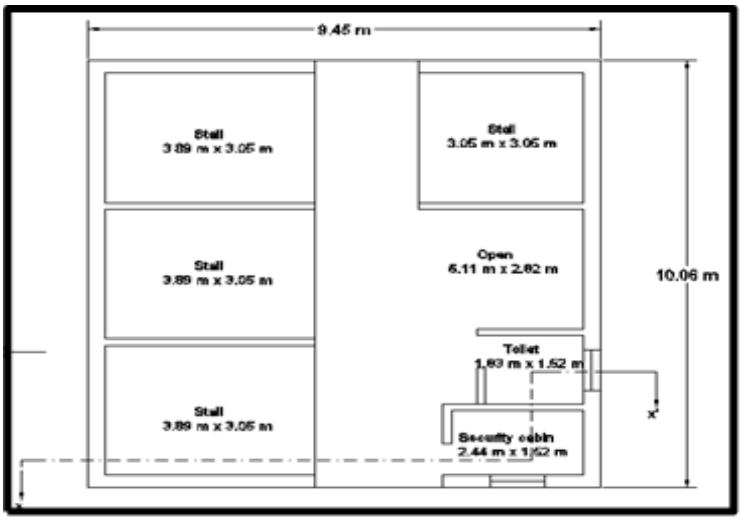


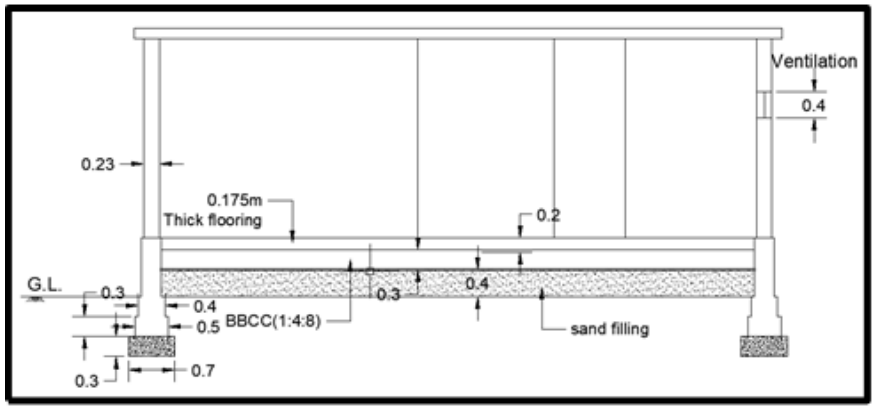


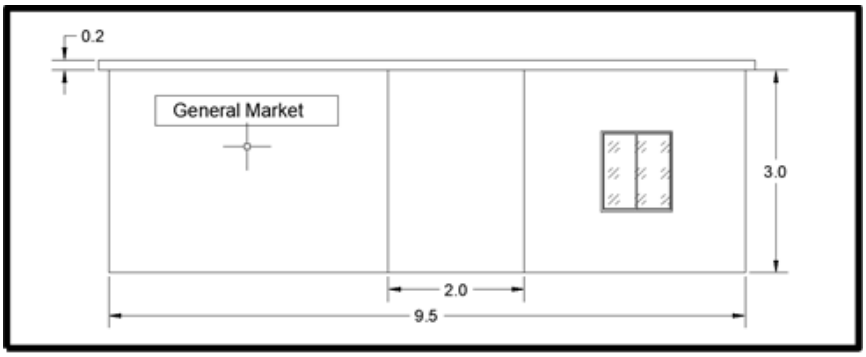


Design Infrastructure – Public Health Centre Village – Narthan Village, Surat

Narthan Village, Olpad, Surat

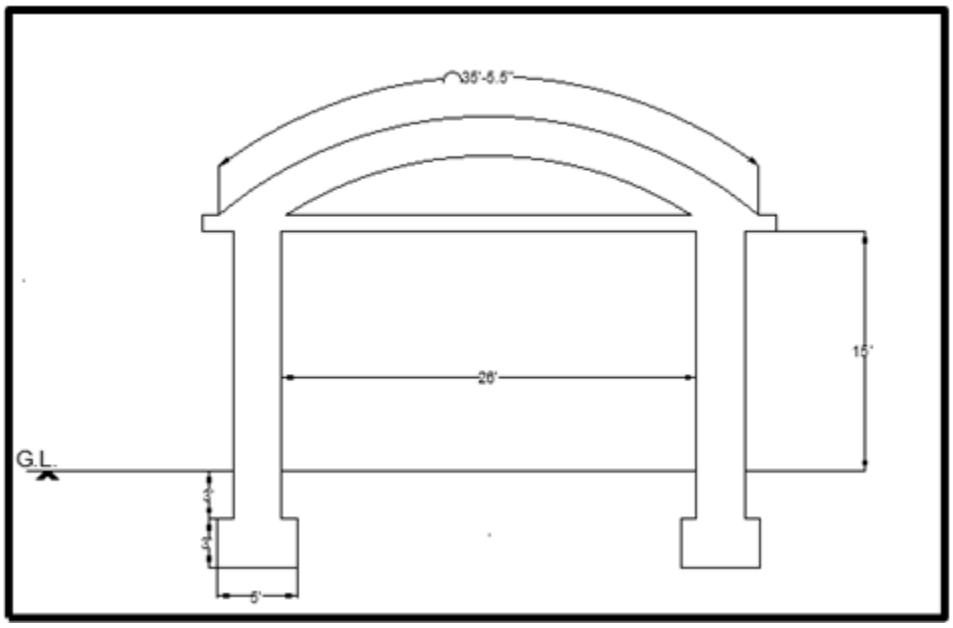


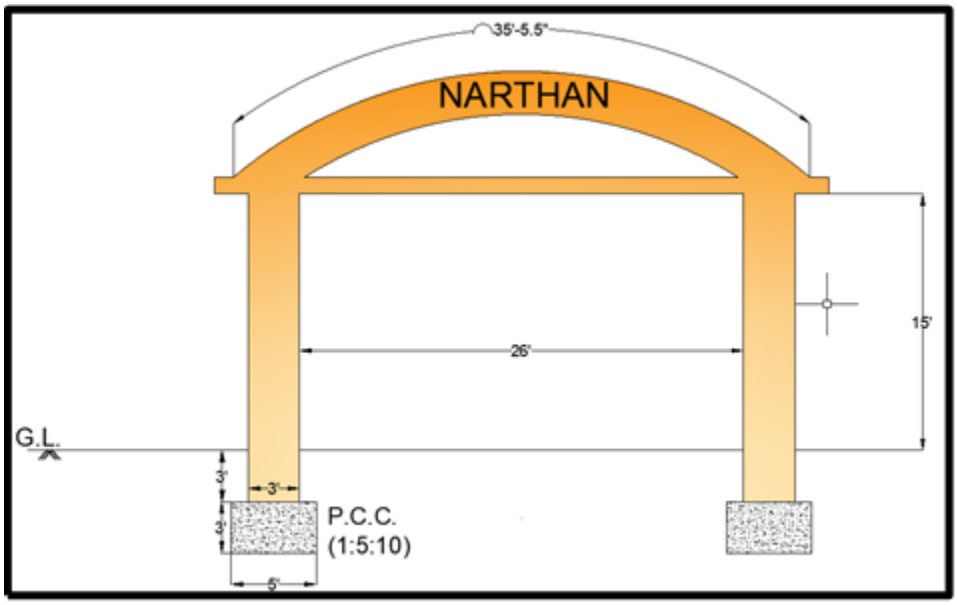




Design Infrastructure – General Market Village – Narthan Village, Surat

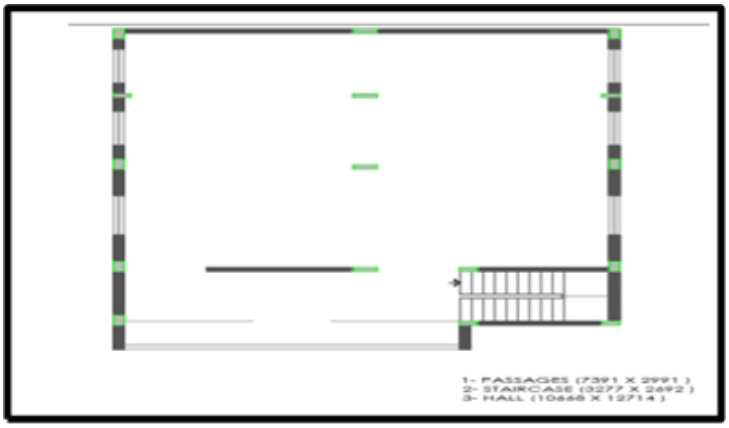
Narthan Village, Olpad, Surat

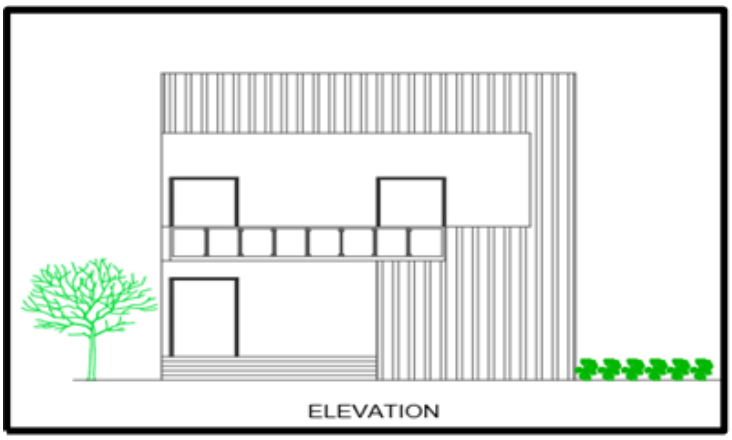




Design Infrastructure – Entrance Gate
Village – Narthan Village, Surat

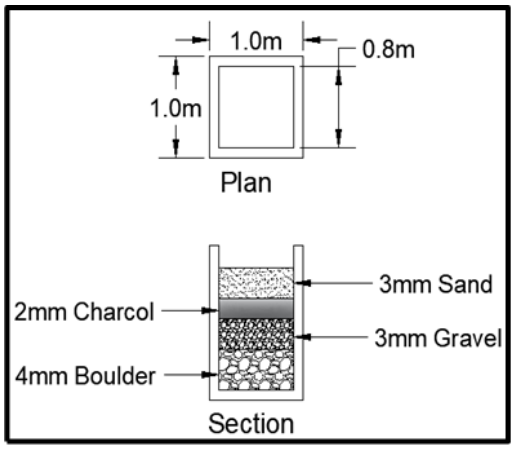
Narthan Village, Olpad, Surat

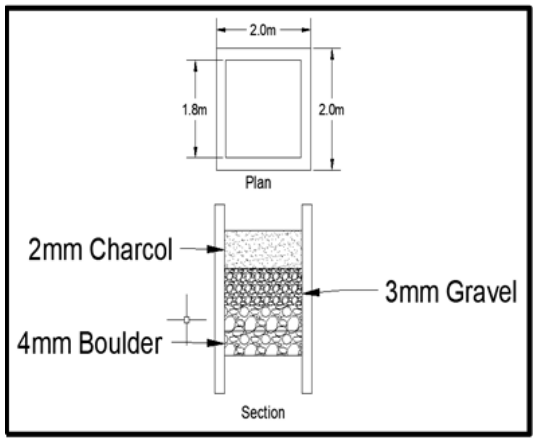


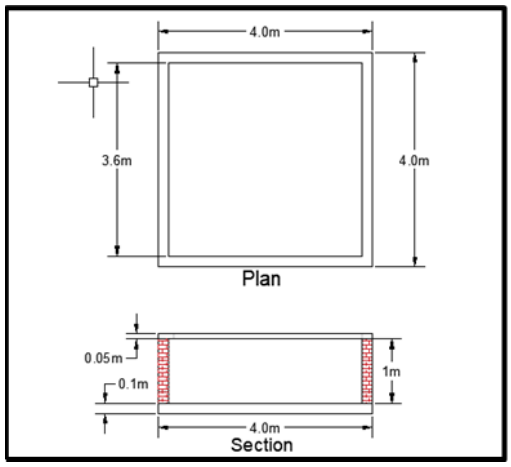


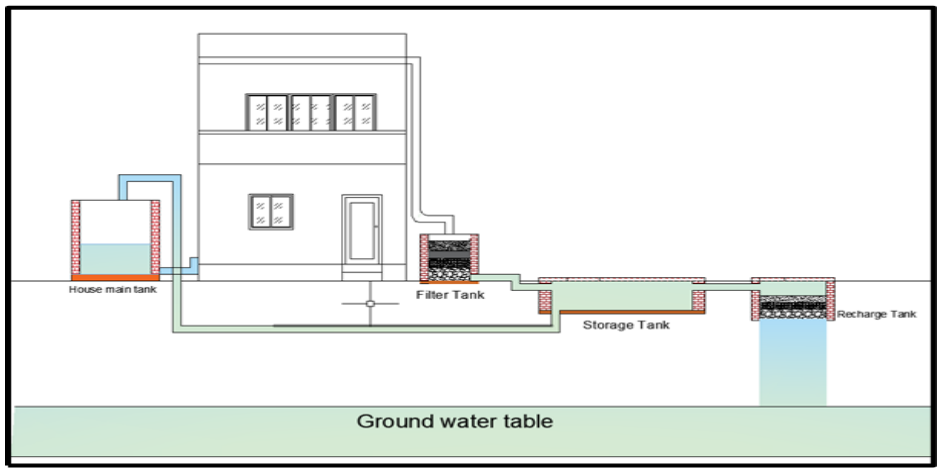
Design Infrastructure – Community Hall Village – Narthan Village, Surat

Narthan Village, Olpad, Surat









Design Infrastructure – Rain water harvesting
Village – Narthan Village, Surat

CHAPTER 13: FUTURE DESIGNS OF THE ASPECTS

13.1 Design Proposals the

- Agro Storage Unit
- Drinking water facilty
- Flexible pavement
- Bio gas plant
- Overhead tank
- Bus stand maintenance

13.1.1 Design 1: Agro Storage Unit

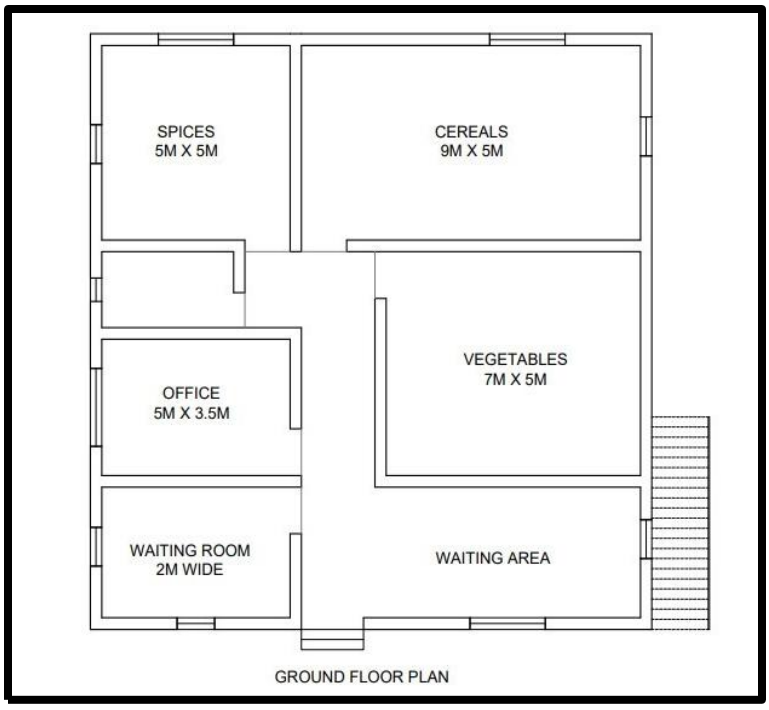


Figure - 69 Plan of agro storage unit

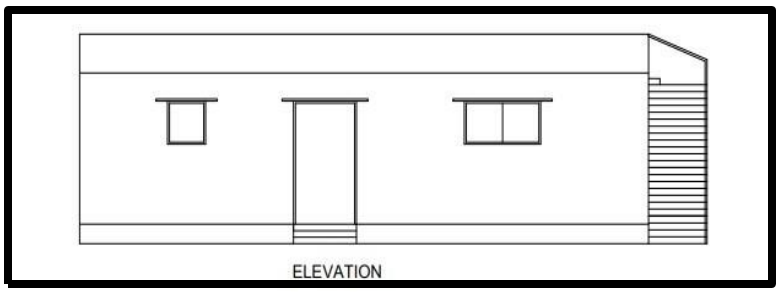


Figure - 70 Elevation of agro storage unit

Table - 34 Quantity Sheet of agro storage unit						
Sr. no.	**Item Description**	**No**	**Length (m)**	**Width (m)**	**Height (m)**	**Quantity (CU.M)**
1	Earthwork in Excavation in Foundation:					
	Excavation for For foundation	16	4	4	1.5	384.00
	Excavation for For step	1	2.4	0.7	0.2	0.34
				TOTAL QTY.		384.34
2	P.C.C in Excavation in Foundation:					
	P.C.C. for foundation	16	4	4	0.1	25.60
	P.C.C. for steps	1	2	0.7	0.1	0.14
				TOTAL QTY.		25.74
3	R.C.C. for foundation					
	Volume	16	0.19			3.04
				TOTAL QTY.		3.04
	R.C.C for beam					
	steps 1	16	5.23	0.23	0.3	5.77
	steps 2	4	4	0.23	0.3	1.10
	steps 3	4	2.23	0.23	0.3	0.62
						7.49
4	Brick Masonary in super structure					
	Long wall 1 L=12m	3	12	0.23	3.5	28.98
	Long wall 2 L= 5m	1	5	0.23	3.5	4.03
	Short wall 1 S=14m	4	14	0.23	3.5	45.08
	Short wall 1 S=5m	1	5	0.23	3.5	4.03
	Brick masonry steps					
	step 1	1	2	0.7	0.3	0.42
	step2	1	2	0.35	0.3	0.21
				TOTAL QTY.		82.74
	Deduction for Door & Window					
	D	1	1.85	0.23	2.1	0.89
	D1	4	1.2	0.23	2.1	2.32
	D2	1	0.9	0.23	2.1	0.43
	W	6	2	0.23	1.2	3.31
	W1	3	1	0.23	1.2	0.83
	V1	1	0.6	0.23	1.2	0.17
				TOTAL QTY.		7.95
5	Flooring					
	Kota stone					
	Room 1	1	5	5		25.00

Sr. no.	Item Description	No	Length (m)	Width (m)	Height (m)	Quantity (CU.M)
	Room 2	1	9	5		45.00
	Room 3	1	7	5		35.00
				TOTAL QTY.(m2)		105.00
	Marbel					
	Office	1	5	3		15.00
	Verandah	1	2.4	3		7.20
	open area 1	1	2	5		10.00
	open area 2	1	5	1.5		7.50
				TOTAL QTY.(m2)		39.70
6	R.C.C. for slab					
	(1:1.5:3)	1	13	15	0.5	97.50
				TOTAL QTY.		97.50
7	out side plaster					
	L2(13+15)	1	56	3.5		196.00
				TOTAL QTY.(m2)		196.00
	Deduction					
	D	1	1.85		2.1	3.89
	W	6	2		1.2	14.40
	W1	3	1		1.2	3.60
				TOTAL QTY.(m2)		21.89
8	**Inside plaster (1:4)**					
	Long wall 1	4	12		3.5	168.00
	Long wall 2	1	5		3.5	17.50
	short wall 1	6	14		3.5	294.00
	short wall 2	1	5		3.5	17.50
				TOTAL QTY.(m2)		497.00
	Deduction					
	D	1	1.85		2.1	3.89
	D1	10	1.2		2.1	25.20
	D2	2	0.9		2.1	3.78
	W	5	2		1.2	12.00
	W1	3	1		1.2	3.60
				TOTAL QTY.(m2)		48.47
9	colour outside					
	L=2(13+15)	1	56		3.5	196.00

Sr. no.	Item Description	No	Length (m)	Width (m)		Height (m)
				TOTAL QTY.(m2)		196.00
	Deduction					
	D	1	1.85		2.1	3.89
	W	6	2		1.2	14.40
	W1	3	1		1.2	3.60
				TOTAL QTY.(m2)		21.89
10	Colour inside					
	long wall 1	4	12		3.5	168.00
	long wall 2	1	5		3.5	17.50
	Short wall 1	6	14		3.5	294.00
	Short wall 2	1	5		3.5	17.50
				TOTAL QTY.(m2)		497.00
	Deduction					
	D	1	1.85		2.1	3.89
	D1	10	1.2		2.1	25.20
	D2	2	0.9		2.1	3.78
	W	5	2		1.2	12.00
	W1	3	1		1.2	3.60
				TOTAL QTY.		48.47
11	Wood work					
	Door (400 thick) & Window					
	D	1	1.85		2.1	3.89
	D1	5	1.2		2.1	12.60
	D2	1	0.9		2.1	1.89
	W	6	2		1.2	14.40
	W1	3	1		1.2	3.60
				TOTAL QTY.		36.38
12	**R.C.C. Chajja**					
	W	5	2.4	0.65	0.1	0.78
	W1	3	1.6	0.65	0.1	0.31
	W3	1	5	0.65	0.1	0.33
				TOTAL QTY.(m3)		1.42
13	R.C.C. Column	16	0.23	0.23	5	4.23
				TOTAL QTY.(m3)		4.23

Table – 35 Abstract Sheet of Agro Storage Unit					
Sr. no	**Item Description**	**QTY**	**Rate**	**Per**	**Amount (Rs.)**
1	Earthwork in excavation in foundation	384.34	90	CU M	34590.6
2	P.C.C. for Foundation	25.74	4200	CU M	108108
3	R.C.C. for Foundation And Beam	24	7400	CU.M	177600
4	Brick masonry in super Structure	74.25	740	SQ. M	54945
5	Flooring	60.5	200	SQ. M	12100
6	R.C.C. for Slab	29.25	2150	SQ.M	62887.5
7	Outside Plaster (1:4)	174.12	132	SQ.M	22983.84
8	Inside Plaster (1:4)	448.54	100	SQ.M	44854
9	Colour outside	174.12	130	SQ.M	22635.6
10	Colour inside	448.54	90	SQ.M	40368.6
11	Wood work for Door and Windows	33.56	245	SQ.M	8222.2
12	R.C.C. for Chajja	1.41	4235	CU.M	5971.35
13	R.C.C. for Column	4.23	4792	CU.M	20270.16
			Total Rs.		615533
		Add 1.5% Water Charge			9233
		Add 10% contractor Charge			61553.3
		Total Estimate Cost in Rs.			**6,86,319**

13.1.2 Civil Design 2: Drinking Water Facility

To provide sweet and clean drinking water to the villagers and travelers. Also in the village sometimes water scarcity occurs. So in that time this drinking water facility unit help villagers for their needs. So we take this problem as a key requirement and proposed the design for same.

We provide this design on the vacant land near the harpati niwas area of Narthan village. this place is much suitable for this design.

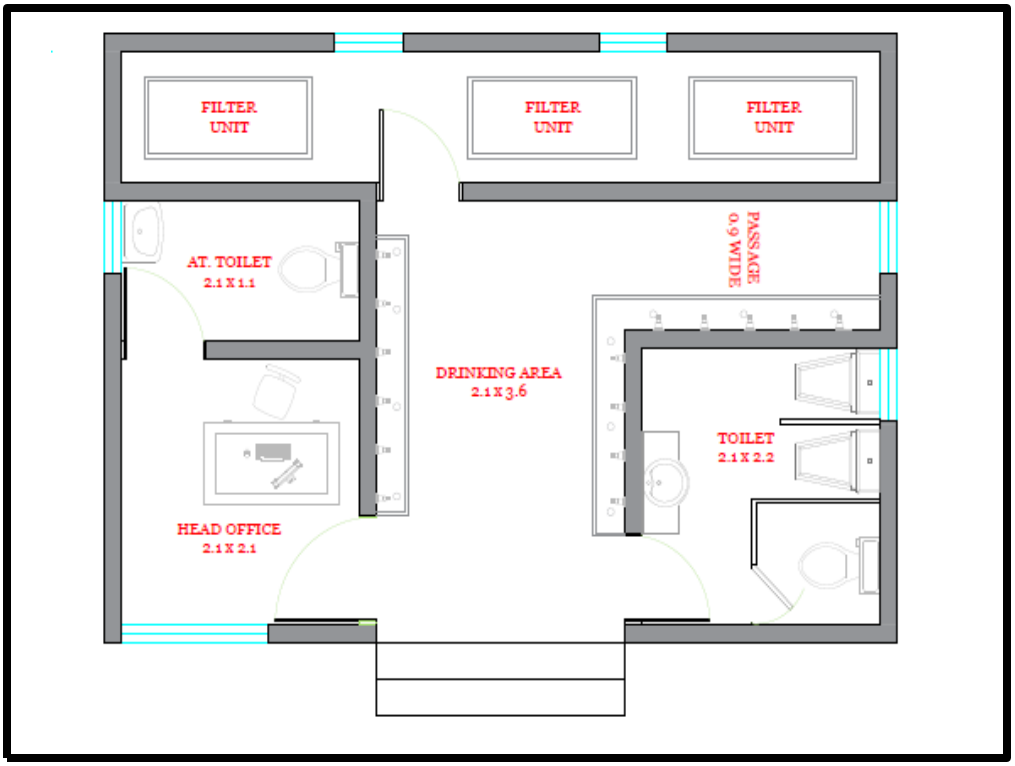


Figure - 71 Plan of Drinking Water Facility

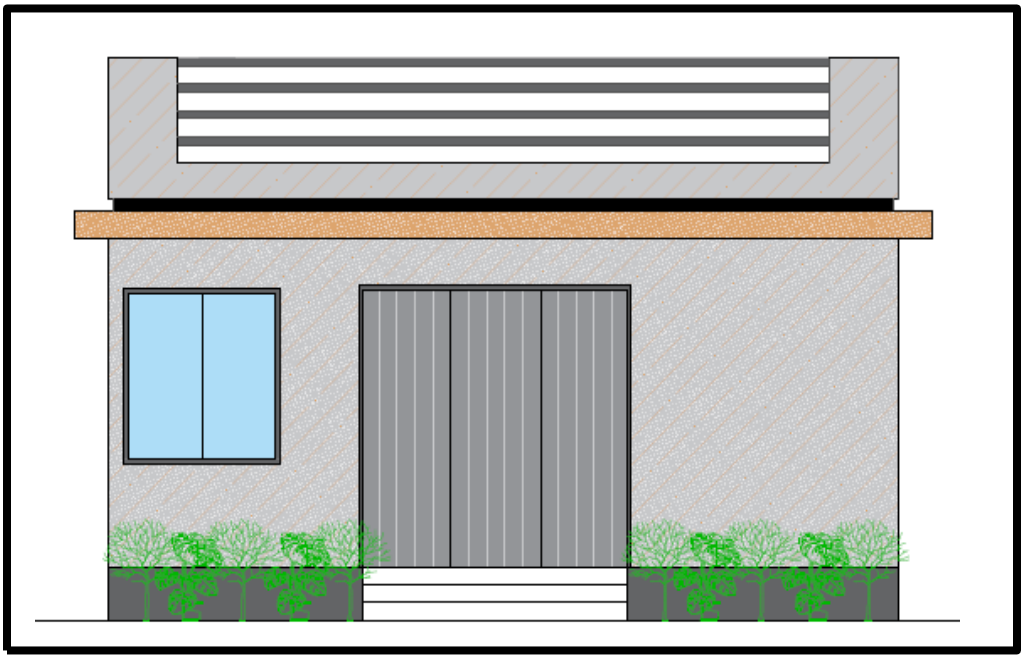


Figure – 72 Elevation of Drinking Water Facility

Table – 36 Quantity Sheet of drinking water facility						
Sr. no.	**Item Description**	**No**	**Length (m)**	**Width (m)**	**Height (m)**	**Quantity (CU M)**
1	**Earthwork in Excavation in Foundation:**					
	L1 =7.90	3	7.9	1	1.5	35.55
	S1 =3.8	2	3.8	1	1.5	11.40
	S2 =2.60	1	2.6	1	1.5	3.90
	S3 =2.10	1	2.1	1	1.5	3.15
		TOTAL QTY.				54.00
2	**P.C.C Foundation:**					
	L1 =7.90	3	7.9	1.5	0.3	10.67
	S1 =3.8	2	3.8	1.5	0.3	3.42
	S2 =2.60	1	2.6	1.5	0.3	1.17
	S3 =2.10	1	2.1	1.5	0.3	0.95
		TOTAL QTY.				16.20
3	**Pad footing in Foundation**					
	STEP1: (L1 =7.50)	3	7.5	0.7	0.3	4.73
	STEP2: (L1 =7.25)	3	7.25	0.15	1.6	5.22
	STEP1: (S1 =4.2)	2	3.4	0.7	0.3	1.43
	STEP2: (S1 =4.45)	2	3.15	0.15	1.6	1.51
	STEP1: (S2 =3.00)	1	2.2	0.7	0.3	0.46
	STEP2: (S2 =3.25)	1	1.95	0.15	1.6	0.47
	STEP1: (S3 =2.50)	1	1.7	0.7	0.3	0.36
	STEP2: (S3 =2.75)	1	1.45	0.15	1.6	0.35
				TOTAL QTY.		14.52
4	**Brickwork in S.S**					
	L1 =7.90	3	7.9	0.15	3.2	11.38
	S1 =3.8	2	3.8	0.15	3.2	3.65
	S2 =2.60	1	2.6	0.15	3.2	1.25
	S3 =2.10	1	2.1	0.15	3.2	1.01
		TOTAL QTY.				17.28
5	**Staircase Qty**					
	L1 =2.10	1	2.1	0.6	0.15	0.19
	L1 =2.10	1	2.1	0.3	0.15	0.09
		TOTAL QTY.				0.28
6	**Deduction for D & W**					
	W1	1	1.3	0.15	1.5	0.29
	V1	5	0.6	0.15	0.15	0.07
		TOTAL QTY.				0.36
7	**Deduction for D & W**					
	W1	1	1.3	0.15	0.12	0.02

Sr. no.	Item Description	No	Length (m)	Width (m)	Depth (m)	Quantity (CU M)
	V1	5	0.6	0.15	0.12	0.05
					TOTAL QTY.	0.08
					NET QTY.	21.59
8	**R.C.C Slab & Chaaja**					
	L=7.00	1	7	5	0.12	4.20
	B=5.00	1				
	R.C.C Chaaja					
	W1	1	1.3	0.6	0.12	0.09
	V1	5	0.6	0.6	0.12	0.22
					TOTAL QTY.	4.51
9	**Plaster inside**					
	HEAD OFFICE	4	2.1		3	25.20
	TOILET	2	2.1		3	12.60
		2	1.1		3	6.60
	D.A	2	2.1		3	12.60
		2	2.9		3	17.40
	TOILET	2	2.1		3	12.60
		2	1.1		3	6.60
	F.U	2	6.7		3	40.20
		2	1		3	6.00
					TOTAL QTY.	139.80
10	**Celling Plaster**					
	HEAD OFFICE	2	1.2		2.1	5.04
	TOILET	2	2.1		1.1	4.62
	D.A	2	2.1		2.9	12.18
	TOILET	2	2.1		1.1	4.62
	F.U	2	6.7		1	13.40
					TOTAL QTY.	185.66
11	**Deduction for D & W**					
	W1	2	1.3		1.5	3.90
	V1	2	0.6		0.15	0.18
					TOTAL QTY.	4.08
					NET QTY.	321.38

Table – 37 Abstract Sheet of drinking water facilities unit					
Sr. no	**Item Description**	**QTY**	**Rate**	**Per**	**Amount (Rs.)**
1	Earthwork in excavation in foundation	54 CU.M	90	CU.M	4860
2	P.C.C foundation	16.2 CU.M	4200	CU.M	68040
3	Pad Footing Upto Plinth	14.1 CU.M	3500	CU.M	49420
4	Brick work for S.S	21.6 SQ.M	150	SQ.M	3238.5
5	R.C.C Slab & Chajja	4.5 CU.M	150	CU.M	676.5
6	Staircase Qty	0.3 CU.M	3000	CU.M	900
7	Smooth plaster on inter wall	321 SQ.M	100	SQ.M	32100
8	Brick work for parapet wall	10.0 CU.M	150	CU.M	1500
				Total Rs.	160735
				Add 1.5% Water Charge	2411.02
				Add 10% contractorCharge	16073.5
				Total Estimate Cost in Rs.	**1,79,220**

13.1.3 Design: 3 WBM Road

Introduction:

Water bound macadam shall consist of clean crushed coarse aggregates mechanically interlocked. By rolling and voids there of filled with screening and binding material with the assistance of water, laid on a prepared subgrade. sub-base, base or existing pavement as the case should be. Water bound macadam may be used as the sub base, base course or surfacing course. In each case, It shall be constructed in accordance with the specification given below and in conformity with the lines, grades and cross section shown on the drawings or as otherwise directed.

Materials used for WBM:

- Coarse aggregates
- Screening
- Binding materials

Coarse aggregates:

- Crushed aggregates
- Cursed slag & Kankan
- Broken Stones & Laterite
- Over Burnt Bricks

Table -38 Size and Grading required for coarse aggregate For WBM Screening

Grading No.	Size range	Sieve designation (IS : 460)	Per cent by weight passing the sieve
1.	90 mm to 45 mm	125 mm	100
		90 mm	90—100
		63 mm	25—60
		45 mm	0—15
		22.4 mm	0—5
2.	63 mm to 45 mm	90 mm	100
		63 mm	90—100
		53 mm	25—75
		45 mm	0—15
		22.4 mm	0—5
3.	53 mm to 22.4 mm	63 mm	100
		53 mm	95—100
		45 mm	65—90
		22.4 mm	0—10
		11.2 mm	0—5

The screening are used to fill up the voids in the compared layer of the coarse aggregate. The screening consist of aggregate of smaller size, generally of the same materials as the coarse aggregates. the grading requirement of screening s for WBM construction are given in table.

Table - 39 Grading required for screening For WBM Binding materials

Grading/ Classification	Size of screenings	Sieve designation (IS : 460)	Per cent by weight passing the sieve
A	13.2 mm	13.2 mm	100
		11.2 mm	95—100
		5.6 mm	15—35
		180 micron	0—10
B	11.2 mm	11.2 mm	100
		5.6 mm	90—100
		180 micron	15—35

Binding materials consisting of fine-grained materials is used in WBM construction to prevent raveling of the stones. Canker nodules or lime stone dust may also be used. Binding material should have plasticity index between 4 to 9 when WBM is used as surfacing course.

Advantages of WBM Road:

- Initial cost is low.
- They make use of locally available materials and labors.
- No skilled labors are required.

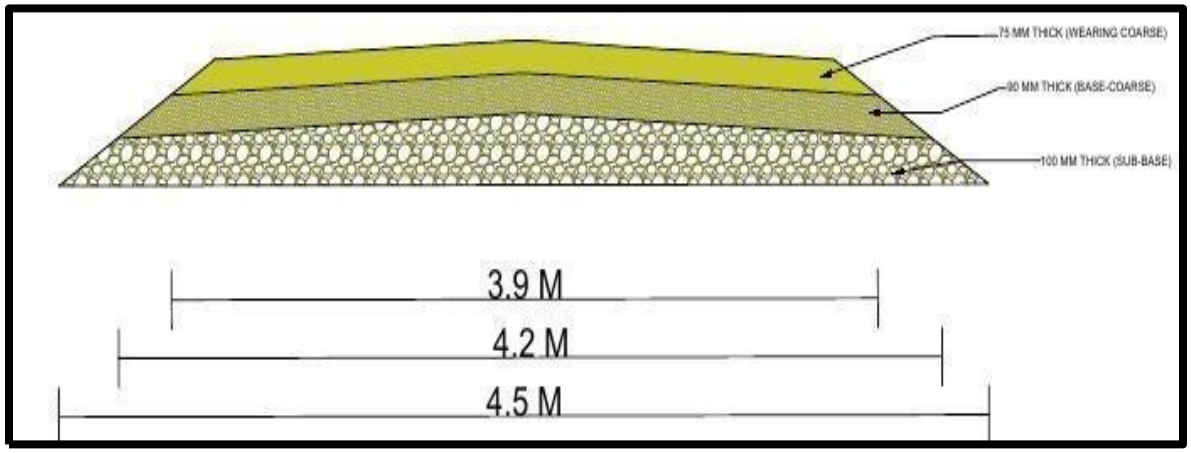


Figure - 73 Cross section of road

- Use 125 mm granular size broken stones in sub grade
- Use 90 mm granular size aggregate in base course

Location and Route of Road :

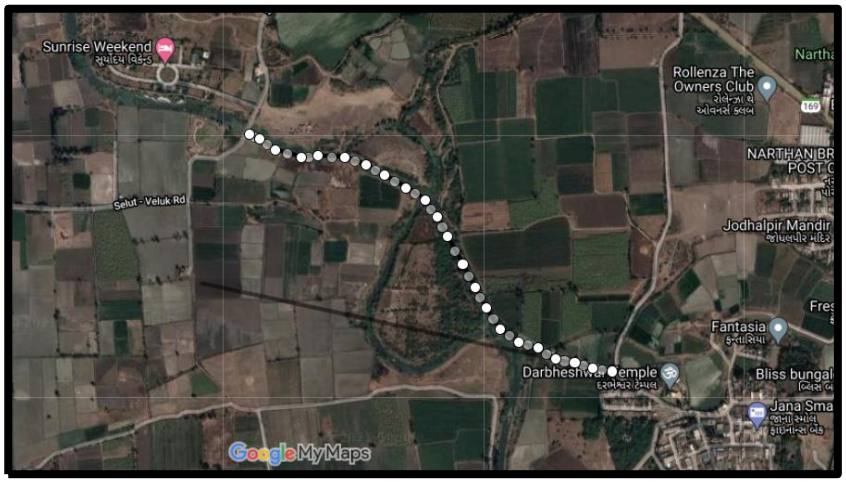


Figure – 74 Route of road

The route shown in figure it is the location of WBM Road Narthan village to veluk village. It is 1.04 km distance.

Table - 40 Quantity sheet of WBM Road						
Sr no	**Description**	**Nos**	**Length (m)**	**Breadth (m)**	**Height (m)**	**Quantity m3**
1	Preparing sub grade	1	1010	4.7	0.01	47.47
2	Preparing base course	1	1010	4.5	0.135	613.58
3	Preparing wearing course	1	1010	4.1	0.115	476.22

Table – 41 Abstract sheet for WBM Road					
Sr. no	**Item description**	**Quantity**	**Rate**	**per**	**amount**
	Preparing sub grade	47.47	800	m3	37976
	Preparing base course	613.58	700	m3	429506
	Preparing wearing course	476.22	900	m3	428598
	Total material cost = Rs. 896080				
	10 % profit of contractor = Rs. 89608.0				
	1.5% water charges = Rs. 13441.2				
	Total cost = **Rs. 9,99,130**				

13.1.4 Design 4: Rectangular Overhead Water Tank

Design Details:

- Length of tank= 8 m
- Width of tank= 4 m
- Height of tank= 3.3 m
- Capacity of water tank= 105.600 m^3 = 105600 Liter
  Actual capacity of water tank= 100600 m^3=100600 liter
- Concrete grade = M30
- Steel grade = Fe 415

One rectangular overhead water tank of capacity is designed capacity of 100000 Litter which requires P.C.C. (1:4:8) at base and 4.75m * 4.75m land is consumed by tank foundation. The Thickness of walls are 150 mm. All Reinforcement Details are shown below.

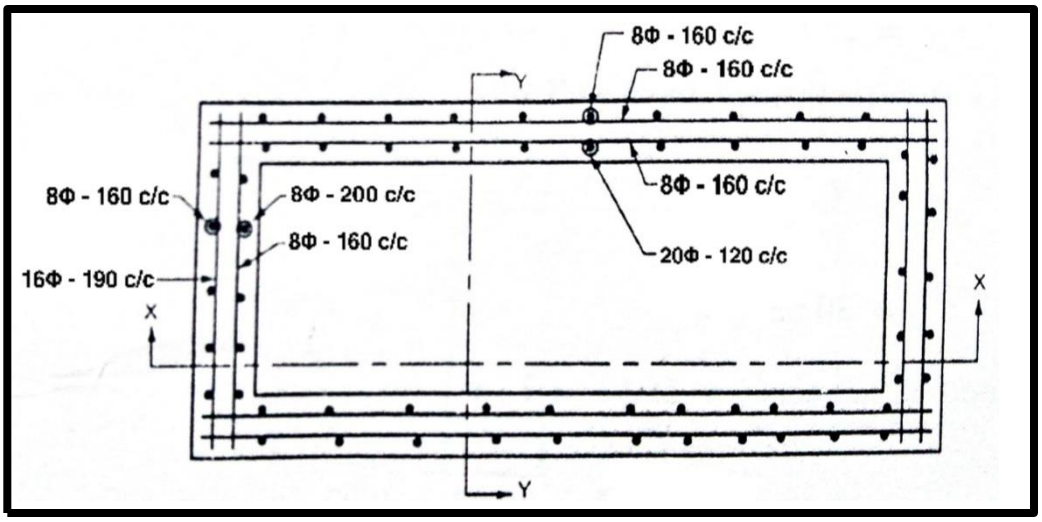


Figure – 75 Plan of water tank

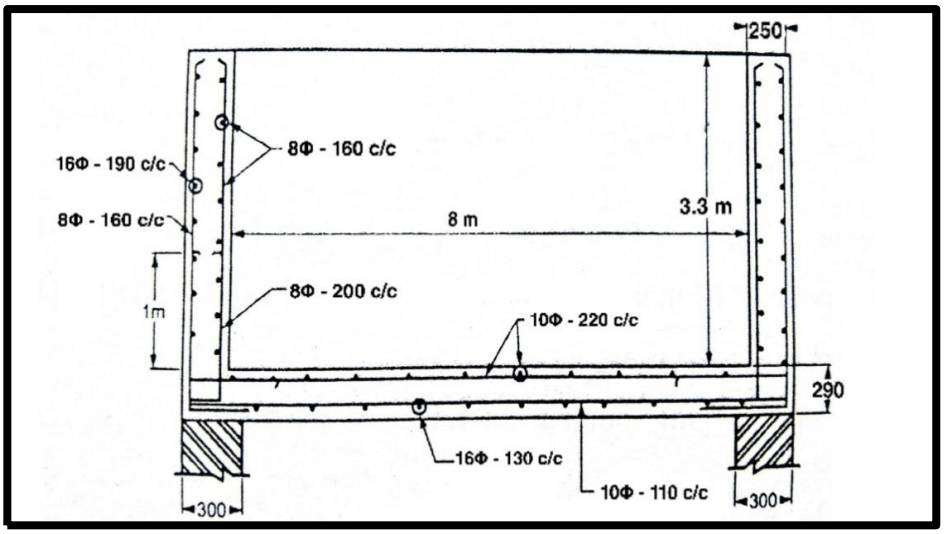


Figure – 76 Section X-X

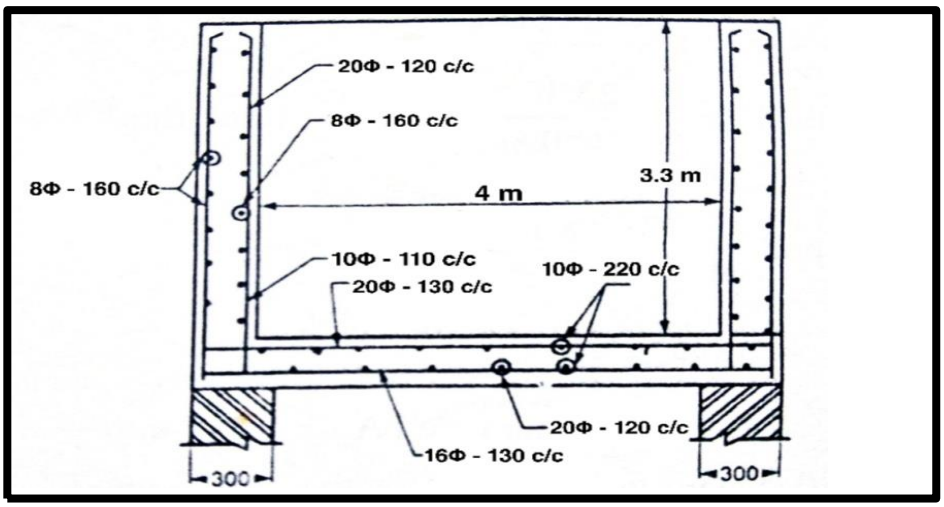


Figure - 77 Section Y-Y

DESIGN OF LONGER AND SHORTER WALLS:

Table - 42 Design of longer and shorter walls				
Sr. no	**Specification**	**Ast required**	**Ast provided**	**Reinforcement details**
1	**Longer Wall** **Design as vertical cantilever:** Liquid face Inner face **Distribution steel**:	 2622 mm² 300 mm²	 2636 mm² 314 mm² 314 mm²	 20mm Ø - 120 mm c/c 8mm Ø - 160 mm c/c 8mm Ø - 160 mm c/c
2	**Shorter Wall** **At support:** Inner face **At center:** Outer face **Distribution steel**: **Cantilever action at bottom:**	 1380 mm² 1044 mm² - 240 mm²	 1435 mm² 1057 mm² 314 mm² 251 mm²	 16mm Ø - 140 mm c/c 16mm Ø - 190 mm c/c 8mm Ø - 160 mm c/c 8mmØ - 200 mm c/c

DESIGN OF BASE SLAB:

Ast required	Ast provided	Reinforcement details
1532 mm²	1545 mm²	16mm Ø - 130 mm c/c

Table - 43 Estimate of Rectangular overhead Water Tank							
Sr. No.	**Description**	**No**	**L**(m)	**B**(m)	**D**(m)	**Quantity**	**Unit**
1	Earthwork excavation						m³
	a) Columns	4	2	2	2.80	44.8	
	b) Bottom beam	4	1.95	0.40	0.40	1.25	
2	Sand cushion						m³
	a) Column	4	2	2	0.50	8	
	b) Bottom beam	4	3	0.40	0.20	0.96	
3	Foundation concrete in P.C.C. (1:4:8)						m³
	a) Column	4	2	2	0.40	6.40	
	b) Bottom beam	4	3	0.40	0.20	0.96	
4	Foundation in R.C.C. 1:1.5.3 for footing						m³
	a) Footing bottom square portion Trapezoidal portion	4 4	2 1.63	2 -	0.40 0.80	6.40 5.22	

	b) Column in R.C.C. 1:1.5:3 below GL	4	0.40	0.40	2.40	1.54	
	c) Column in R.C.C. 1:1.5:3 above GL	4	0.40	0.40	7	4.48	
5	Beams in R.C.C. 1:1.5:3						m^3
	Ground beam, brace beam	8	7	0.40	0.40	8.96	
	Top beam	4	7	0.40	0.50	5.6	
6	Vertical wall of a tank In R.C.C. 1:1.5:3	1	23	0.25	3.3	18.97	m^3
7	Floor and roof slab of tank in R.C.C. 1:1.5:3						m^3
	Floor slab Roof slab	1 1	8 7.85	4 3.85	0.29 0.1	9.28 3.02	
8	Concreting work for column						m^2
	1) Concreting area for Column footing 2) Column below GL 3) Above bottom beam 4) Above brace beam	4 4 4 4	6.80 1.60 1.60 1.60	- - - -	0.40 0.80 2.90 2.85	10.88 5.12 18.56 18.24	
9	Concreting works for Beam and brace beam						m^2
	1) Bottom beam Inner side Outer side	 4 4	 7.2 8	 - -	 0.40 0.40	 11.52 12.8	
	2) Brace beam Bottom Inner side Outer side	 4 4 4	 7.2 7.2 8	 0.40 - -	 - 0.40 0.40	 11.52 11.52 12.8	
	3) Top beam Bottom Inner side Outer side	 4 4 4	 7.2 7.2 8	 0.40 - -	 - 0.50 0.50	 11.52 14.40 16	
10	Concreting for floor slab Side	4 4	7.2 8	0.4 -	- 0.25	11.52 8	m^2
11	Concreting for root slab Side	4 4	8 4	0.4 -	- 0.1	12.8 1.6	m^2
12	Concreting work for tank vertical walls Inside Outside	 4 4	 3.6 8	 - -	 3.3 3.3	 47.52 105.6	m^2
13	Plastering outer side 16 mm thick C.M. 1:4						m^2
	Outer face of tank wall, Bottom of floor slab (outside)	4 4	8 7.2	- 2.45	2.45 -	78.4 35.28	

	Top of root slab	4	8	4	-	128	
14	Inside plastering C.M. (1:4)12 mm thick						m^2
	Tank vertical wall Bottom of floor slab Top of root slab	4 4 4	7.2 8 8	- 2.45 2.45	2.45 - -	70.56 36 78.40	
15	Plastering of beams and columns						m^2
	1) Bottom beam side Top 2) Brace beam, side Top and bottom 3) Top beam, sides Top and bottom 4) Column plastering	8 4 8 8 8 8 16	3 3 3 3 3 3 0.40	- - - - - 0.40 -	0.40 0.40 0.40 0.40 0.50 - 7	9.6 4.8 9.6 9.6 12 9.6 44.80	
	Deduction joint of Column and beam Bottom beam Brace beam Top beam	 8 8 8	 0.40 0.40 0.40	 0.40 0.40 0.50	 - - -	 -1.28 -1.28 -1.60	
	Net plastering area					95.84 m^2	

Table – 44 Abstract Sheet of overhead water tank

Sr. No.	Description of Item	Quantity	Rate (Rs)	Per	Amount (Rs)
1	Earthwork in excavation	46.05	152.5	m^3	7027.23
2	Sand cushion	8.96	2700	m^3	24192
3	P.C.C for base surface (1:4:8)	7.36	4845	m^3	35659.2
4	R.C.C work (1:1.5:3)	63.47	7800	m^3	495066
5	16 mm Thick cement plaster on outer face of tank in C.M. (1:3)	241.68	250	m^2	60420
6	12 mm Thick cement plaster on inner face of tank in C.M. (1:4)	184.96	230	m^2	42540.8
7	Plastering for beam and column	95.84	300	m^2	28752
8	Total Concreting work	341.92	1700	m^3	581264
				Total Estimate	1274922
	Add 1.5 % water charge Add 10 % contractor's profits				19124 127492.2
			Total required cost		**14,21,538**

13.1.5 Civil Design 5: Vermicomposting Unit

Vermicomposting involves the stabilization of organic solid waste through earthworm consumption which converts the material into worm casting. Vermicomposting is the result of combined activity of micro-organisms and earthworm. Microbial decomposition of biodegradable organic matter occurs through extracellular enzymatic activities whereas decomposition in earthworm occurs in elementary tract by micro-organisms inhabiting gut.

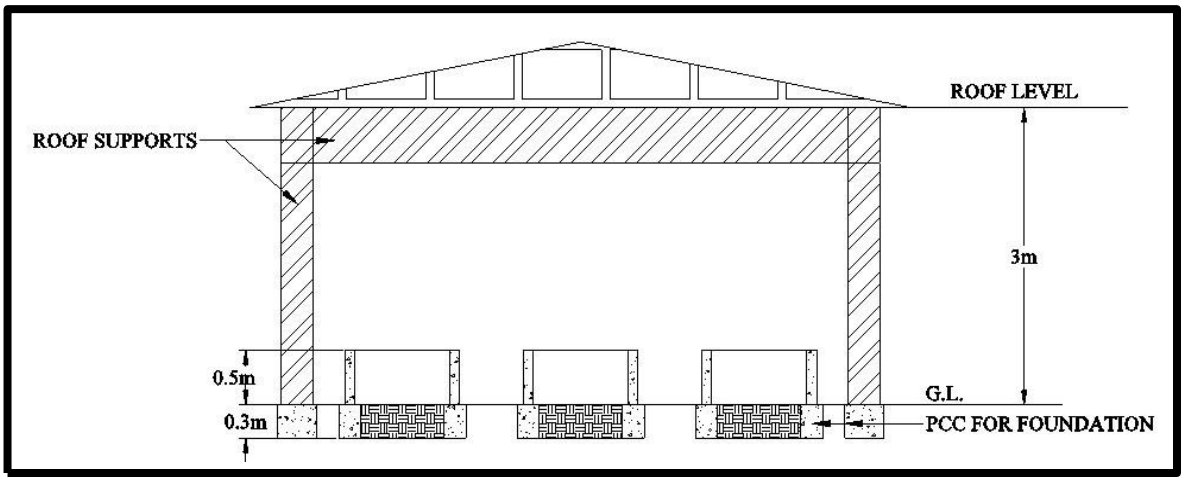


Figure - 78 Section of vermicomposting unit

Table - 45 Estimate of vermicomposting unit

Sr no.	Description	No.	L(m)	B(m)	D(m)	Quantity	Unit
1	Excavation for P.C.C	15	9.2	0.35	0.3	14.49	m^2
2	Excavation for G.I. poles	6	0.6	0.6	0.8	1.72	m^2
3	P.C.C. for vermicompost unit (1:4:8)	15	9.2	0.35	0.3	14.49	m^2
4	P.C.C. for G.I. poles (1:3:6)	6	0.6	0.6	0.8	1.72	m^2
5	Masonry work (1:4)						
	Long wall:	15	3	0.15	0.6	4.05	
	Short wall:	15	1.5	0.15	0.6	2.025	
					Total:	6.075	m^2
6	G.I. sheets (2.5 mm)	1	22.3	10.4		231.92	m^2
7	Plaster 12 mm (1:5)	15	4.5		0.6	40.5	m^2
8	G.I. Angle section (60x40x6 mm)	1	65.4	4.42kg/m		28.6	Kg
	(22.3x2+10.4x2) =65.4						
9	G.I. Box section (60x40 mm)	6	3.24	8.84kg/m		28.6	Kg
10	Hook	45				45	Nos.

Table – 46 Abstract sheet of vermicomposting unit					
Sr No	**Description of Item**	**Quantity**	**Rate (Rs.)**	**Per**	**Amount (Rs.)**
1	Excavation for P.C.C	14.49	80	m^3	1159.2
2	Excavation for G.I poles	1.72	80	m^3	137.6
3	P.C.C for vermicompost unit (1:4:8)	14.49	4000	m^3	57960
4	P.C.C for G.I poles (1:3:6)	1.72	3700	m^3	6364
5	Masonry work (1:4)	6.075	3500	m^3	21262.5
6	G.I sheets	231.92	280	m^2	64937.6
7	Plaster 12mm (1:5)	40.5	150	m^2	6075
8	G.I Angle Section (60x40 x6mm)	289.06	40	Kg	11562.4
9	G.I Box section (60x40mm)	28.6	40	Kg	1144
10	Hook	45	12	Nos.	540
				Total =	171122.3
				Add 10 % contractor's profits	17112.23
				Add 1.5 % water charge	2566.83
				Total cost =	**1,90,801**

13.1.6 Design 6: Maintenance of Bus Stand

In village one bus stand is available but its condition is not good enough to use so proposed maintenance of it.

Figure - 79 Existing bus stand of village

Table – 47 Quantity sheet of maintenance of bus stand						
Sr. No.	**Description**	**No**	**Length (m)**	**Depth (m)**	**Quantity (m^3)**	**Unit**
1	Plaster 12 mm (1:5)					
	For wall	4	6	3.5	84.00	m^2
	For ceiling	1	6	3.5	21.00	m^2
	Outer face side wall	2	3	3.5	21.00	m^2
	Outer face front & back wall	2	6	3.5	42.00	m^2

	Deduction of door & window					
	For door	2	2.5	2.5	12.5	m²
	For window	4	1.2	1.5	7.2	m²
				Total	19.7	m²
			TOTAL QUANTITY		148	m²
2	Paint work					
	For wall	4	6	3.5	84.00	m²
	For ceiling	1	6	3.5	21.00	m²
	Outer face side wall	2	3	3.5	21.00	m²
	Outer face front & back wall	2	6	3.5	42.00	m²
	Deduction of door & window					
	For door	2	2.5	2.5	12.5	m²
	For window	4	1.2	1.5	7.2	m²
				(-)	19.7	m²
					TOTAL QUANTITY = 148.3 m²	

Table – 48 Abstract Sheet For Bus Stand Maintenance

Sr. No.	Description	Quantity	Rate (Rs)	Per	Amount (Rs)
1	Plaster 12 mm (1:5)	148.3	130	m²	19279
2	Paint work	148.3	30.48	m²	4520.18
					Total = 23,799.18
					Add 1.5 % water charge = 357 Rs.
					Add 10 % contractor's profit = 2380 Rs.
					Total Cost = 26,536 Rs

13.1.7 Electrical Design 1 - Generate power using microturbine:

Most microturbines are using high-speed permanent magnet generators to produce alternative electricity. The heat from fuel combustion in turbines is used for energy optimization. Electrical efficiency of the microturbine is 20%–30% and the power range is from 25 to 500 kW. Microturbines are often used in large commercial buildings such as hotels, schools, and offices. Microturbine systems are divided into three categories based on consumption and energy production. Microturbines with a recuperator are more efficient because of using the output heat of the turbines. This type of microturbine is shown in Fig.

Block diagram:

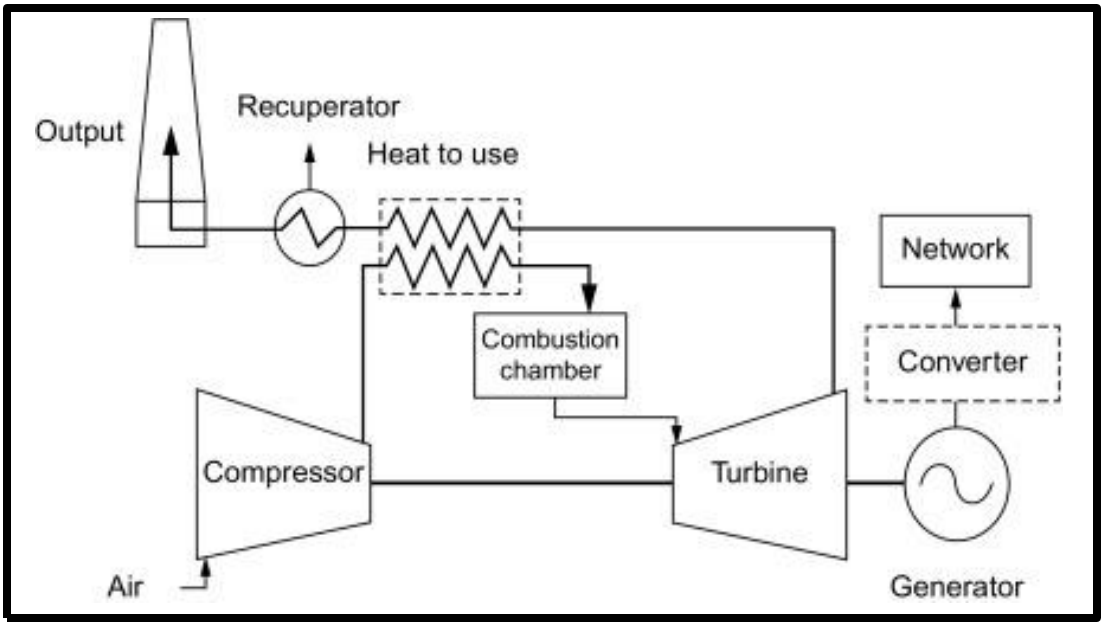


Figure – 80 Block diagram of Generate power using microturbine

Microturbines without a recuperator (with simple cycle) are less efficient and cheaper as well. Microturbines that work based on combined heat and power (CHP). In Fig. , the process of a CHP microturbine is shown. Microturbines can also be divided into two groups as uniaxial (single-shaft) and biaxial (two-axis). In the single-shaft, both compressor and generator are driven by a turbine, while in the two-axis model, the turbine that drives the compressor is on the same shaft and the turbine that drives the rotor of the generator is on the other shaft. In a two-axis model, the appropriate frequency can be directly produced for consumers by using a conventional synchronous generator with a separate turbine for generator and gearbox.

Single-axis models usually are designed for operation at very high rotation speed. The frequency of the alternative current produced by these generators is very high. In the high-speed single-shaft generators, it is necessary that its high-frequency output be changed to 50 Hz.

Regardless of the high investment costs, microturbines have the advantages of small size, light weight, good efficiency in heat and power cogeneration, low emissions, use of waste fuels, less repair, and good performance at low gas pressures.

Table - 49 Microturbine overview	
Generate power using microturbine	Yes (Limited)
Size Range	25-500 kW
Fuel	Natural gas, hydrogen, propane, diesel
Efficiency	20-30% (Recuperated)
Environmental	Low (<9–50 ppm) NOx
Other Features	Cogeneration (50–80°C water)
Commercial Status	Small volume production, commercial prototypes now.

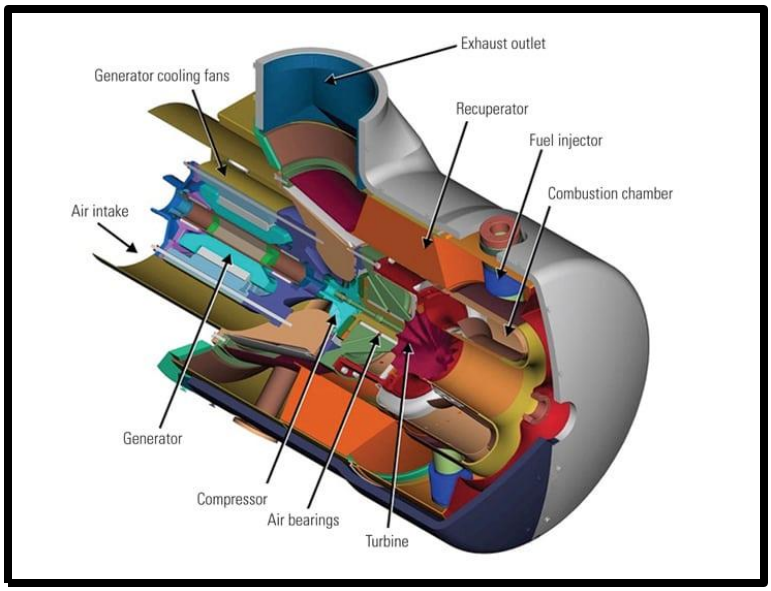


Figure - 81 Microturbine

Circuit diagram:

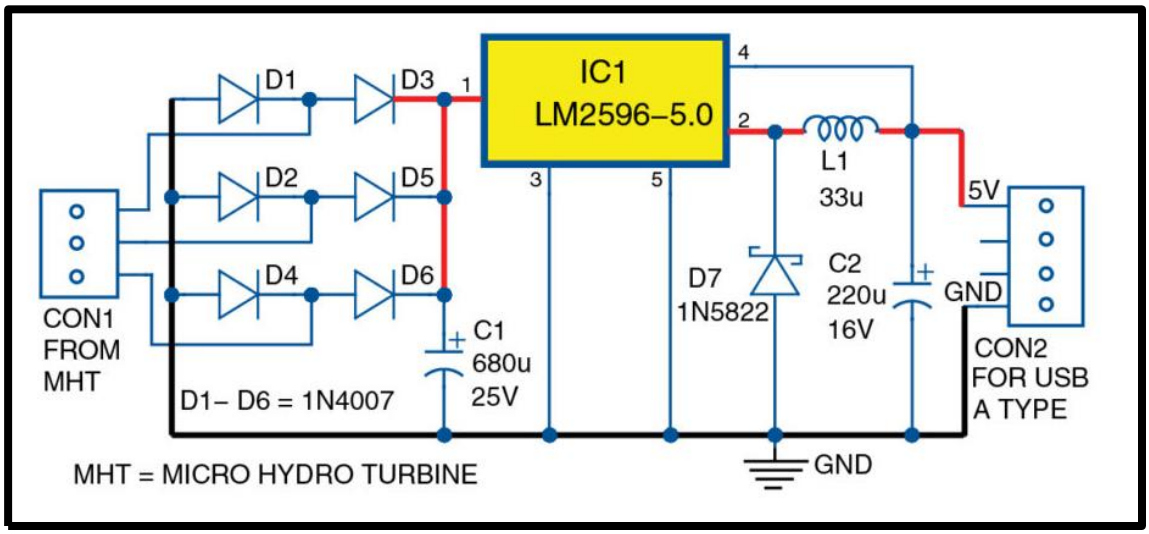


Figure - 82 Circuit diagram of Generate power using microturbine

Advantages

- Low Installed Cost
- Short Commissioning Period < 8 Hours for commissioning
- Ease of Operations "Big turbine" style controls
- No Lubricants or Coolants Nothing to drip
- Small Footprint, Light Weight 30% less than recips
- Wide range of fuels
- Higher availability
- Lower maintenance cost

Strengths:

- Small number of moving parts
- Compact size
- Lightweight
- Good efficiencies in cogeneration
- Low emissions
- Can utilize waste fuels
- Long maintenance intervals
- No vibrations
- Less noise than reciprocating engines
- Strengthens energy security

Weaknesses:

- Low fuel to electricity efficiencies
- Loss of power output and efficiency with higher ambient temperature and elevation

Applications:

Microturbines can be used for stand-by power, power quality and reliability, peak shaving, and cogeneration applications. In addition, because microturbines are being developed to utilize a variety of fuels, they are being used for resource recovery and landfill gas applications. Microturbines are well suited for small commercial building establishments such as: restaurants, hotels/motels, small offices, retail stores, and many others. The variety of energy consumers that are already using microturbines is large and growing fast. For example:

- Landfill gas-fired microturbines installed at the Jamacha Landfill in Spring Valley, California supply power on-site and back to the grid.
- A restaurant in Chicago, Illinois, gets most of its electricity from a natural-gas-powered microturbine, cutting $1,500 off its total monthly power bill.
- A textile mill in Lawrence, Massachusetts, ensures continuous operation by getting its power from microturbines.
- The Chesapeake Building on the University of Maryland campus, College Park, Maryland has a cooling, heating, and power (CHP) system consisting of microturbines, chiller, and stack that uses waste heat to cool and heat the building, significantly increasing system efficiency.

Microturbine costing:

Table - 50 Costing of Microturbine

Sr. No.	Microturbine cost	Cost (Rs.)
1.	Capital cost	50000-8000
3.	Maintenance interval	5000-8000

Conclusions

- Ideal power generation for oil & gas installations, onshore and offshore
- More than 5,000 Capstone Microturbines sold and 18 million operating hours
- Gas from 350 BTU – 2500 BTU with up to 7% H2H2
- Small footprint & light weight
- Lowest maintenance cost of 0.016 $/kWh with 6 hours/year of planned maintenance
- No lubricants or coolants

13.1.8 Electrical Design 2- Simple low power inverter

Inverter circuit:

In this Tutorial we will learn about how to make simple DC to AC low power inverter. The working principle, Inverter circuit designing for Low power inverter and applications of the inverter project.3 Simple low power inverter.

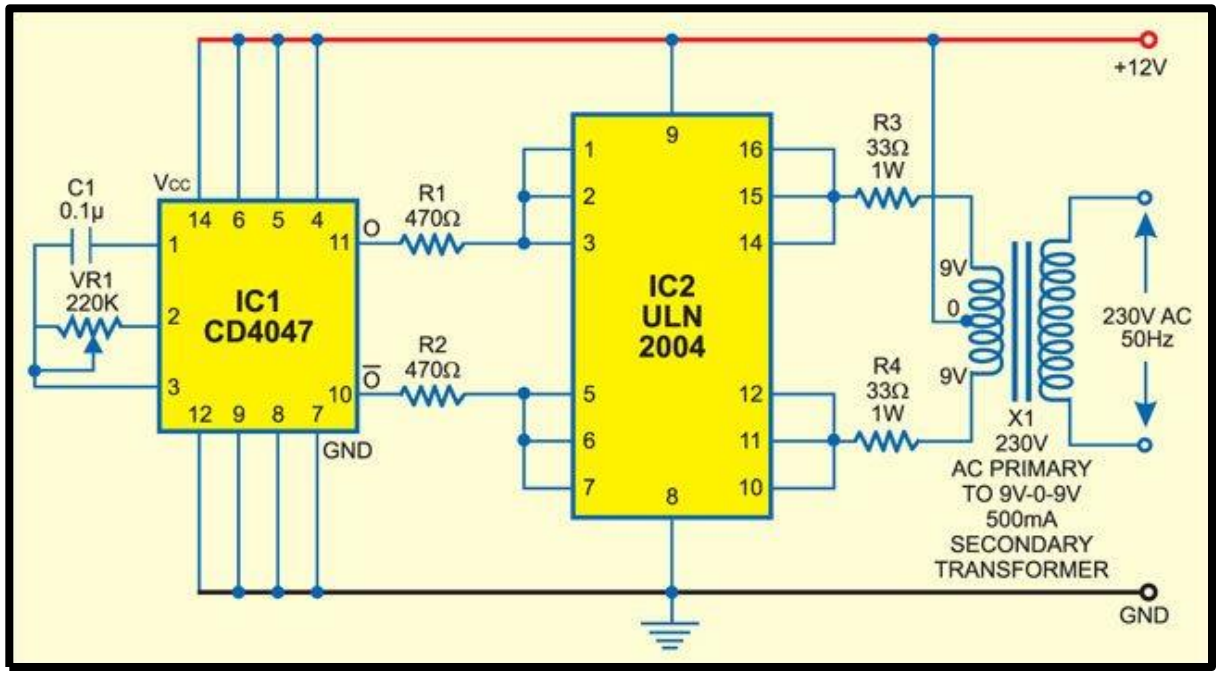


Figure – 83 Circuit diagram of Simple low power inverter

DC to AC Inverter:

An Inverter is used to convert DC voltages into AC. The AC voltages are used for long distance transmissions and to power grid services. There are different ways we can convert DC voltages into AC. There are different power watt ranges for Inverter. We can build and design a inverter circuit as according to our needs. For large houses we need more power so we need a bigger battery power wattage and current ratings. Similarly for small homes and offices we need a low power inverters. Low power inverter project can be used in different ways not to just power the

homes. Basically low power inverter is just an experiment to build a more efficient and better DC to Ac power system.

Objective:

To Convert 12V volts DC into 220V Volts AC. The 220 Volts can be used to power up any electrical appliance or to power the home bulb etc.

Required Components List for DC to AC Inverter:

Table - 51 Components of Simple low power inverter		
Sr.no	**Components**	**Quantity**
1	Rechargeable Battery	1
2	CD 4047 IC	1
3	Step Down Transformer 12-0-12 5A or 9A 230V primary	1
4	Resistors: 1K 18K 100 Ohm 0.5Watt	 1 1 2
5	Mosfet IRFZ44	2
6	Capacitor 0.22Uf	1

Working of DC to AC Inverter:

- The Rechargeable Battery provides the DC 12V that is going to be converted into amplified 230 volts by Power mosfet IRFZ44 and Transformer.
- The Transformer is used as inverterted configuration.The primary Side that is 230 volts or 110 volts is used as secondary for output.
- The IC CD4047 Provides pulses as push pull configuration at 50 Hertz to Power mosfet.
- Read the Datasheet of IC CD 4047 for its configuration. The Power mosfets are connected on the pin 10 and 11 of the IC CD4047. The Q and Q' of the IC output.
- The power mosfets transfers the power to the transformer that steps up the voltages to 230 volts. is used to filter out the output response in AC.

Results:

The Output results of the Inverter will be 220/230 Volts and 150 Watts for 5A transformer.
The Results for 9A tranformers will be 200 to 250 watts.

Applications of the Inverter:

There are lots of applications of the DC to AC inverter. We can not use DC to power up Appliances in power failure so a DC to AC inverted supply is used. Here we will discuss only the low power inverter applications.

- Used to power up light bulbs and Energy savers that need only 15 to 20 Watt
- Used for electric appliances that runs on low power like charging Fans, Lights , even for ceiling fans that runs on 75 to 80 watts.
- Used to power up gadgets and mobile chargings etc in power failure.
- Low power inverter can be used outside where we need AC instead of DC.
- Low power inverter can be helpful as a portable power device.

Advantages

- Can be an energy efficient way of changing voltage and step voltage up or down.
- Can provide electrical isolation between input and output.
- Can provide an AC voltage from a DC source.
- Can smooth out random variations in input voltage.
- Can be used to produce 50 Hz from a 60 Hz supply or vice versa.

Disadvantages

- Require rectification and smoothing on the output if the output is to be DC.
- May produce radio interference or audible tones.
- May produce AC at a non-specific frequency.
- In certain types of UPS the inverter may need to phase synchronized to the input AC power to ensure a spike free switchover.
- May produce excess output voltage under no load or very light load conditions.

Table - 52 Costing of Simple low power inverter

Sr. No.	Components	Cost (Rs.)
1.	Rechargeable battery	1200
2.	CD 4047 IC	30
3.	Step Down Transformer 12-0-12 5A or 9A 230V primary	600
4.	Resistors 1K 18K 100 Ohm 0.5Watt	50
5.	Mosfet IRFZ44	30
6.	Capacitor 0.22Uf	50
Total	**-**	**1960**

Conclusion

While there is so still so much space for growth in terms of how air conditioners affect the environment, inverter ACs take us a step closer to achieving the goal. After weighing in the positives and negatives, you may decide to buy an inverter ac; if you decide to do so, you could read reviews on inverter ACs online to choose the best and most efficient ac.

13.1.9 Electrical Design - 3 Remote operated domestic appliances control

The influx of the Internet of things (IoT) devices has created a huge demand for connecting everything to everything. In the same race, this remote control for home appliances lets you connect your regular everyday appliances to be controlled by a remote. All you have to do is connect this circuit to any of your home appliances (lamp, fan, radio, etc) and you are good to go. The appliance can now be controlled by a remote control working at the designated frequency. The circuit can be activated from up to 10 metres.

Working:

The 38kHz infrared (IR) rays generated by the remote control are received by IR receiver module TSOP1738 of the circuit. Pin 1 of TSOP1738 is connected to ground, pin 2 is connected to the power supply through resistor R5 and the output is taken from pin 3. The output signal is amplified by transistor T1 (BC558). The amplified signal is fed to clock pin 14 of decade counter IC CD4017 (IC1). Pin 8 of IC1 is grounded, pin 16 is connected to Vcc and pin 3 is connected to LED1 (red), which glows to indicate that the appliance is 'off.'

The output of IC1 is taken from its pin 2. LED2 (green) connected to pin 2 is used to indicate the 'on' state of the appliance. Transistor T2 (BC548) connected to pin 2 of IC1 drives relay RL1. Diode 1N4007 (D1) acts as a freewheeling diode. The appliance to be controlled is connected between the pole of the relay and neutral terminal of mains. It gets connected to live terminal of AC mains via normally opened (N/O) contact when the relay energises.

Circuit Diagram:

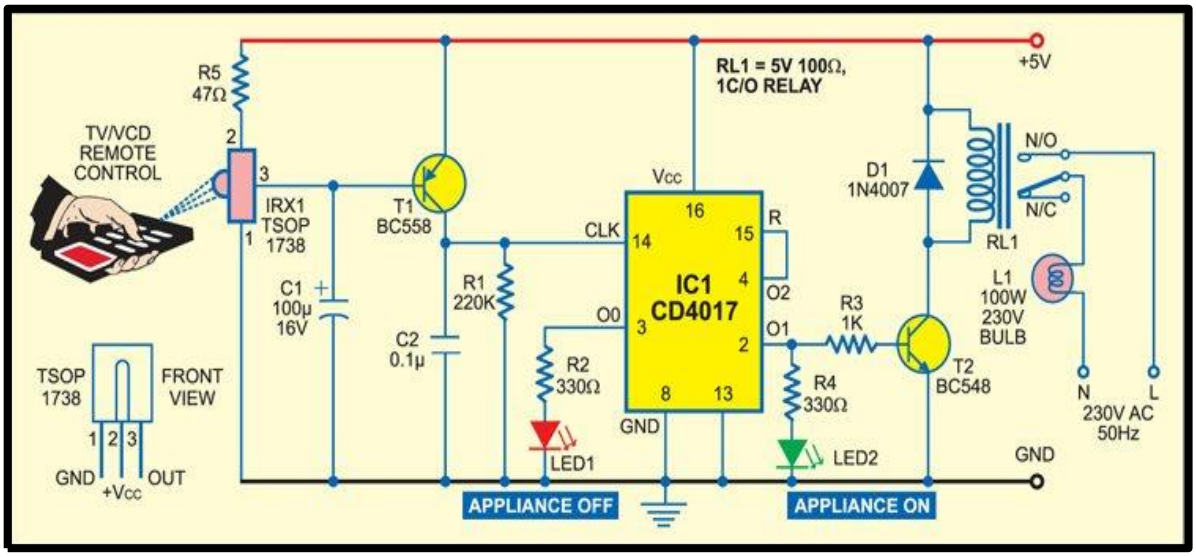


Figure - 84 Circuit diagram of Remote operated home appliances control

Hardware Specifications

- 8051 Microcontroller
- T.V Remote
- IR Receiver
- Relay and Relay Driver IC
- Voltage Regulator IC
- Crystal Oscillator
- Resistors and Capacitors
- Transistors
- Cables and Connectors
- Diodes
- PCB and Breadboards
- LED and Lamps
- Transformer/Adapter
- Push Buttons
- Switch
- IC and IC Socket

Software Specifications

- Keil compiler
- Programming Languages: C

Block Diagram:

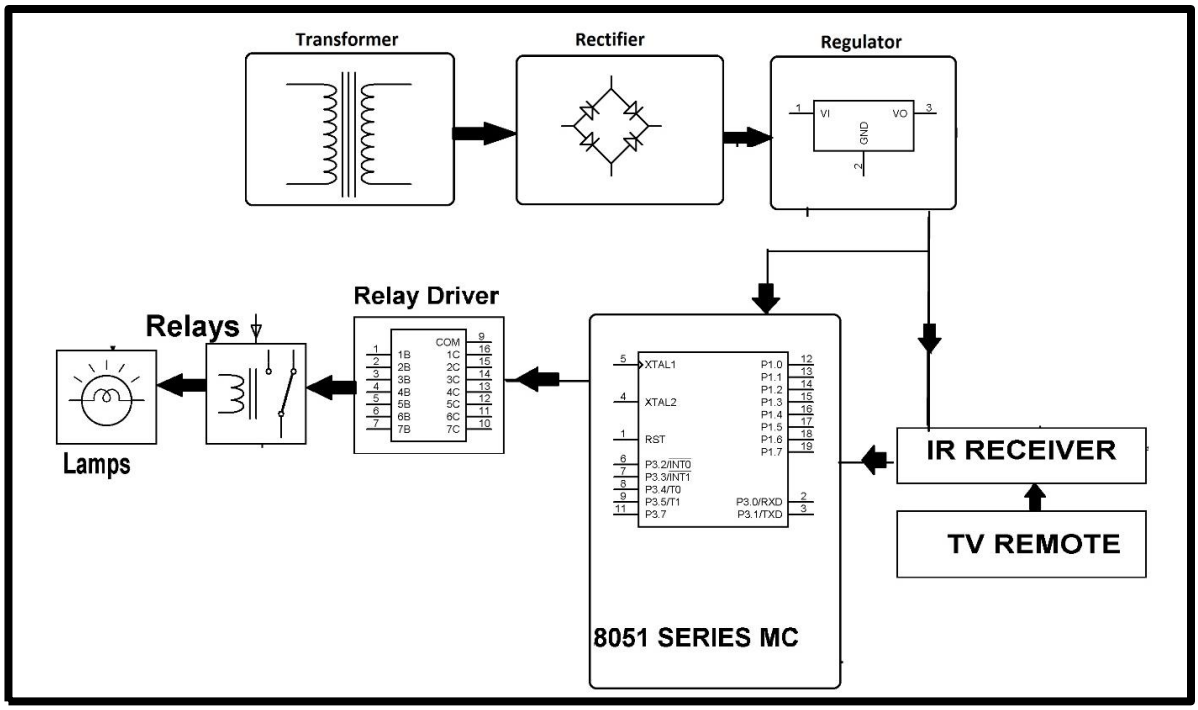


Figure - 85 Block diagram of Remote operated home appliances control

Advantages:

- Managing all of your home devices from one place. The convenience factor here is enormous.
- Flexibility for new devices and appliances.
- Maximizing home security.
- Remote control of home functions.
- Increased energy efficiency.
- Improved appliance functionality.
- Home management insights.

Table – 53 Costing of Remote operated home appliances control

Sr. No.	Components	Cost
1.	8051 Microcontroller	550
2.	T.V Remote	250
3.	IR Receiver	50
4.	Relay	250
5.	Relay Driver IC	180
6.	Voltage Regulator IC	170
7.	Crystal Oscillator	200
8.	Resistors	50
9.	Capacitors	50
10.	Transistors	120
11.	Cables and Connectors	200
12.	Diodes	200
13.	PCB and Breadboards	300
14.	LED	80
15.	Transformer/Adapter	400
16.	Push Buttons	30
17.	Switch	50
18.	IC	20
19.	IC Socket	20
20.	Lamps	20
Total	**-**	**3190**

Conclusion

The gift of technology to mankind is to make life simpler. In this work, a remote control for multiple home appliances is designed, presented and implemented.

13.2 Reason for Students Recommending this Design

- To improve cleanness and hygiene of village.
- To improve health of villagers.
- To improve availability of items in village.
- To provide such place which is use for gathering or any function.
- To improve aesthetic looks of village.
- To increase in water level and storage of rain water.
- To improve efficiency of farmers and their crops.
- To provide clean and sweet water to villagers or traveler.
- To improve in transition of villagers and easy movement.
- To provide fertilizer to farmers by producing it in the village.
- To improve efficiency of bus stop and looks aesthetic.
- Saves the daily operation time of the system.
- It makes street light operation easy.
- To stop reverse current flow and charge the battery effectively using the solar panel.
- To generate electricity using microturbine.
- To easily control domestic appliances.

13.3 Suggestion / Benefits of villagers:

1. Public latrine block – for hygiene point of view.
2. Public health center – to improve villagers health.
3. General market – to provide ease of buying items.
4. Community hall – for gathering or function
5. Entrance gate – to improve aesthetic looks.
6. Rain water harvesting with ground water recharge – store water and increase water table.
7. Agro storage unit – to enhance agricultural productivity.
8. Drinking water facility – to provide clean water.
9. WBM Road – improve transportation facility.
10. Overhead water tank – to meet the requirement of village.
11. Vermicomposting unit – to produced fertilizer for farmers.
12. Maintenance of bus stand – to improve movement.
13. Auto electric school bell – Saves the daily operation time of the system.
14. Automated night lighting system – It makes street light operation easy.
15. Solar powered battery charging with reverse current protection - To stop reverse current flow and charge the battery effectively using the solar panel.
16. Generate power using microturbine – to get power by microturbine.
17. Simple low power inverter – to generate electricity using microturbine.
18. Remote operated domestic appliances control – to easily control domestic appliances.

CHAPTER -14 TECHNICAL OPTIONS WITH CASE STUDIES

14.1 Civil Engineering

14.1.1 Advanced Earthquake Resistant

There are many known and practiced measures to protect against seismic threats. Let's take a look at some of the **earthquake resistant techniques** used by the engineers world over to minimize the damage to structures due to earthquakes:

Floating Foundation:

The levitating or floating foundation separates the substructure of a building from its superstructure. One way of doing this is by floating a building above its foundation on lead-rubber bearings that comprise a solid lead core covered in alternating layers of rubber and steel. The bearings are attached to the building and its foundation with the help of steel plates. So, when an earthquake occurs, the floating foundation can move without moving the structure above it. In Japan this base isolation system works at a whole new level. Their design allows buildings to float mid-air. The system levitates, keeping the building on a cushion of air. The system has in-built sensors for detection of seismic activity and these sensors communicate with the air compressor that creates the layer of air between the building and its base.

Shock Absorption:

Similar to the shock absorbers used in vehicles, buildings also makes use of this technology. This earthquake resistant technology helps buildings slow down and reduce the magnitude of vibratory motions. Ideally shock absorbers should be placed at each level of the building – one end attached to the beam and the other end to the column. Each comprises a piston head that moves inside a cylinder full of silicone oil. During earthquakes, the horizontal motion of building will make the piston push against the oil, transforming mechanical energy from the quake to heat.

Rocking Core-Wall:

Modern high-rise buildings use this technique to improve seismic resistance at a low cost. To make this work, a reinforced concrete core is set through the heart of the structure, surrounded by elevator banks. Many modern high-rise buildings use this technique to increase seismic resistance in an affordable way. It works most effectively when used together with base isolation. For base isolation, elastometric bearings are built with alternating layers of steel and natural rubber/neoprene. The bearing thus created has low horizontal stiffness and vertical rigidity. The combination is highly effective, cost-friendly and simple to implement.

Pendulum Power:

The pendulum power technique works by suspending a huge mass near the top of the structure. This mass is supported by steel cables and viscous fluid dampers are placed between the mass and the building that it protects. In case of any seismic activity, the pendulum moves in the

opposite direction to balance the energy. Each of the pendulums are tuned to sync with the natural frequency of the structure and these systems are called tuned mas dampers. Their goal is to counter resonance and reduce the structure's dynamic response.

Symmetry, Diaphragms And Cross-Bracing:

Generally one common criterion for seismic designs is symmetry. Seismic risks of asymmetrical designs are higher. L-Shaped, T-Shaped and split-level structures may be more visually appealing but they are also prone to torsion. Thus engineers design symmetrical structures to keep the forces equally distributed through the structure and limit ornamental elements like cornices, cantilever projections etc. An earthquake has a significant lateral force. Seismic designing counteracts these forces in both horizontal and vertical structural systems. Diaphragms are integral to horizontal structures – such as floors of a building or roof. Engineers design each diaphragm on its own deck and strengthen it horizontally so it can distribute sideways forces with vertical structure parts. With vertical structures, engineers have several approaches. Braced frames are often used in building walls. Braced frames rely on trusses for resisting sideways motion. Cross-bracing is a technique that uses two diagonal members in an X-shape to build wall trusses and it is a popular technique to build earthquake resistant structures.

14.1.2 Seismic Retrofitting of buildings

Seismic retrofitting is the modification of existing structures to make them more resistant to seismic activity, ground motion, or soil failure due to earthquakes.

Seismic Retrofit of an Existing RC Building With Isolation Devices Applied at Base:

Seismic isolation is actually a design strategy largely applied all over the world either for designing new buildings or for retrofitting existing ones. Essentially, it consists in decoupling the superstructure motion from the ground one by installing seismic devices having a low horizontal stiffness. The result of lengthening the superstructures fundamental natural period, significantly reduces the seismic demand in terms of lateral accelerations, with a consequent increase of lateral displacements. In this way the superstructure elements damage may be nullified thanks to the drastic reduction of the interstory drifts and floor shear (Kelly, 1986; Alhan and Gavin, 2004; Ibrahim, 2008). Therefore, the seismic isolation strategy, if applicable, results particularly convenient with respect to the classical one of locally strengthening the structural elements. In this case, in fact, the elements strength is being increased instead of reducing the seismic action, through local interventions also suggested by the observation of the typical response mechanisms occurred in the last seismic events. Seismic isolation may result convenient if compared with the design strategy considering dissipative bracing systems, where an increase of stiffness and strength through additional elements is provided to the structure.

As known, the dynamic response of an isolated building strictly depends on the characteristics of the isolation devices and having the combined function of building re-centering during the horizontal oscillations and dissipating the kinetic energy. Different typologies of the isolation

devices may be applied and combined among them such as elastomeric devices, flat sliders, friction pendulum devices, elasto-plastic dissipators. Recently, studies have also addressed to assess the actual properties of elastomeric devices through the nanoindentation technique avoiding, therefore, removing devices for laboratory testing. To this scope an innovative procedure has been proposed in Rossi et al. (2020).

This paper illustrates the application of the seismic isolation at the base as structural retrofitting, to an existing Reinforced Concrete (RC) building located in Marconia, in southern Italy. The building was designed only for vertical loads and built without any detailing rule for structural ductility and due to the date and time of the construction of the building, the building site fell within an area not classified as seismic. After the National seismic hazard maps update in 2003, the seismic classification of the area of the building has been under consideration and has been upgraded, and classified as a medium-low seismic intensity zone. The case study results are interesting since the application of the seismic isolation has also required the realization, only along the building transverse direction, and an additional bracing system throughout the height consisting of two lateral elastic steel frames. This intervention has been necessary in order to stiff the superstructure and to reduce high vibration mode effects as much as possible.

The paper presents the main results related to numerical simulations through implementation of FEM models, considering the "as-built" initial condition with a Fixed-Based (FB) model, and the retrofitted configuration with a Seismic Isolated (SI) model. All the investigations, numerical analyses, and verifications shown in this study are conducted by referring to the Italian design code (NTC, 2008), that is the design code adopted for retrofitting the case study. It should be underlined, however, that no significant modification has been introduced with the next design code update (NTC, 2018) as far as what is concerned in this study. Moreover, due to their current characteristics all masonry infills (perimetral and internal partitions made by simple hollowed brick blocks) are assumed as non-structural elements. They, as indicated by many seismic design codes including the NTC (2008), are modeled only in terms of vertical loads with the related masses, since they do not significantly affect the lateral response in terms of stiffness and strength.

Case Study Description

The chosen case study is a RC building designed in the '90s and built in Marconia, a locality of the Pisticci Municipality (Province of Matera, Italy). It was realized by ATER, which is the local company for housing of the Basilicata Region, with the aim of providing social housing to the applicants. The building is composed by seven floors plus a two-pitch roofing system. The pilotis ground floor is used as porch, while the upper six floors are used for housing. Some image of the considered building in the "as-built" condition is reported in Figures 1A,B. While a foundation plan and a transverse section are illustrated in Figures 1C,D, respectively. In plan the building is a simple rectangle of dimensions 20.10 × 11.0 m, reaching the maximum height measured above the ahead foundation of 21.1 m. The foundations were realized through inverted T beams strips having a total height of 1.50 m and a width of 0.50 m (the flange has dimensions 1.60 × 0.50 m).

The ground floor has an height of 3.1 m, and was realized with an incoherent foundation back-fill within. The other floors have a constant height of 3.0 m.

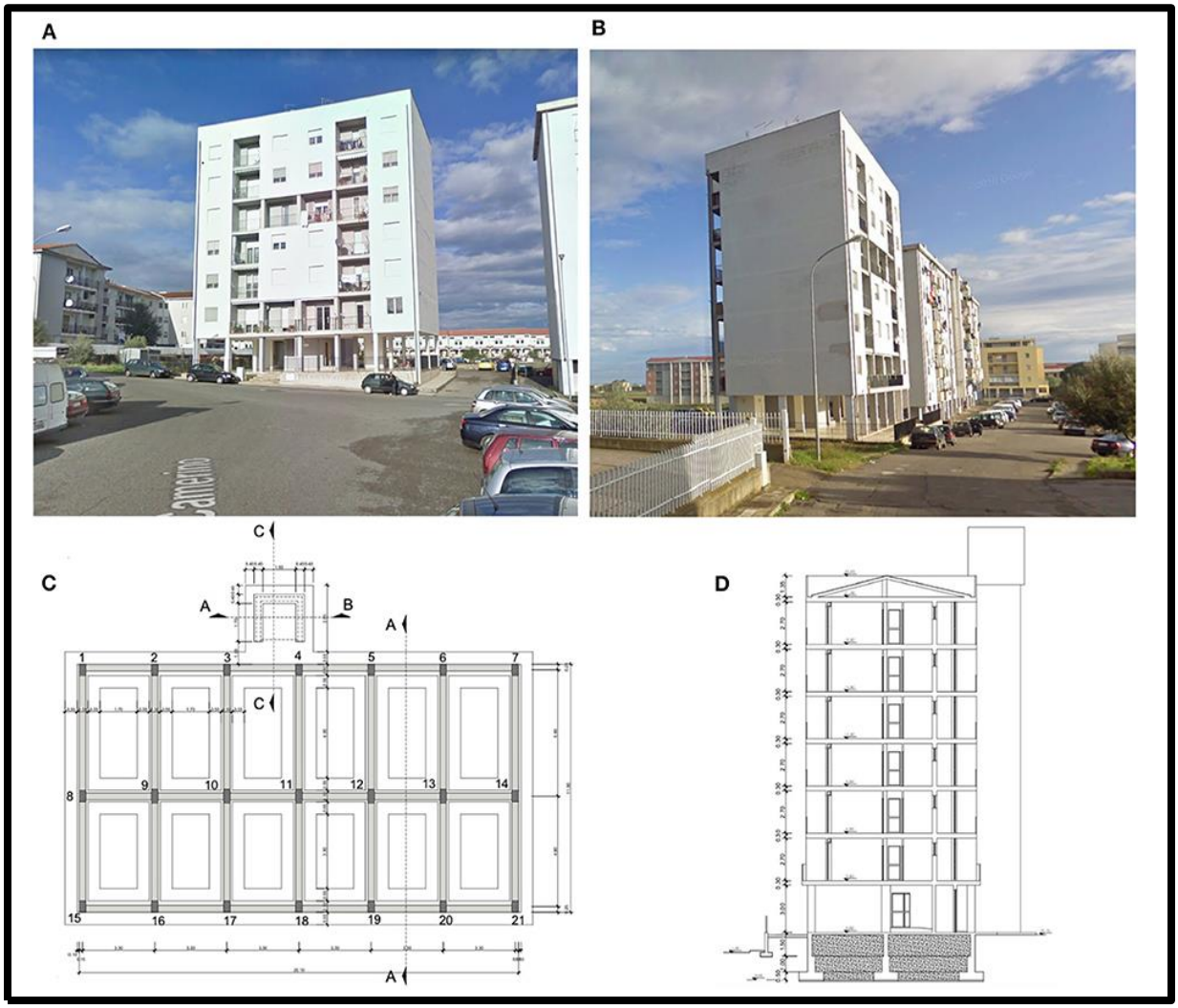


Figure - 86 Perspective view of case study building

The building has for all floors, one-way RC joists all directed along the transverse direction (Y direction), with hollowed lightening blocks. No internal RC frame along the transverse direction is present. Each floor may be reached through concrete stairs, or else with an elevator hosted within a concrete core made by vertical RC walls running throughout the total building height, and having a thickness of 20 cm. In total, 21 columns compose the 3D building frame, having the dimensions and reinforcements details summarized in Table 1. As for the beams, the principal ones supporting the joists have, at all floor levels, a section of 100 × 25 cm, while the secondary ones have a section 60 × 25 cm. The typical reinforcements, respectively, of principal and secondary beams, are depicted in Figures 2 A,B, respectively.

Floor N.	Column N.	Dimensions	Reinforcement details
1, 2, 3 1, 2	1, 2, 5, 6, 7, 15, 16, 17, 19, 29, 21 18	30 cm 50 cm	Longitudinal: 6 ϕ 16 Transverse: ϕ 8/18 cm
1, 2, 3 2, 3, 4 3, 4	3, 4, 8, 14 9, 12, 13 10, 11	30 cm 50 cm	Longitudinal: 8 ϕ 16 Transverse: ϕ 8/18 cm
1 1, 2	9, 12, 13 10, 11	30 cm 60 cm	Longitudinal: 10 ϕ 16 Transverse: ϕ 8/18 cm
4, 5 3	1, 2, 5, 6, 7, 15, 16, 17, 19, 20, 21 18	30 cm 40 cm	Longitudinal: 8 ϕ 16 Transverse: ϕ 8/18 cm
4	3, 4, 8, 14	30 cm 40 cm	Longitudinal: 10 ϕ 16 Transverse: ϕ 8/18 cm
4, 5, 7	18	30 cm 30 cm	Longitudinal: 6 ϕ 16 Transverse: ϕ 8/15 cm
6, 7	1, 2, 5, 6, 7, 15, 16, 17, 19, 20, 21	30 cm 30 cm	Longitudinal: 4 ϕ 16 Transverse: ϕ 8/15 cm
5, 6, 7, 8	3, 4, 8, 9, 10, 11, 12, 13, 14	30 cm 40 cm	Longitudinal: 6 ϕ 16 Transverse: ϕ 8/15 cm

Sections and reinforcements at different building floor

Figure – 87 Existing column in building

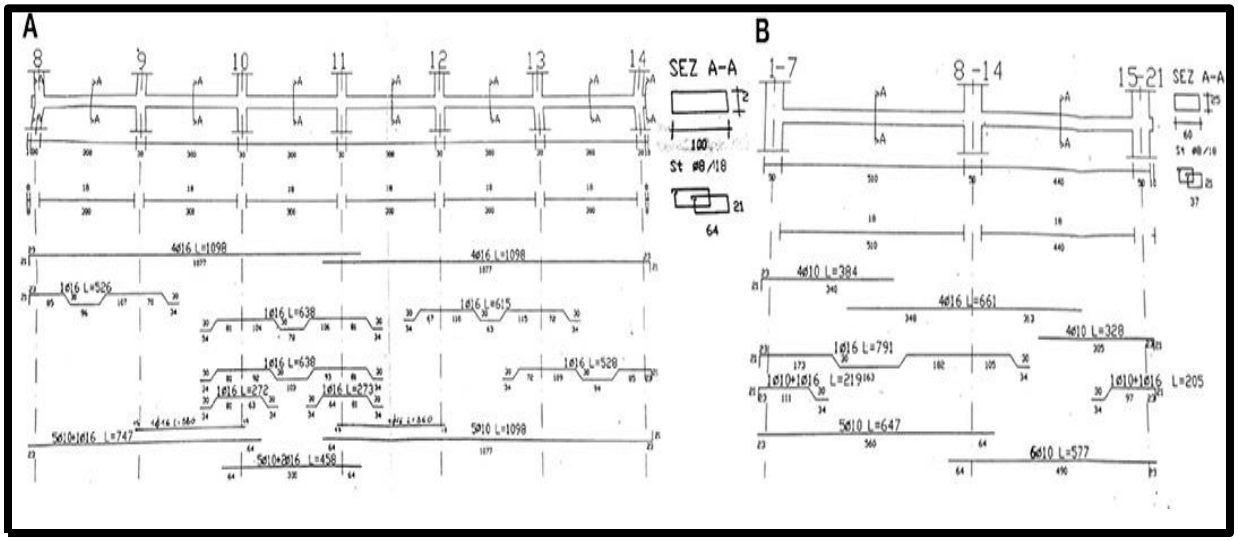


Figure – 88 Existing beam in building

The building was designed in according to the Italian Design Code (NTC, 1992), only for vertical loads without any detailing rule for structural ductility, by applying the allowable stress design method (also called working stress design method). Although the construction period is quite recent, the seismic action was not considered because of the considered area, which was classified by law as not seismic. On the contrary, as it will be discussed later, by referring to current seismic classification (NTC, 2008) the site belongs to a zone having a medium-low seismic intensity.

Materials Properties

Details on the building under consideration were collected firstly from the examination of the complete original design documents, including the original certificates which are related to concrete and reinforcing steel samples tested in the laboratory, as required by the design code adopted for building design (NTC, 1992). However, in situ measurements and tests including extraction of concrete cores were conducted, too. The comparison between the information gathered through the tests campaign and the original documents has demonstrated that the building was realized accordingly to the project approved, without any significant difference.
Precisely, the in situ investigations included dimensional measures of the primary and secondary elements, pacometer investigations, visual assays of elements steel reinforcements (by locally removing the concrete cover), surveys and assays for defining the effective permanent loads. All the in situ inspections were planned and performed by distributing in plan and in elevation as much as possible in the investigations. More in detail: in total 10 concrete cores were extracted from the concrete core walls; 40 coupled pacometric and sclerometric tests were conducted for applying the SONREB method, demonstrating an acceptable homogeneity of concrete within the elements. It should be noted that the concrete cores were extracted from the vertical walls instead of the columns since it was decided of not disturbing these elements that showed at the base of the ground floor an evident degradation state. The results of the average compressive strength experienced in the laboratory on the 10 concrete cores are numerically reported in Table 2, the results of non-destructive tests conducted in the same points where the core were extracted are shown. In addition, in the histogram form, the values of the concrete compressive strength ($f_{c,i}$), sclerometric rebound index (S_i) and ultrasonic velocity (V_i) are reported, each divided by the correspondent average value ($f_{c,m}$, S_m, V_m). The resulting ratios, for each point investigated, are sorted in according to the increasing ratio $f_{c,i}/f_{c,m}$. It is important to note that in the case, a really low correlation among the destructive ($f_{c,i}/f_{c,m}$) and non-destructive measures (S_i/S_m, and V_i/V_m) is observed. In conclusion, the average concrete cylindrical compressive strength resulted equal to 19.15 MPa, and is compatible with a concrete class R_{bk} = 25 MPa, that was the concrete strength used for realizing building components, as resulted in the material certificates of the original project. This value has been assumed as design value for seismic assessment of the building under consideration. As for the reinforcing steel no sample was extracted and the assumed value of the tensile strength has been the one reported in the original material certificate. It resulted in according to a reinforcing steel of class FeB44k, with a characteristic

tensile strength equal to f_{yk} = 440 MPa. Therefore, the Knowledge Level (KL) reached, in according to the NTC (2008), resulted equal to KL3, with a Factor of Confidence equal to 1.

Id Concrete core	Level	$f_{c,i}$ (N/mm²)	S_i	V_i (m/s)
1	Ground floor	20.19	29	3,592
2	Ground floor	23.28	28	3,821
3	Ground floor	21.12	30	3,734
4	Floor 1	22.76	34	3,376
5	Floor 2	20.96	37	3,707
6	Floor 3	19.7	35	3,433
7	Floor 4	16.34	34	4,154
8	Floor 5	16.02	36	3,731
9	Floor 5	24.49	33	3,613
10	Floor 6	15.71	36	3,577
	Average value	19.75	33	3,674
	Standard dev.	3.13	3.06	217.74
	C.V.	16%	9%	6%

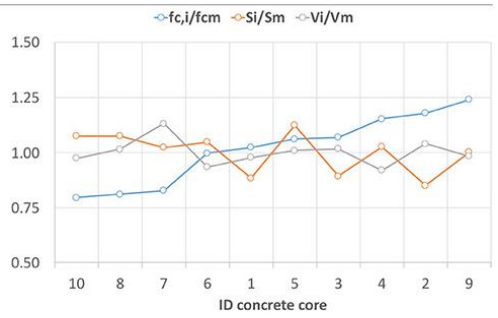


Figure – 89 Compressive strength of extracted cores

In summary, the design values for concrete and steel assumed in this study are the following:

- Concrete: $f_{cd} = f_{cm}/(\gamma_c \cdot FC) = 9.75/(1.5 \cdot FC) = 13.16$ MPa
- Steel: $f_{yd} = f_{yk}/\gamma_s = 440/1.15 = 382$ MPa.

Site Seismic Hazard and Response Spectra

In this section, the actual seismic hazard of the site is examined. It corresponds to the seismic hazard adopted by the Italian design Code (NTC, 2008) considered for assessing and designing the retrofit interventions later discussed. This seismic hazard remains unchanged in the current Italian design code (NTC, 2018). On the contrary, as already said, the same area was not classified as seismic zone in according to the previous Italian design codes.

Figure 3 illustrates the site seismic hazard and the horizontal response spectra assumed in the numerical simulations when seismic action is considered. More in detail, a nominal life V_N = 50 years and coefficient of use C_U = 1 are considered, resulting in a reference period V_R of 50 years. For completeness, the seismic parameters in conditions of horizontal rigid soil (indicated as Type A soil) are reported for the four Limit State assumed by the reference design code (NTC, 2008), that are: Operativity Limit State (OLS), Damage Limit State (DLS), Life-Safety Limit State (LSLS), Collapse Limit State (CLS). Specifically, the following parameters are detailed (Figure 3A):

- Return period T_R;
- Maximum soil accelerations a_g in the case of rock soil;
- Maximum spectrum amplification coefficient F_0;
- Transition period T∗cTc* in the spectrum between constant acceleration and constant velocity.

A

V_N=50 years, C_U=1, V_R=50 years					
Limit State	**T_R (years)**	**a_g (g)**	**F_0**	**T^*_C (sec)**	**PGA (g)**
OLS	30	0.035	2.418	0.276	0.052
DLS	50	0.043	2.454	0.313	0.064
LSLS	475	0.009	2.665	0.433	0.135
CLS	975	0.110	2.741	0.454	0.164

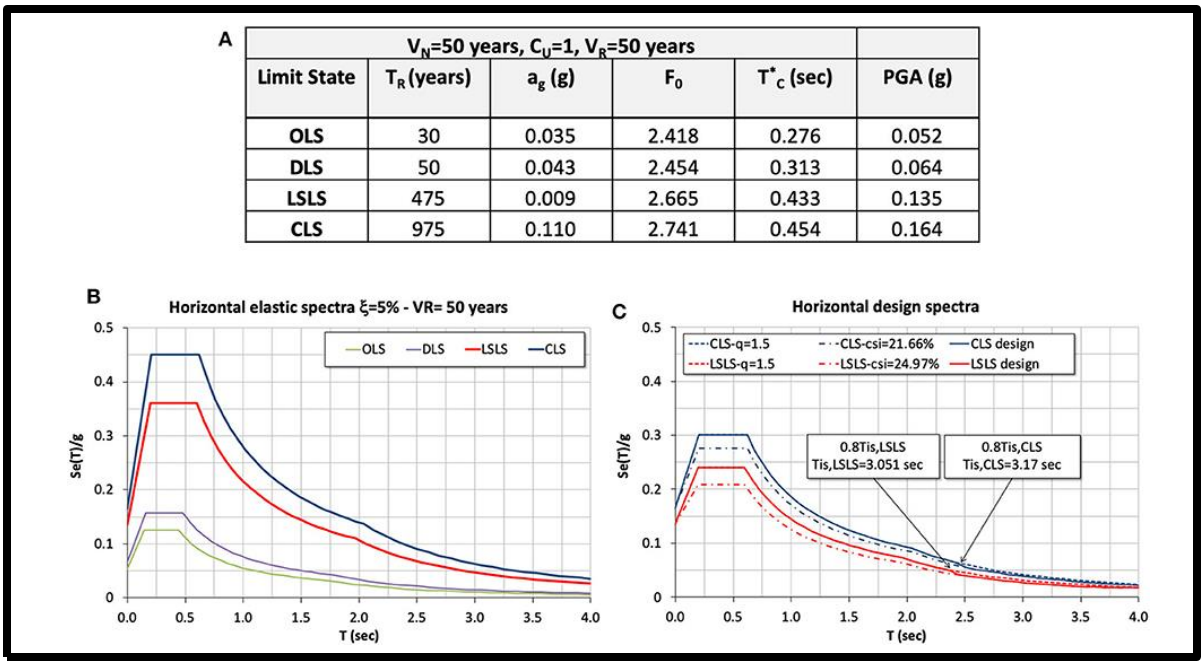


Figure – 90 Site seismic hazard and response spectra

The horizontal elastic response spectra for the site considered are reported in (Figure 3B), by referring to a soil of Type C, as resulted in the case analyzed, and to a conventional viscous damping ratio ξ = 5%. While, in Figure 3C design spectra by considering the Fixed-Base (FB) and Base-Isolated (BI) structure are shown. In particular, due to the lack of detailing rules for ductility the horizontal design spectrum for FB model is calculated starting from the elastic one and by assuming conservatively a behavior factor q = 1.5. As for the BI structure, in order to properly take into account the energy dissipated by the isolating system the appropriate design spectrum is calculated as indicated by NTC (2008). Therefore, the design spectra ordinates for LSLS and CLS having a period $T \geq 0.8^{*}T_{is}$ (that is the range of isolating system vibration periods) are reduced through the factor $\eta=10(5+\xi eis)-\sqrt{\eta}=10(5+\xi eis)$ as function of the equivalent viscous damping ratio ξ_{eis} due to isolation system. As known, ξ_{eis} depends on the design horizontal displacement which, in turn, is function of the considered limit state. In this case ξ_{esi} results, as it will be discussed later on, equal to 24.97% for LSLS, and to 21.66% for CLS. While, for $T < 0.8^{*}T_{is}$ the spectra ordinates are coincident with the design ones calculated with a ductility factor q = 1.5 since these ordinates regard the superstructure modes.

Numerical Investigations on "as-Built" Building (Fixed-Base Model)

The existing RC building in the fixed-base (FB) original configuration has been implemented with a FEM model within SAP 2000 software (Computers Structures Inc., 2015). In particular, an elastic model has been adopted, consisting of frame elements for the beams and columns, shells for the elevator core walls and joists. No reduction for flexural and shear stiffness of beams and columns has been considered due to the limited behavior factor assumed for the structure (NTC, 2008). Finally, the model has been fully fixed at the base.

As for the evaluation of the floor masses, they have been calculated in accordance with the following combination:

Gk1+Gk2+∑jψ2jQkj (1)Gk1+Gk2+∑jψ2jQkj (1)

where G_{k1} represents the permanent structural loads, G_{k2} are the semi-permanent non-structural loads, and Q_{kj} represent the j-th variable load. In this case we have:

- Housing floors: $G_{k1}+G_{k2}$ = 6.20 kN/m^2
- Under-roof floor: $G_{k1}+G_{k2}$ = 3.20 kN/m^2
- Roof: $G_{k1}+G_{k2}$ = 3.75 kN/m^2
- Live load: Q_k =2.00 kN/m^2
- Snow load: Q_s = 0.60 kN/m^2

In all the performed analyses the horizontal seismic action effects are evaluated, together with the vertical loads, through a modal analysis with response spectra where the modal effects are combined with CQC combination rule. For taking into account the directional effects of the seismic action, the following combinations have been considered in evaluating the structural response:

±1.00 EX±0.3EY (2)±1.00 EX±0.3EY (2)

where the multiplier coefficients have been permutated. Moreover, the vertical component of seismic action has been neglected.

Modal Analysis Results

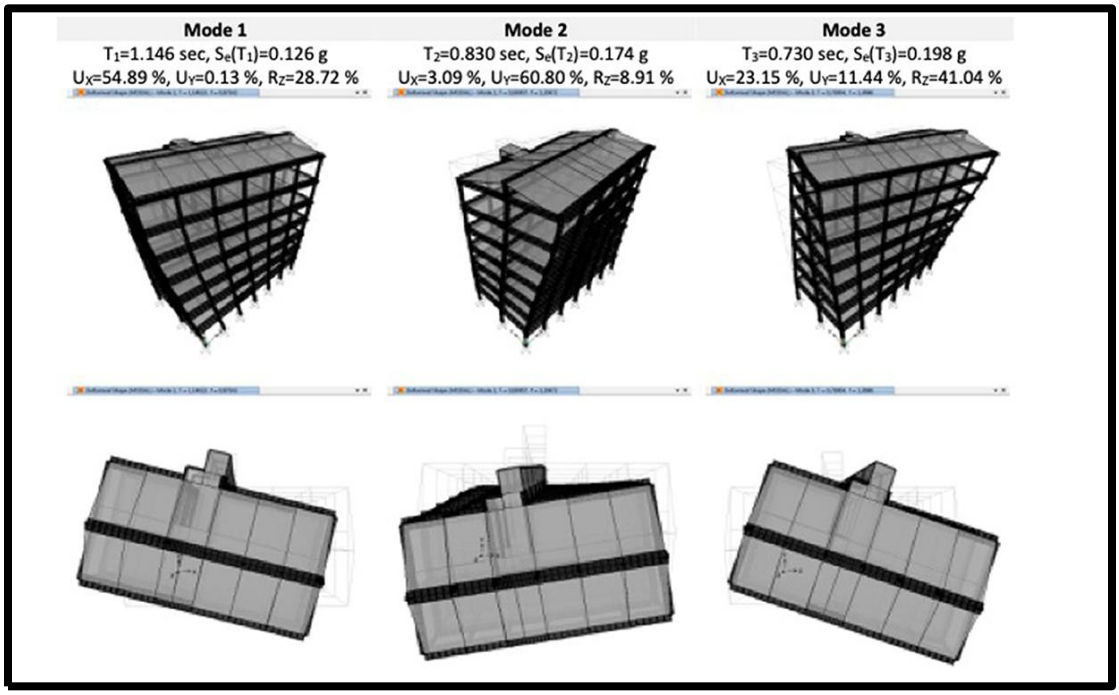


Figure – 91 Modal analysis results with the FB model

In Figure 4, the results of the first three vibration modes for the FB model are reported. As it is clear to note, all of them result roto-translational modes. In particular, the first mode is rotational and prevailingly translational along X axis (T_1 = 1.146 s), the second vibration mode is rotational and prevailingly translational along Y axis (T_2 = 0.830 s), while the third is rotational and prevailingly translational again along X axis (T_3 = 0.730 s). In Figure 4, also details about the participating mass ratios are illustrated. In particular, the sum of the modal participating mass ratios along the two principal directions (U_X and U_Y), and the rotation mass ratio around Z axis (R_Z) are numerically summarized. Finally, the spectral ordinate $S_e(T)$ of the LSLS response spectrum of each considered vibration mode is reported.

Structural Verifications

As for the structural verifications for the existing FB building, a modal linear analysis with a design spectrum for LSLS has been conducted. Due to the absence of detailing rules with respect to structural ductility, a behavior factor q = 1.5 has been considered for both verifications of ductile (flexural) and brittle (shear) mechanisms. Overall, as it was simple to expect, by applying the current design code (NTC, 2008) all the beams and columns result verified only with respect to the current vertical loads. Whereas, if one considers the seismic combinations no-one of the primary elements (columns and beams) satisfies the safety verifications. More precisely, the flexural mechanisms do not result verified neither for columns nor for beams. As proof of this, for instance in Figure 5 the columns structural verifications with respect to the design combinations including the seismic action (Equation 2) are reported. As regards the shear verifications, the transverse reinforcement amounts in beams and columns should result sufficient by considering, as indicated by NTC (2008), the secondary shear-resistant mechanisms contribution. However, it should be pointed out that the current stirrups spacing detected respected the detailing of NTC (1992), that indicated a spacing not >0.8 the effective section depth, and therefore not >0.8·23 cm = 18.4 cm.

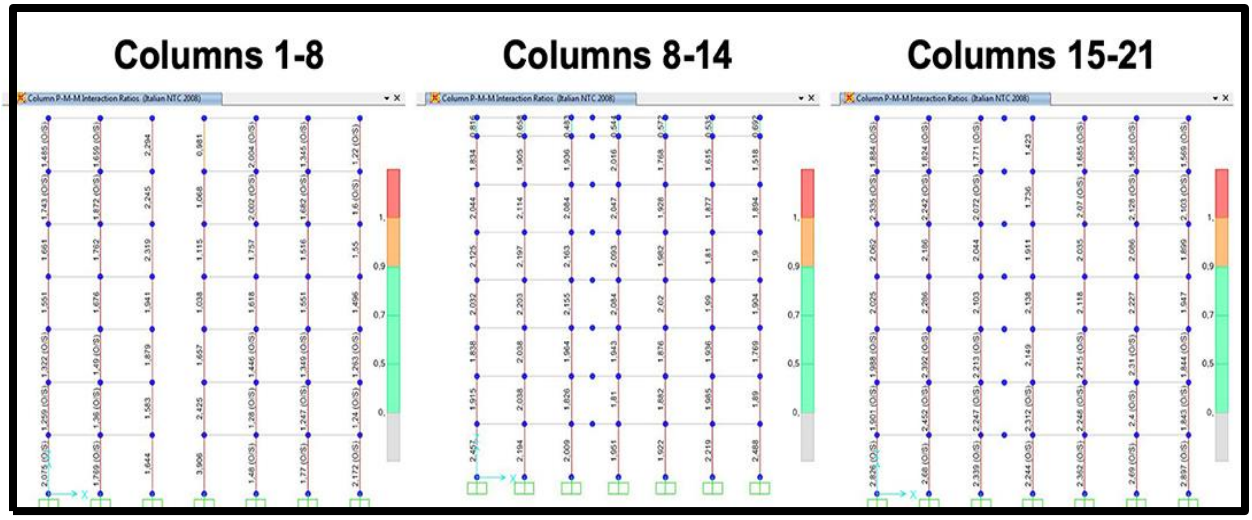


Fig. – 92 Existing columns structural verification with respect to axial and bending moment

For completeness, Figure 6A plots for LSLS the floor shear distributions along the two principal directions, by considering separately the seismic action along the longitudinal (EX) and transverse direction (EY) direction. As a useful comparison, in the same figure the resulting shears for the BI model are illustrated, too. It is easy to note that, in the case of FB building the shear distribution is quite non-linear especially for the higher floors. While, in Figures 6B–E are reported for DLS interstory drifts calculated for X and Y directions, by considering the perimetral columns n. 1, 7, 15, and 21 (see Figure 1). These graphs clearly show that the response is irregular with respect to lateral actions due to important torsional effects mainly provoked by the concrete core hosting the elevator. This is proved by the fact that significant interstory drifts occur also along the direction orthogonal to the acting seismic action. In any case the maximum interstory drift does not exceed the 0.5% limit value assumed as maximum allowable for the infills masonry (NTC, 2008).

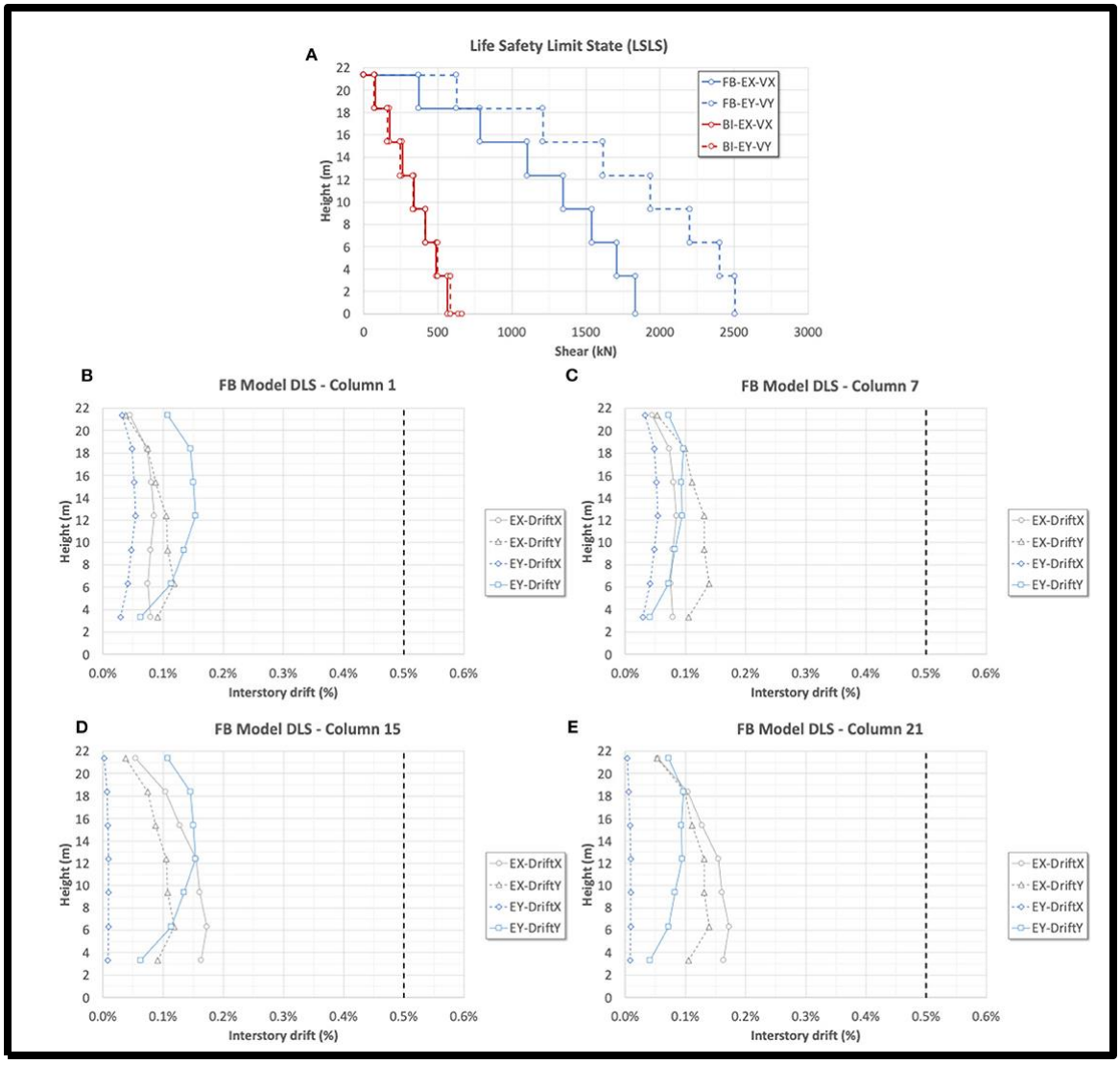


Figure - 93 FB model

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

Building construction methods have experienced significant facelift in recent times with innovative technologies being harnessed optimally for improving the qualitative index of buildings. This has spelled considerable advantages for end users like us who can remain immune from recurrent expenses on repairs and other incidental building-related jobs. Construction lead time has also been reduced and building costs have been rationalized. This post takes you through 8 techniques that have given the much-needed fillip to the most primitive human pursuit that still exists i.e. construction.

1) 3D Volumetric Construction

Using this modular construction technology, 3D units are produced in controlled factory settings using needful construction and building materials.Finished units are transported to site in various modules, basic structural blocks or final touched up units with all amenities installed, for assembly. Blocks can be erected rapidly at site and properties of concrete like fire retardant, sound resistivity, thermal mass etc. are retained.

2) Precast Flat Panel Modules

These are primarily wall and floor modules which are manufactured away from the actual site and then transported to site for erection. Load bearing components like decorative cladding and insulation panels can also be produced. Also called cross-wall construction, the technology has gained momentum due to seamless adherence to specifications and ease as well as swiftness of construction.

Figure – 94 Precast flat panel modules

3) Tunnel Formwork System

With this tunnel technique, construction is paced up for cellular structures of repetitive patterns through the building of monolithic walls or units in a single operation per day. Expeditious work is achieved by deploying formwork and readily mixed concrete with the convenience and agility of factory conditions. Formworks in tunnel form are stacked and used at the site with cranes.

Figure – 95 Tunnel formwork system

4) Flat Slabbing Technology

This technique utilizes the simplicity of contemporary formwork for quickly building flat slabs to facilitate easy and swift placing of horizontal amenities and for partitioning. Maximization of pre-fabricated services occurs as services can be carried out in an uninterrupted manner in zones underneath the floor slabs. Every top-notch building Construction Company is using the same as internal layouts can be conveniently modified for accommodating alterations at a later date. Further, reinforcement needed is lesser which cuts down labour costs significantly.

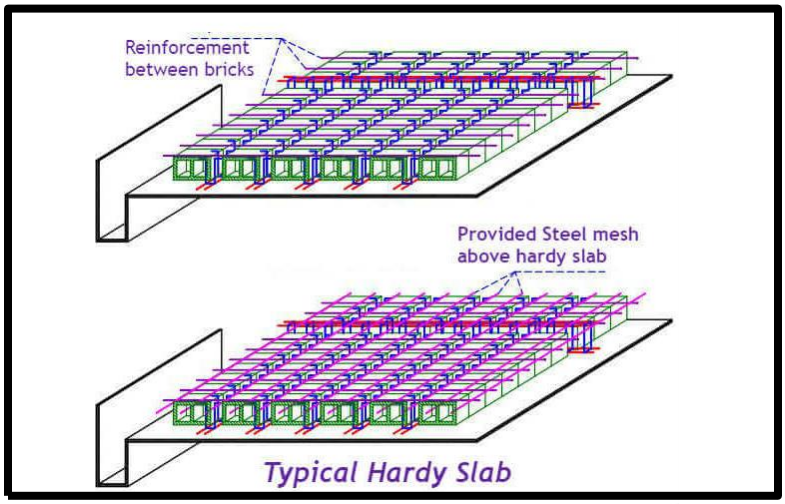


Figure – 96 Flat slabbing technology

5) Pre-cast Foundation Technique

Foundations can be built swiftly with precast concrete units which are produced in a factory and are high on quality quotient. Strength is imparted to foundation related building construction materials through interconnected concrete piles. This technique allows construction work to progress even in inclement weather and minimizes excavation activity**.**

Figure - 97 Pre-cast foundation technique

6) Insulating Concrete Formwork (ICF) Technique

ICF technique employs polystyrene blocks that feature twin walls and can be rapidly put together for creating building wall formwork. The formwork is then pumped in with high quality, ready mixed, factory-made concrete. The building construction process becomes fool-proof and the resultant structure has a high level of sound and thermal insulation.

Figure - 98 Insulating concrete formwork technique

14.1.4 Engineering Aspects Of Soil mechanics - Environmental Impact Assessment

Soil mechanics is defined as the application of the laws and principles of mechanics and hydraulics to engineering problems dealing with soil as an engineering material. Soil has many different meanings, depending on the field of study. To a geotechnical engineer, soil has a much broader meaning and can include not only agronomic material, but also broken-up fragments of rock, volcanic ash, alluvium, Aeolian sand, glacial material, and any other residual or transported product of rock weathering. As the name Soil Mechanics implies the subject is concerned with the deformation and strength of bodies of soil. It deals with the mechanical properties of the soil materials and with the application of the knowledge of these properties to engineering problems. In particular it is concerned with the interaction of structures with their foundation material. This includes both conventional structures and also structures such as earth dams, embankments and roads which are their-selves made of soil.

Soil consists of different phases of solid, liquid, and gas and its characteristics depend on the interacting behaviour of these phases, and on the stress applied. The solid phase includes clay, non-clay minerals, and organic matter. These elements are categorized by their size as clay, sand, and gravel. The liquid phase is composed of water that contains organic compounds available from chemical spills, wastes, and ground water, while the gas phase is normally air. The size, form, chemical properties, compressibility, and load carrying capability of the soil particles are determined by soil mineralogy, which is a science related with the chemistry, structure, and physical properties of minerals. The structure of a soil depends upon the arrangement of particles, particle groups, pore spaces, and the composition. These basic characteristics determine the type of structure to be built and what external support measures, if any, has to be taken to make the structure last long and bear the effects of earthquake, water seepage, and other external factors. Consolidation of soils is also an important factor that needs to be studied to make strong and durable structures. Consolidation is a procedure according to which the volume of soils is reduced, by the application of a stress due to which the soil particles are packed together firmly, thereby decreasing the volume. With the removal of the stress, the soil will bounce back and recover some of the volume lost during the process of consolidation. While studying consolidation, the crucial factors to be analysed are the rate of consolidation and the amount of consolidation. Another important factor is permeability of the soil. All the factors are closely associated with each other and they affect the overall design and construction process.

For instance, ff a structure is to be built on a soil with fine grains that have a low permeability, the flow of water through the soil voids will be less. Large water content in this soil may cause the structure to sink due to its weight. The process of consolidation in fine grained soils is slow. However, the extraction of pore water is simple in coarse grained soils since it moves freely within the region. The consolidation rate will be influenced by the soil history, nature of soil, and the load on the soil. Thus all the factors like water content permeability, consolidation, liquid limit are analysed collectively. Soil mechanics studies are used to determine lateral earth

pressure, bearing capacity of soil, and conduct slope stability analysis. These studies always help a civil engineer to design and construct better structures and indirectly these studies help in risk mitigation too because if we know beforehand how the soil mass is going to behave, we can take precautionary measures at the time of construction itself.

14.1.5 Water Supply-Sewerage system- Sustainable development techniques

Integrated Water Resource Management through reuse and aquifer recharge promotes long-term sustainable solutions to water supply and wastewater issues in urban California and South African townships. Integrated Water Resource Management (IWRM) is becoming recognised as the only sustainable solution to water scarcity. This holistic water resource approach, referred to as the Dublin - Rio principle (UNCED Rio de Janeiro 1992), highlights that freshwater is finite, vulnerable and essential to sustain life, economic development and the environment. Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels. Water production and consumption growth rates in many regions are clearly unsustainable. For example, analysts predict that eleven countries in the Mediterranean region will have consumed more than 50% of their renewable water resource by 2010. In 2025, this percentage is predicted to exceed 100% in eight countries and more than 50% in three others. Currently, an estimated 427 million inhabitants reside in the 21 Mediterranean coastal countries. Some 145 million live near the sea with an additional 180 million tourists each year. By 2025 the population is expected to increase by 17% to 19% and the tourist population by 40%. The long-term effects of climate change, evidenced by a proven increase in average temperatures and rainfall reduction in the region, calls for water professionals with political support from government leaders, to optimise water resource management and increase desalination and water reuse.

IWRM promotes a holistic approach for the finite water resource that considers all users, planners and policy makers. One practical benefit that resulted from numerous high-level environmental conferences is an increase in communication and initiatives between municipalities, non-governmental organisations (NGOs) and private enterprise. For example, the KwaZulu-Natal pilot project in South Africa demonstrates that this tri-sector partnership brings added value to both township communities and to all three parties. These informal settlements provide homes for 26% of the population in Durban. The worldwide Business Partners for Development (BPD) programme, established by the World Bank in 1998, includes this pilot project. Vivendi Water, with their project partners — Durban Metro, City of Pietermaritzburg, Umgeni Water, Mvula Trust (NGO) and Water Research Commission - installed and operate a new water distribution network for the townships in Durban and Pietermaritzburg. The partnership also trains employees to operate the system. The water system implemented in the KwaZulu pilot project includes low-pressure water distribution that continually feeds a potable water tank in the customer's property with a maximum of 200 litres per day. Trained water bailiffs selected by the community manage the system in addition to standpipes available for

those who are not connected to the low-pressure system. Trained local staff works with water bailiffs to provide maintenance. Customers using less than 200 litres per day are supplied free of charge following an initial US$ 24 connection fee.

Durban Water Recycling (DWR) is a Durban Metro — Vivendi Water public-private partnership that provides a 20-year build-own-operate and transfer service to Durban Metro, which started operating in May 2001. Primary sewage is treated and reclaimed water is repurified at 47,500 m3/day. This recycling system treats seven percent of the wastewater being discharged to the sea and guarantees a low cost, high quality industrial water supply to the MONDI Paper mill and the SAPREF Refinery.

These sustainable solutions in Durban provide the following benefits:

- Community partnership with affordable water supplies in poor informal settlements.
- Making available an additional eight percent of potable water for the community.
- Guaranteeing lower water costs to industry (25% than potable).
- Reducing flow to an overloaded long sea outfall, thereby extending its life.

By 2004, the 330,000 m3/day groundwater replenishment project at Orange County Water District's (OCWD) Water Factory 21 in the US state of California will purify for reuse highly treated wastewater that is currently discharged to the ocean. The project will provide a drought-proof water resource for industry and irrigation, reduce wastewater disposal to the sea, and provide clean water to inject into deep groundwater aquifers to prevent seawater intrusion. The OCWD plans to eventually expand capacity to 405,000 m3/day. Over abstraction of groundwater resulted in saline ingress up to eight kilometres inland along the Californ-ian coast in the 1950s. Consequent-ly, three fresh water injection barriers were created to control saline ingress. Imported fresh water has been injected for more than 40 years and for 25 years repurified wastewater treated to drinking water standards has been used to provide saline ingress control and aquifer recharge for indirect potable use. The Orange County Water District (OCWD) supplies approximately two million people with potable water. The population is expected to increase to almost three million within the next 20 years. To meet the increased demand, OCWD and Orange County Sanitation District (OCSD) developed a cost-effective solution to provide a supplemental source of high quality water. The two agencies are sponsoring this water purification project, known as Groundwater Replenishment System (GWRS), to purify for reuse additional highly treated wastewater.

Secondary wastewater from OCSD will be treated through microfiltration, reverse osmosis and ultraviolet disinfection. Approximately 80% of the potable quality water produced by the GWRS will be piped 21 km to the OCWD recharge facilities, while the balance will be used to expand the existing seawater intrusion barrier. The aquifer recharge project provides 75% to 80% of the potable water source for the area through direct injection and surface percolation ponds in the Santa Ana river basin. The GWRS will be capable of supplying approximately 22% of the water needed to recharge the ground-water basin by the year 2020.

In 1992 OCWD confirmed that the key issue to be resolved was identifying the most effective RO pre-treatment solution based on their 16 years experience of operating RO on lime clarification and rapid gravity sand filtration. This experience led to the long-term pilot study (> 53,000 hrs) at their world-renowned test centre so that they could select and budget for their 405,000 m3/d system. Reclaiming secondary sewage with the GWR system consumes 1.21 kWh/m3 compared with imported water from Northern California or the Colorado river at 1.82 to 2.82 kWh/m3. Wastewater reclamation will also delay by 10 years a US$ 150 million investment in a new ocean outfall. In the Fall of 2002, USFilter begins its first stage of construction of a temporary CMF-S system that will process 25,000 m3/day. This system will be incorporated into a 300,000 m3/day permanent treatment system fed with 327,000 m3/day of microfiltered water.

Integrated water resource management needs a holistic long-term approach that must be supported by legislation, quality standards and international finance to facilitate project completion. This is helped when one governmental water agency is responsible for all water resource issues - ranging from freshwater to wastewater treatment - rather than separate regulators responsible for a single part of the total solution. Increasing global experience in large high-efficiency systems continually reduces water production costs. Lowering the cost of power, finance, equipment and membranes is the key to maximizing opportunities for sustainable projects. Hybrid systems provide real benefits by taking advantage of the process synergy between power generation, desalination, reuse and aquifer recharge in one system. These innovative solutions enable water-scarce coastal cities to move rapidly towards Integrated Water Resource Management.

Wastewater reuse benefits community

- Planning for a sustainable future requires reliable knowledge of resource available, recharge, future demand and a positive involvement of the community.
- Partnerships provide affordable water supplies to poor communities by building on local experience and skills.
- Increases availability of potable water and reducing water cost by repurifying wastewater for industry and irrigation.
- Provides drought-proof water resource through reuse.
- Helps grow cash crops and creates employment in areas blighted by soil salinisation.
- Positively controls saline ingress and recharges aquifers to create sustainable water resource.
- Reduces wastewater disposal to sea and protects bathing beaches
- Supports tourism industry through irrigation of landscapes and golf industry with repurified water.

14.2 Electrical Engineering

14.2.1 Design of Power Electronics converter

This module provides in-depth knowledge of power electronic devices and converter topologies for hybrid and electric vehicles. It includes the integration, reliability and manufacturing of power electronic converters. Advanced PWM control methods and electromagnetic compatibility are introduced. This module covers modelling and design of power converters in detail through lectures, workshops and practical. It also introduces future power electronics technologies for the upcoming EV applications.

This module aims to:

Extend students' depth of knowledge of power electronic circuits and components for hybrid and electric vehicles. Introduce integration, reliability and manufacturing considerations of power electronic converters. Introduce thermal modelling and cooling design of power electronic converters. Provide students with skills and techniques necessary for analysis, modelling and design of power electronics and related control systems for automotive applications.

Objectives

Critically evaluate characteristics of power semiconductor devices and select devices for a range of automotive applications. Differentiate power converter topologies, operation, control and practicalities for real-world application to hybrid and electric vehicles. Evaluate detailed operation, losses and efficiency of power electronics converters through use of analytical methods and modelling techniques. Interpret the integration, reliability and manufacturing of power electronic components for automotive applications. Systematically design power electronic subsystem/ system for hybrid and electric vehicles and critique design trade-offs and technology advances.

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

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 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 cavitations 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 minimised from the system, The Voltage supplied to stator windings are adjustable and it has ramp characteristics.

14.2.3 Advanced Wireless Power Transfer System

The Transfer of electrical power in reliable and efficient way is always challenging for the designers and engineers. Presently all electrical power from the generating stations to the distribution station is transferred by the uses of wires and underground cables. One of the major issues in these types of systems is the losses due to resistance of the material. Generally the percentage of loss of power during the transmission and distribution is 26% .

In modern technology the use of portable device has increased such as mobile robots and electric vehicle. Mobility is the main concern of these equipment i.e. they are not connected to the main source of power. All these problems are the main motivation for researchers. Nikola Tesla was the first who introduce the concept of wireless power transfer. But this technology from the time of Tesla is underdeveloped due to lack of funding and technology. But research from past few years has always going on and recent development has been observed in the field. Wireless power transfer can be achieved by several methods (discussed later). Here we discussed few methods such as induction coupling, resonating coupling, LASER technology for electrical power transfer.

Hardware Requirements of Wireless Power Transfer

The hardware requirements of wireless power transfer include HF-Transformer, HF-diodes, rectifier, basic Transistors, Two air filled inductor coils, Voltage regulator and BLDC fan.

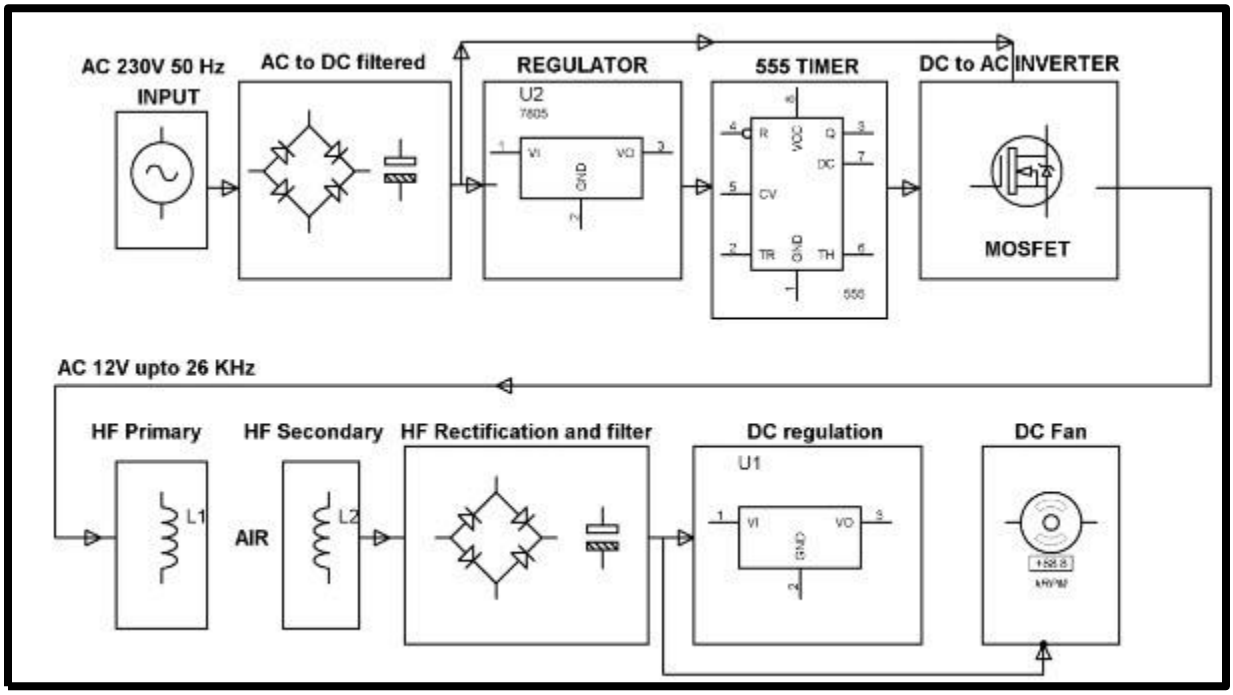


Figure – 99 Block diagram of Wireless power transfer

HF-Transformer

High frequency (HF) transformers transfer electric power and the physical size are reliant on the power to be transformed as well as the operating frequency. The emf equation of universal transformer indicates that at a higher frequency, the core flux density will be lower for a given voltage. This implies that a core can have a smaller cross-sectional area. High frequency (HF) transformers transfer electric power and the physical size are reliant on the power to be transformed as well as the operating frequency. The emf equation of universal transformer indicates that at a higher frequency, the core flux density will be lower for a given voltage. This implies that a core can have a smaller cross-sectional area.

Voltage Regulator

A voltage regulator is an electrical regulator, designed to maintain a constant level voltage automatically.

- There are three terminals positive voltage regulators are available in many packages and also with several o/p voltages, making them useful in a wide range of applications. Output current up to 1A and o/p voltage is 12.
- Thermal overload and short circuit protection
- Output transistor safe operating area protection

Coil

- An electromagnetic coil is formed when a conductor is wound around a core
- Primarily used to transfer energy from one electrical circuit to another by magnetic coupling
- Common types of electrical coils are Tesla, Barker, Choke, Maxwell coil, etc.

IN4007 Diode

- This diode is used as full wave bridge rectifier circuit in this project
- Maximum reverse bias voltage capacity of 50V and max forward current capacity of 1Amp.

Working

The main concept of this project is to design a device for the concept of wireless power transfer to eliminate the use conventional copper cables and also current carrying wires. This project is built upon using a circuit which converts AC 230V 50Hz to AC 12V, High frequency (HF). The output is fed to a tuned coil shaping as main of an air core transformer. The minor coil develops a voltage of HF 12volt. Thus the power transfer can be done by the primary to the secondary that is divided with 3cm distance. So the transfer could be seen as the primary transmits and the secondary receives the power to run a load.

In addition, this method can be used in several applications, like to charge gadgets like mobile phone, laptop battery, iPod, propeller clock wirelessly. And also this type of charging offers a far lower risk of electrical shock as it would be galvanically isolated. This is an Emerging Technology, and in future, the distance of power transfer can be improved as the study across the world is still going on.

Advantages

- It gives the human comfort as there is no chording or wiring problem, so mobility is easier.
- There is no problem of power failure and extensive heating.
- Cost of overall system decreases due to no uses of wires.
- Overall efficiency increases due to decrease in the power loss.
- It offers no corrosion as there is no exposure to the
- atmosphere which is Eco-friendly.
- It offers ranges of power levels and separation distance between coils.
- It offers convenient, reliability, high efficiency, low cost at the same time.

Disadvantages

- WPT methods uses the electromagnetic radiation for power transfer and the main effect of electromagnetic wave is its biological impact which harms human beings and animal.
- Biological impact of inductive coupling and resonance coupling is far less than compared to microwave power transmission technique.
- power capacity. Interference of microwave with other communication system.
- Initial cost is very high for implementing WPT system Wireless Power.

Applications

Medical Devices

The most important application of WPT is in medical science. As we know medical device uses very small amount of power. Some medical device are LAVAD heart assist pumps, pacemaker and infusion pumps. These device one implemented in human body. Now for replacement of battery there is a need of surgery after a particular period. With using the WPT technology, the power can sufficiency supplied to medical device without harming human body.

Electrical Vehicles

Electrical vehicles are the new technology which uses electrical energy for their operation. The main concern about the electrical vehicles is that their mobility i.e. they are not directly connected to the source of power by wires. With using this technology, it enables the reliable and efficient power transmission to electrical vehicles without using of wires. WPT also marketed the electrical vehicles which attract the consumers to buy it and decrease the load on diesel and petrol vehicles.

Solar Power Satellite

The most important application of WPT system is solar power satellite that uses the microwave for energy transferring. Satellites are generally equipped with solar power transmitter and receiver antenna. Solar panel converted the generated electricity into high power microwave beams and directed towards the ground station receiver antenna. The major problem with this system is it biological effect of microwave radiation on human and animals, if they are distracted from their path. The receiving zone of SPS is much larger for getting a small amount of power. For achieving 750MW power with power intensity of 1mw/cm², we have to take a area with 10KM diameter so that radiation level is in safe zone.

14.2.4 Industrial Temperature Controller

Targeting at the problem of slow response and low accuracy of the automatic temperature control system for material processing and boiler heating, a new design method is proposed to work with the PLC-based temperature control system, where the box temperature control may be achieved through the fan and the heating plate. The hardware design and software design of the system are

analyzed in detail. In this paper, a combination of the traditional PID control and the more popular fuzzy control is taken as the control program to achieve the overall design of the control algorithm. Followed by the simulation in the MATLAB software, the designed system is highlighted by it's the characteristics of impressive stability, precision and robustness.
The modern sensing technology and control methods are undergoing continuous innovation, where the real-time Temperature control is demanding higher accuracy and faster response more than ever. Temperature control is widely used production and industrial control processes in all aspects. For example, in the iron steel smelting process. Iron and steel to be baked requires heat treatment in order to achieve their performance indicators: plastic qualitative process also needs maintain a certain temperature range. The fact is that the temperature control system is a complex process object involving large inertia and pure delay with multi-variable and time-varying parameters. At present, the PID control methodology is adopted in most cases. In this way, different PID parameters should be selected for different control objects, for which some practical experience is needed. As a language controller, the fuzzy PID control is to imitate the way of human thinking and experience to achieve its control process that can more closely reflect the best control behavior of the controller. With strong robustness and control stability, it can be applied to different control objects. The combination of fuzzy control and PLC, which is widely used in industrial control, is one of the hotspots in this research area. Therefore, this work involved the use of the PLC-based fuzzy PID control technology, by which the system temperature was set through the fan and the heating plate to control the box temperature.

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

Enormous advance has proven throughout the years in the area of traffic surveillance by the growth of intelligent traffic video surveillance system. In the current work, through the traffic videos, the traffic video surveillance automatically keyed out the vehicles like ambulance and trucks, which in turn assisted us in directing the vehicles at the time of emergency. Nevertheless, it doesn't provide us a vital solution for the regulating the traffic. Moreover, this idea just identifies the vehicles, but it couldn't notice the accidents expeditiously. Therefore in the proposed work, expeditious traffic video surveillance and monitoring system are presented along with dynamic traffic signal control and accident detection mechanism. Hybrid median filter has been utilized at the beginning for pre-processing of traffic videos, and to remove the noise. Hybrid support vector machine (SVM with extended Kalman filter) has been utilized to chase the vehicles. Next, the histogram of flow gradient features are drew-out to categories the vehicles. According to the traffic density and through video files, vehicles are computed, and then for emergency vehicles, the traffic signal gets switched dynamically. To realize the arrival of ambulances, the cameras have been set to catch traffic videos minimum at 500 m of the signal and deep learning neural networks has been employed. Hence dynamic signal control has been

incorporated expeditiously. Likewise, multinomial logistic regression has been utilized in real-time live streaming videos, to identify the accidents correctly. The observational solution shows that the proposed intelligent traffic video surveillance system render expeditious dynamic control of traffic signals and it raises the identification of accidents correctly.

The motor vehicle population is growing at a faster rate than the economic and population growth. Accidents and the death rate due to road accidents, especially two wheelers are also increasing at an alarming rate. Most of the accident deaths that happens are due to the lack of immediate medical assistance, on the roads like express highways. A facility for providing immediate medical assistance to the accident area can reduce the fatality to a greater extend. Thus comes the idea of an alert system that senses the accident and its seriousness to alert the nearby medical center for providing ambulance or medical aid to the accident area. The proposed system will check whether an accident has occurred and identify the seriousness of the injury to the accident victim/driver. Once the decision of serious accident has taken, the system will check for the nearest medical center and notify them about the incident. The rescue team can rush to the spot immediately without any delay as the correct location will be communicated by the mobile phone of the accident victim. The system will also send message to the friends and relatives to inform them about the incident. Accident detection and alert system has been extensively studied over the past several years. Research work in this field has proposed a Telematics model which has three main modules. The system is intended to capture the location of the vehicle through GPS receiver, send the location information to vehicle owner's mobile number through SMS and also to the telematics operator server through GPRS. Another prototype proposes a system to detect and provide faster assistance to traffic accident victims. A prototype architecture to improve the chances of survival for passengers involved in car accidents has also been proposed. The proposed system offers automated detection, reports, and assistance to passengers involved in road accidents by exploiting the capabilities offered by vehicle to vehicle communication technologies. Here a low cost alert system is proposed to provide immediate medical aid to the accident victims by alerting the nearby medical assistance center with the exact place of accident and the details of the patient through SMS. This system also takes the medical condition of the accident victim by checking the heartbeat to understand the seriousness of the accident and inform the medical aid center.

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.

The below stated table shows the design we have proposed for this semester. We proposed this design due to the lack of this facilities in the village.

The following designs will help the villagers to live a healthy and joyful life like the people living in smart villages.

Table – 54 Design costs and benefits

Sr. no	Design name	Period	Cost (Rs.)	Benefits
1	Public latrine block	8 months	1,87,000	Improve cleanness and hygiene.
2	Public health center	6 months	2,71,000	Improve health of villagers.
3	Community hall	12 months	7,96,000	Provide place for gathering.
4	Rainwater harvesting with ground water recharge	2 months	42,500	Increase in ground water table and store rainwater.
5	General market	6 months	3,87,000	Provide different items easily.
6	Entrance gate	2 months	1,09,000	Provide aesthetic looks.
7	Agro storage unit	6 months	6,86,300	Improve efficiency of farmers
8	Drinking water facility	3 months	1,79,220	Provide neat and clean water.
9	WBM road	18 months	9,99,130	Ease of transportation.
10	Overhead water tank	9 months	14,21,500	More storage of water.
11	Vermicomposting unit	3 months	1,90,800	Produce fertilizer for farmers.
12	Maintenance of bus stand	2 months	26,536	Improve quality of bus stand.
13	Auto electronic school bell	immediately	3409	Saves the daily operation time of the system.
14	Automated night lighting	1 week	3700	It makes street light operation easy.
15	Solar powered battery charging with reverse current protection	immediately	4983	To stop reverse current flow and charge the battery effectively using the solar panel.
16	Generate power using microturbine	1 month	85,000	To generate electricity using microturbine.
17	Simple low power inverter	immediately	1960	To use electrical energy during power cut.
18	Remote operated domestic appliances control	immediately	3190	To easily control domestic appliances.

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

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

Sr.	Questions	Yes/ No	Remarks
1	What are the sources of income in village?	-	Farming
2	What are the chances of employment in village?	-	Labour
3	What are the special technical facilities in village?	-	LED street light
4	Is any debt on village dwellers?	No	
5	Are village people getting agricultural help?	No	
6	Is women health awareness Program organized in village?	No	
7	Are women having opportunity to work and income?	Yes	
8	Child girl education is appreciated in village?	No	
9	Facility of vaccination to child is available in village?	Yes	
10	Are village people aware about child vaccination and done to each and every child as per norms?	Yes	
11	Women help line number information is provided to village people?	No	
12	Is water scarcity in village? How many days per year?	Yes	65 days per year
13	Is village under any debt?	No	
14	Is any serious issue due to debt from bank or any person happened in village?	No	
15	Is any suicide like incident observed in village due to government policy, debt or threatening?	No	
16	Is any death of patient occurred due to unavailability of medical facility in village?	No	
17	How many disabled (physically challenged) is observed in village? Provide list with Male/female/girl/boy with age and type of disability and reason of disability.	No	
18	Is village improvement is observed in comparative scenario from past to present?	Yes	
19	Is any unavoidable difficulty village people are facing? Any natural calamity is there?	No	
20	Life Living standard of girls and women is appreciated and uplifted in village?	No	

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

CHAPTER - 17 IRRIGATION / AGRICULTURE ACTIVITES AND AGRO INDUSTRY, ALTENATE TECHNICS AND SOLUTION

Agriculture activites and technics

Efficient application of irrigation water is one the most important ways to mitigate any effects that increased biofuels production may have on water resources. There are several irrigation techniques that reduce the amount of water applied per unit of biomass produced, thus improving irrigation efficiency regardless of crop type. For example, subsurface drip irrigation systems minimize the amount of water lost due to evaporation and runoff by being buried directly beneath the crop and applying water directly to the root zone, thus keeping the soil surface dry (Payero et al., 2005). Realtime soil moisture and weather monitoring—the former through microwave remote sensing—are emerging technologies that can potentially help improve the scheduling of irrigation. Rainfall harvesting, efficient irrigation water transport, and use of reclaimed water can also lead to more efficient agricultural water use. These techniques would be effective for both corn and cellulosic ethanol crops. The overall effect of improved irrigation techniques on the regional water budget will vary on a case-by-case basis. For example, if application efficiencies lead to less water being withdrawn from an aquifer, this would leave more water in long-term groundwater storage for future use. On the other hand, if lower water withdrawals from a stream only serve to make additional water available for junior water rights holders, the net effect on the regional water budget might be negligible. Soil Erosion Prevention As pointed out in the previous chapter, soil erosion can impair the water quality of streams and rivers and also contribute to nutrient pollution. Surface cover, especially in conjunction with conservation buffers, is crucial in reducing sediment in runoff and limiting soil erosion (Figure 4-1). Farmers can employ a number of conservation tillage techniques that leave some portion of crop residues on the soil surface. In “no-till” systems, as the name implies, crops are simply planted into the previous year’s crop residues. In “strip-till” systems, less than full-width tillage is conducted, leaving a relatively high amount of crop residue between rows. For corn, the stalks and cobs left in the field after the grain has been harvested—called the corn stover—can potentially be converted to cellulosic biofuel, but leaving them on the fields can greatly reduce soil erosion. The effects of crop residue management on soil erosion can be represented by the “cover-management factor” (C) in the U.S. Department of Agriculture’s Revised Universal Soil Loss Equation. Because soil loss varies directly with C, a lower value corresponds to lower erosion estimates. In Table 4-1, the C-factor is estimated to be 0.02 for perennial grass, 0.04 for continuous corn when 100 percent of the corn stover is left in the field, and 0.55 for continuous corn when 95 percent of the residue is removed. Thus, from the standpoint of water quality with regard to erosion, sediment, N loss, P loss, and pesticide loss, it is clear that perennial grasses or polyculture (a form of agriculture in which one raises multiple species of crops at the same time and place) would have a great advantage over continuous corn, especially if most of the stover is

removed. Overall, conservation tillage appears to have had a positive effect on erosion. For example, in 1985, incentives were put in place to encourage adoption of conservation tillage practices. According to data from the National Resources Inventory (NRI), maintained by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service, overall annual cropland erosion fell from 3.06 billion tons in 1982 to about 1.75.

Nutrient Pollution Reduction

There are various nutrient management techniques that can reduce the amounts of N and P in stream runoff and groundwater. One technique is using enhanced efficiency fertilizers that match nitrogen fertilizer applications to the nitrogen uptake patterns of various crops. Another is injecting the fertilizer below the soil surface, which will result in reduced runoff and volatilization. Controlled release fertilizers have water-insoluble coatings that prevent water-soluble nitrogen from dissolving. These techniques increase the efficiency of the way nutrients are supplied to and are taken up by the plant, regardless of the corp.

Precision Agriculture Tools

Precision Agriculture (PA) can be defined as "an integrated information- and production-based farming system that is designed to increase long term, site-specific and whole farm production efficiency, productivity and profitability while minimizing unintended impacts on wildlife and the environment" (U.S. House of Representatives H.R.2534). The approach can be used to manage feedstock production inputs on a site-specific basis such as land preparation for planting, seed, fertilizers and nutrients, and pest

Agro Industry

Agro-industry, understood here broadly as postharvest activities involved in the transformation, preservation and preparation of agricultural production for intermediary or final consumption, typically increases in importance with regard to agriculture and occupies a dominant position in manufacturing as developing countries step up their growth. In all developing countries population growth is becoming predominantly an urban phenomenon, increasing the role of agro-industry in mediating food production and final consumption. While many long-standing commodity exports have declined in importance, 'non-traditional' food exports, especially fruits, horticulture and fish products, and components of the animal protein complex, have become central to developing country exports. Whether looked at from the point of the domestic market or exports, therefore, agro-industry plays a fundamental role in the creation of income and employment opportunities in developing countries. The agro-processing sector covers a broad area of postharvest activities, comprising artisanal, minimally processed and packaged agricultural raw materials, the industrial and technology-intensive processing of intermediate goods and the fabrication of final products derived from agriculture. The hybrid characteristics and heterogeneous features of the agro-processing sector, ranging from the informal contract relations of poor rural communities to the complex,

Agro-industry production and development impacts

An extended definition of the agro-processing sector, including not only agrorelated industries, but also distribution services and trading activities, would roughly account for more than one-third of the GDP of Indonesia, Chile, Brazil and Thailand, and between 20% and 25% of GDP in sub-Saharan countries. The entire food system, including the production of primary goods and commodities, marketing and retailing, would account for more than 50% of the GDP in developing countries (Jaffee et al., 2003, based on World Bank, FAO and UNIDO databases). In order to gather comparable data within a narrower, more industry specific perspective, we used only the UNIDO Industrial Statistics Database 2005, selecting countries for which data are available on a consistent basis and grouping them according to the World Bank country classification by level of income per capita. On the basis of this analysis, formal agro-processing participation in the overall gross product corresponds to around 4.3% in LICs (which include Bangladesh, Ethiopia, Eritrea, India, Mongolia, Senegal and Vietnam) and about 5% in LMICs and UMICs2 (see Table 1). Considering the importance of artisan production and the informal sector in this activity, particularly in LICs, but generally in the developing world, we can safely interpret this information as heavily underestimating the real picture. Within manufacturing or production, the agro-processing sector in developing countries occupies a relevant place in overall turnover and value added, particularly for the least- and less-developing countries, though huge heterogeneity may exist among them. Considering the group of LICs analysed here, on average, about 52% of total manufacturing value added corresponds to the agro-processing sector; for the LMICs and UMICs we find figures of, respectively, 36% and 32%. In agriculture-based countries the contribution of agroprocessing to total manufacturing is 66%, while in transforming and urbanized countries the figures are, respectively, 38% and 37%. Based on Jaffee et al. (2003) we calculated the ratio of agribusiness share over the agriculture share of GDP for a group of selected countries, which includes a representative sample of sub-Saharan African countries, transforming countries (Indonesia and Thailand), urbanized countries (Latin America and South Africa) and the USA. Agribusiness provides inputs to farmers and connects them to consumers through the handling, processing, transportation, marketing and distribution of agricultural products. According to the WDR (2008), strong synergies can exist between agribusiness, the performance of agriculture and poverty alleviation: efficient agribusiness can spur agricultural growth and a strong link between agribusiness and smallholders can reduce rural poverty. According to FLO (2007), recent trends show that there has been a rapid increase of production value adding via agribusiness opportunities relative to primary agricultural production. Demand from agro-processing increases as does the effective size of the market for agricultural products. Traders and agro-processing firms furnish crucial inputs and services to the farm sector, inducing productivity and product quality improvements, stimulating market growth and innovation throughout the value chains. In this case, the agribusiness/agriculture ratio captures the degree of productive and commercial development of agro-related activities, the sophistication of agro-industrial backward and forward linkages, the capacity level of value adding and market creation, and the importance of distributing and retailing. For agriculture-

based countries, for instance, moving the core economic activities from the farm gate to the agro-industrial sector and its services may represent productive diversification and lead to higher levels of productivity and income generation as well as higher shares of non-farm employment in rural areas. Above all, at an aggregate level, this ratio may capture the level of structural transformation currently faced by developing countries, where productivity growth corresponds to a shifting sector composition of economic activity, a fall in the share of agriculture and increasing transfers of capital and labour from agriculture towards expanding agro-industrial and related service sectors. In the USA agribusiness contributes 13 times more to GDP than pure agricultural activities. In urbanized developing countries, following the WDR typology, this ratio remains at 3.3, whereas in transforming countries it falls below 2 and in agriculture-based countries it is only 0.6. More fundamentally, and not surprisingly, this ratio is highly correlated with basic measures of socioeconomic development. Low indices of human development are directly related to low ratios of agribusiness-to-agriculture development. Socio-economic catch-up, on the other hand, can be highly and positively correlated with levels of economic growth passed on from agriculture to agro-related manufacturing and service activities (Figure 1). According to the WDR, growth in rural non-farm employment is in many cases an important factor in rural poverty alleviation and remains closely linked to improvements in agriculture. Rural trade and transport, often of food, would represent about 30% of rural non-farm employment.3 The direction of causality, however, is conditional on specific circumstances. Some estimates for rural China highlight the effects of growth on farming rather than on non-farming activities, with less evidence of reverse linkages. On the other hand, with urbanization becoming an almost generalized worldwide trend, growth in rural non-farm employment occurs independently of agriculture performance. When capital and products are mobile, investors search for low-wage opportunities in areas that have not increased their incomes through higher agricultural productivity. There are also generally areas that are closer to primary agricultural inputs. For instance, urban overcrowding and higher labour costs have stimulated urban-to-rural subcontracting in East Asia, both for domestic consumption and for export. In this case, although relatively few of the poor gain access to nonfarm jobs in rural areas, higher labour demand would indirectly put upward pressure on agricultural wages.

CHAPTER – 18 SOCIAL ACTIVITIES – ANY ACTIVATES PLANNED BY STUDENTS E.G TEACHING LEARNING ACTIVITIES, AWARENESS CAMP, BUSINESS IDEA FOR SELF HELP GROUP OR ANY OTHER

1.Swachha bharat abhiyan

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

Fight against drugs

Slogan banner made to fight against the Drug Abuse and illicit Trafficking.

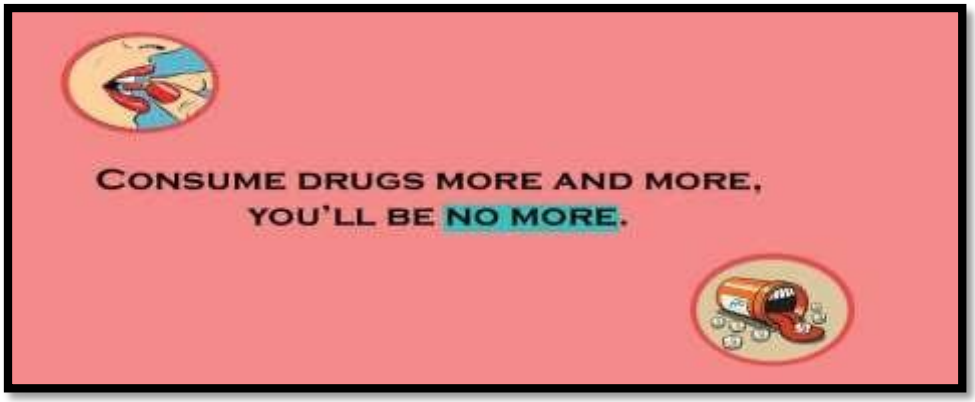
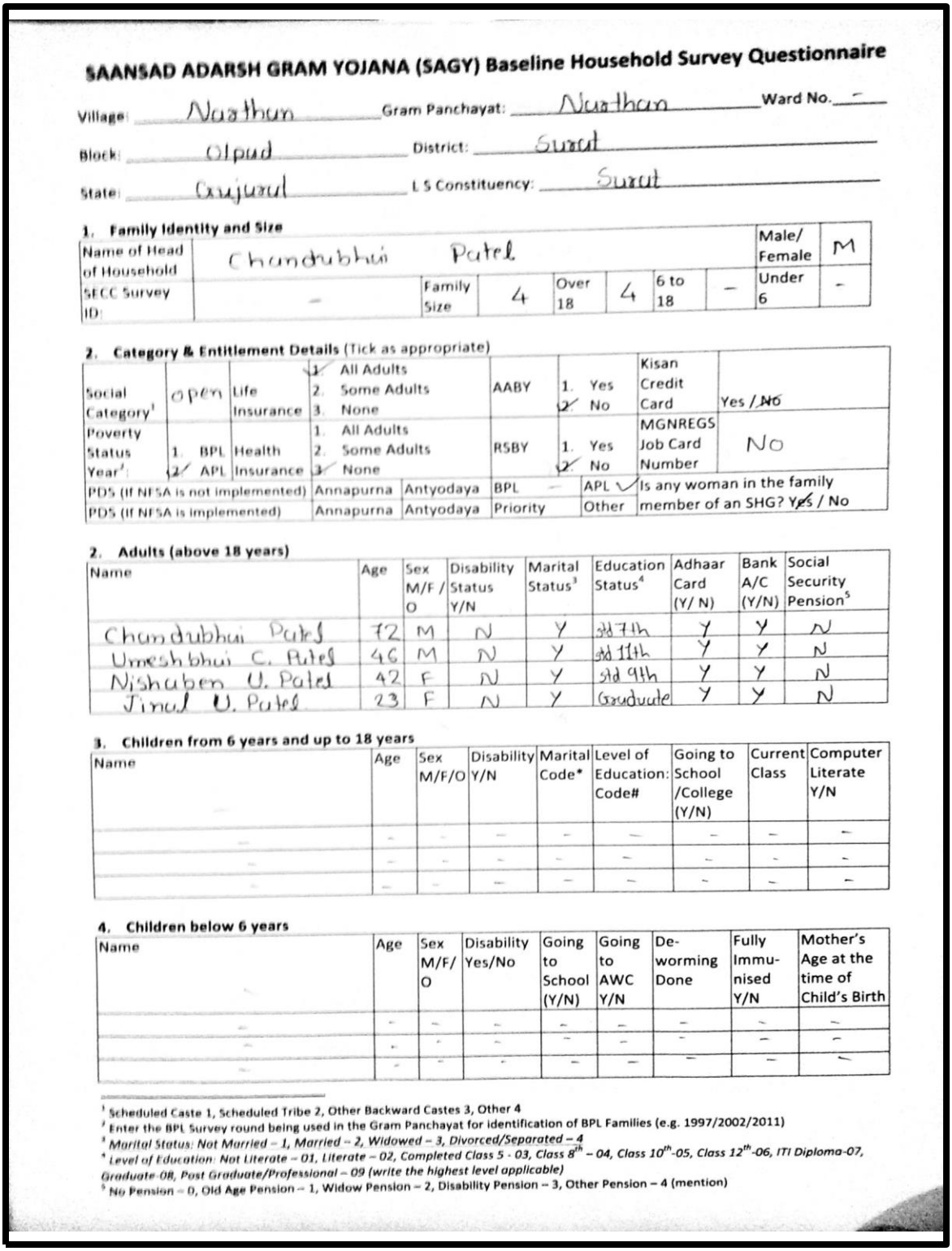


Figure – 100 Slogan banner

19. NARTHAN VILLAGE: SAGY QUESTIONNAIRE SURVEY FORM WITH THE SARPANCH SIGNATURE (SCANNED COPY ATTACHMENT IN THE SOFT COPY REPORT)



SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Narthan Gram Panchayat: Narthan Ward No. -

Block: Olpad District: Surat

State: Gujarat L S Constituency: Surat

1. Family Identity and Size

Name of Head of Household	Chandubhai Patel							Male/ Female	M
SECC Survey ID:	-	Family Size	4	Over 18	4	6 to 18	-	Under 6	-

2. Category & Entitlement Details (Tick as appropriate)

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

2. Adults (above 18 years)

Name	Age	Sex M/F/O	Disability Status Y/N	Marital Status[3]	Education Status[4]	Adhaar Card (Y/ N)	Bank A/C (Y/N)	Social Security Pension[5]
Chandubhai Patel	72	M	N	Y	Std 7th	Y	Y	N
Umeshbhai C. Patel	46	M	N	Y	Std 11th	Y	Y	N
Nishaben U. Patel	42	F	N	Y	Std 9th	Y	Y	N
Jinal U. Patel	23	F	N	Y	Graduate	Y	Y	N

3. Children from 6 years and up to 18 years

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

4. Children below 6 years

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

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

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

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

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

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

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

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

6. Use of Mosquito Net

Children: ~~Yes~~ / No Adults: ~~Yes~~ / No

7. Do members take Regular Physical Exercise

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

8. Consumption of Tobacco

	Smoking	Chewing
Adults	-	-
Children	-	-

9. House & Homestead Data

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

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

Source of Water		Distance
Piped Water at Home	Yes / ~~No~~	-
Community Water Tap	Yes / No	-
Hand Pump (Public / Private)	~~Yes~~ / No	2.5 km
Open Well(Public / Private)	~~Yes~~ / No	2.5 km
Other (mention): Pond, lake		-

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	1425	2. Cultivable Area	856
3. Irrigated Area	856	4. Uncultivable Area	569

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
Sugarcane	-	1cy
Wheat	-	ky
Rice	-	1cy

17. Livestock Numbers

Cows: 170	Bullocks: 190	Calves: 60
Female Buffalo: 100	Male Buffalo: 85	Buffalo Calves: 5
Goats/ Sheep: -	Poultry/ Ducks: -	Pigs: -
Any other: Type -		No. -
Shelter for Livestock: Pucca / Kutcha / ~~None~~		
Average Daily Production of Milk(Litres): -		

18. What games do Children Play

Cricket, ~~Foot~~ball & other local games.

19. Do children play musical instrument (mention)

NO

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: Narthan

b. Block: Olpad

c. District: Surat

d. State: Gujarat

e. Lok Sabha Constituency: Surat

f. Number of Wards in the Gram Panchayat: 8

g. Number of Villages in the Gram Panchayat: 1

h. Names of Villages: Narthan

Demographic Information

Number of Households 288 Total Population 1237 Male 634 Female 603

SC HHs 40 ST HHs 132 OBC HHs 30 Other HHs 86

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	N	2 km
b.	Nearest Primary Health Centre (PHC)	N	2.5 km
c.	Nearest Community Health Centre (CHC)	N	2.5 km
d.	Nearest Post Office	Y	–
e.	Nearest Bank Branch (Any)	Y	–
f.	Nearest Bank with CBS Facility	N	12 km
g.	Nearest ATM	N	–
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	N	12 km
m	Nearest ITI / Polytechnic Centre	N	12 km
n	Kisan Seva Kendra	N	12 km

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
l	Library	N	4 km
m	Common Service Centre	N	2.5 km
n	Veterinary Care Centre	N	6 km

ii. Road Connectivity

a. Habitations connected by All-weather Roads *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations where not available: 1

iii. Drinking Water Facilities

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

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

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

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

iv. Coverage of Habitations under Waste Management System

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

If 3 mention the name of the habitations not covered: 25-1. covered

b. Coverage under Open Drains: 2 *(1-All 2-None 3-Some)*

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

c. Coverage under Doorstep Waste Collection: *(1-All 2-None 3-Some)* : 1

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)* : 1

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

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

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): 3

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

vii. Education, ICDS

a. Number of Anganwadi Centres: 2

c. Schools (Number)

Primary Private: 5 Primary Govt.: 1

Middle Private: 5 Middle Govt.: –

Secondary Private: 5 Secondary Govt.: –

Higher Secondary Private: 5 Higher Secondary Govt: –

2

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	4 km
p	Nearest Agro Service Centre	N	30 km
p	MSP based Government Procurement Centre	N	20 km
q	Milk Cooperative /Collection Centre	N	3 km
r	Veterinary Care Centre	N	11 km
s	Ayurveda Centre	N	20 km
t	E – Seva Kendra	Y	-
u	Bus Stop	Y	-
v	Railway Station	N	26 km
w	Library	N	8 km
x	Common Service Centre	Y	-

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total 3 Public 2 Private 1

b. Mini Stadium : 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 –

Names of such villages: Narthan

c. Schools (Number)

Primary Private: 5 Primary Govt.: 1

Middle Private: 5 Middle Govt.: –

Secondary Private: 5 Secondary Govt.: –

Higher Secondary Private: 5 Higher Secondary Govt: –

VI. Public Distribution System

	Item	Private Contractor	Women's SHG	Gram Panchayat	Cooperative	Other (Mention)	Location in GP (mention Location)	If outside GP, Location & distance from GP HQrs)
a.	Cereal (Rice/ Wheat/ Millets)	–	–	Yes	Yes	–	–	2.5 km Velvk
b.	Kerosene	–	–	Yes	Yes	–	–	2.5 km Velvk
c.	Other (mention)	–	–	Yes	Yes	–	–	2.5 km Velvk

2

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

VII. Coverage of Villages under different Facilities & Services

	Parameter	Villages Status[1]	Names of Villages Covered	Names of Villages not Covered
a.	Piped Water Supply Coverage to Villages	Covered ✓ / Not Covered	Narthan	–
b.	Hand Pump Coverage in Villages:	Covered / Not Covered ✓	–	–
c.	Coverage under Covered Drains:	Covered ✓ (25%) / Not Covered	Narthan	–
d.	Coverage under Open Drains:	Covered / Not Covered ✓	–	–
e.	Villages with Household Electricity Connection (Numbers)	Connected ✓ / Not Connected	Narthan	–

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	856	d.	Pasture / Grazing Land	–	g.	Check Dam	–
b.	Irrigated Land	856	e.	Forests/ Plantations	-	h.	Wells/Bore Wells	1
c.	Un-irrigated Land	–	f.	Other Common Land	–	i	Tanks /Ponds	2/1

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

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

IX. Parameters relating to Households & Institutions

		Number
a)	Number of eligible Households for pension (old age, widow, disability)	121
b)	Number of Households receiving pension (old age, widow, disability)	78
c)	Number of eligible Households who are not receiving pension	43
d)	Number of Households eligible for Ration Card	288
e)	Number of eligible HHs having ration cards	230
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	0
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	0
h)	Number of active Job Card holders under MGNREGA	0
i)	Number of Job Card holders who completed 100 days of work during 2013-14	0
j)	Number of shops selling alcohol	0
k)	Number of BPL families	140
l)	Number of landless households	10
m)	Number of IAY beneficiaries	0
n)	Number of FRA[2] beneficiaries	0
o)	Number of Community Sanitary Complexes	0
p)	Number of Households headed by single women	121
q)	Number of Households headed by physically handicapped persons	0
r)	Total number of Persons with Disability in the village	0
s)	Number of SHGs	0
t)	Number of active SHGs	0
u)	Number of SHG Federations	0
v)	Number of Youth Clubs	0
w)	Number of Bharat Nirman Volunteers	0

Name and Signature of Surveyor and Respondent'

P.B. Jariwala Pratik Jariwala Surveyor	PRI Respondent (Preferably Gram Panchayat Chairperson)	N.U.Bhly સરપંચ નરથાણ ગ્રામ પંચાયત Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey

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

4

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

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

I. Basic Information

a. Village: Narthan

b. Ward Number: -

c. Gram Panchayat: Narthan

d. Block: Olpad

e. District: Surat

f. State: Gujarat

g. Lok Sabha Constituency: Surat

h. Number of Habitations / Hamlets in the Gram Panchayat: 288

i. Names of Habitations / Hamlets:
Narthan village

Demographic Information

Number of Households 288 Total Population 1237 Male 634 Female 603

SC HHs 40 ST HHs 132 OBC HHs 30 Other HHs 86

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	Y	-
c.	Nearest Secondary School	Y	-
d.	Kisan Seva Kendra	N	4 km
e.	Milk Cooperative /Collection Centre	N	4 km
g.	Health Sub Centre	N	2.5 km
h.	Bank	Y	-
i.	ATM	N	6 km
j.	Bus Stop	Y	-
k.	Railway Station	N	26 km

[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

viii. Land Category		Area in Acres		Land Category	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	856	d.	Pasture / Grazing Land	–	g.	Check Dam	0
b.	Irrigated Land	856	e.	Forests/ Plnatations	–	h.	Wells/Bore Wells	1
c.	Un-irrigated Land	–	f.	Other Common Land	–	I	Tanks /Ponds	3

ix. Entitlement Related Parameters		
1	Number of active Job Card holders under MGNREGA	0
2	Number of active Job Card holders who have completed 100 days of work	0
3	Number of shops selling alcohol	0
4	Number of BPL families	140
5	Number of landless households	10
6	Number of IAY beneficiaries	0
7	Number of FRA beneficiaries	0
8	Number of common sanitation complexes	0
9	Number of SHGs	0
10	Number of active SHGs	0
11	Existence of SHG Federation in the Village (Yes / No)	NO
12	Number of Youth Clubs	0
13	Number of Bharat Nirman Volunteers	0

Name and Signature of Surveyor and Respondent'

Nikhil Solanki Solanki Surveyor	PRI Respondent (Preferably a ward member from a ward that is fully or partially covered under the Village)	N.V. Patel સરપંચ નરથાણ ગ્રામ પંચાયત તા. ઓલપાડ, જિ. સુરત. 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

Gmail

Pratik Jariwala <pratikjari44@gmail.com>

Development Scenario of Narthan Village

1 message

Pratik Jariwala <pratikjari44@gmail.com> Wed, Jun 23, 2021 at 11:41 PM
To: ddo-sur@gujarat.gov.in, tdoolpad@gmail.com, collector-sur@gujarat.gov.in, tdo-sur@gujarat.gov.in
Cc: rurban@gtu.edu.in

DPR NARTHAN .docx

DPR NARTHAN .pdf

Respected Sir / Madam

We are the students of C.K. Pithawala College of Engineering & Technology, Surat affiliated with Gujarat Technological University- GTU. GTU has been assigned to Vishwakarma Yojna-VY in which students survey the various villages and Design various amenities to deliver to making them ideal for living a better life as per requirements & village problem statements.

As a part of Vishwakarma Yojana guidelines, we have been asked to inform all the respected officers about our project in which we will shortly notify about Narthan Village's profile of issues for development and our final report is also attached herewith.

Best Regards,
Nikhil Solanki (Civil Engineering), Pratik Jariwala (Civil Engineering) &
Harsh Gohil (Electrical Engineering)
U.G., Civil and Electrical Engineering
C.K. Pithawala College of Engineering & Technology
Gujarat Technological University

CHAPTER 21: COMPREHENSIVE REPORT FOR THE ENTIRE VILLAGE

CONCEPT

Vishwakarma Yojana is provides special scheme for development of village by GTU and Government of Gujarat in which students work together and collect data and information regards village development with the help of gram panchayat and stake holders.

Village have some basic facilities likes drinking water, drainage system, pucca road, and other facilities like primary school, primary health center, community hall, library, public latrine block, are sufficient so that village can develop. So, we will give proposal regarding sustainable energy sources and solution related to infrastructure problems.

Efforts have been made in this project work to identify and plan some of the below facilities for sustainable development of village and to meet need of future population. Vishwakarma Yojana is one of the initiatives towards Rurbanisation that is village development by the government of Gujarat, which was allotted as a real time situation type project provides to GTU.

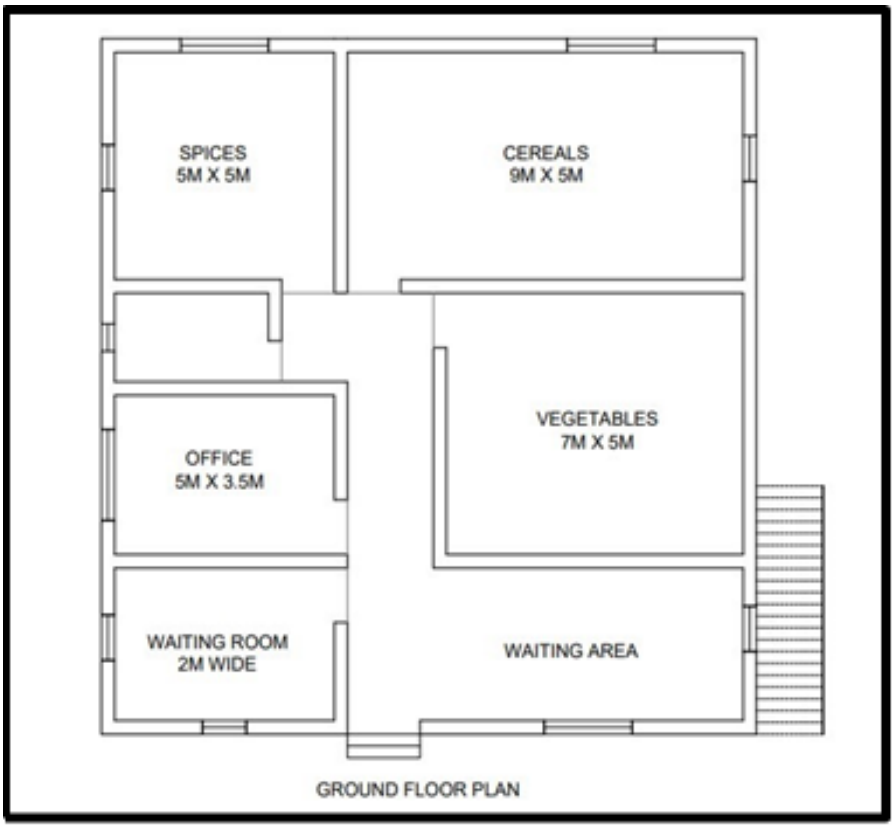
It is one of the strategies to reduce urban city pressure and lower the migration rate by developing village with a “rural soul” but with all urban amenities that a city may have. In this project the students meet the relevant citizens of village and survey the existing facilities.

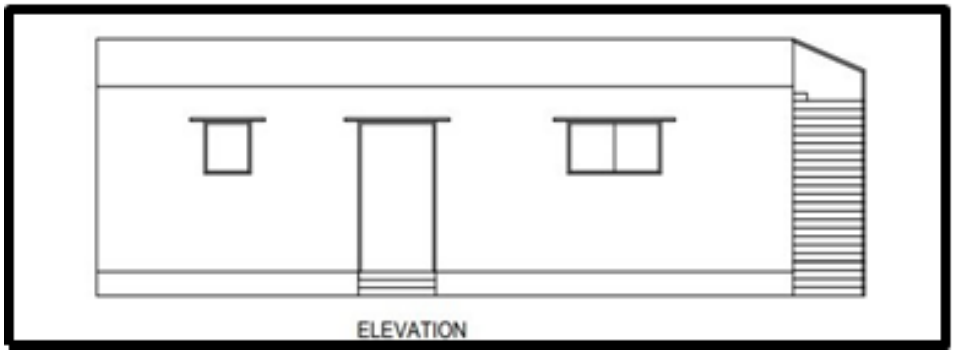
Then design of the sustainable infrastructure which is to be modified is carried out for the village. This includes implementation of engineering skills to prepare detailed project reports for village as a part of the final year project work.

By this project certain experiences recreates a real work and need of application of an individual technical knowledge on any existing problems. Based on survey we tried to give design of basic facilities to fulfill their needs.

By providing these basic facilities to village for reduce urban city pressure and decrease migration rate, which is ultimate aim of Vishwakarma Yojana.

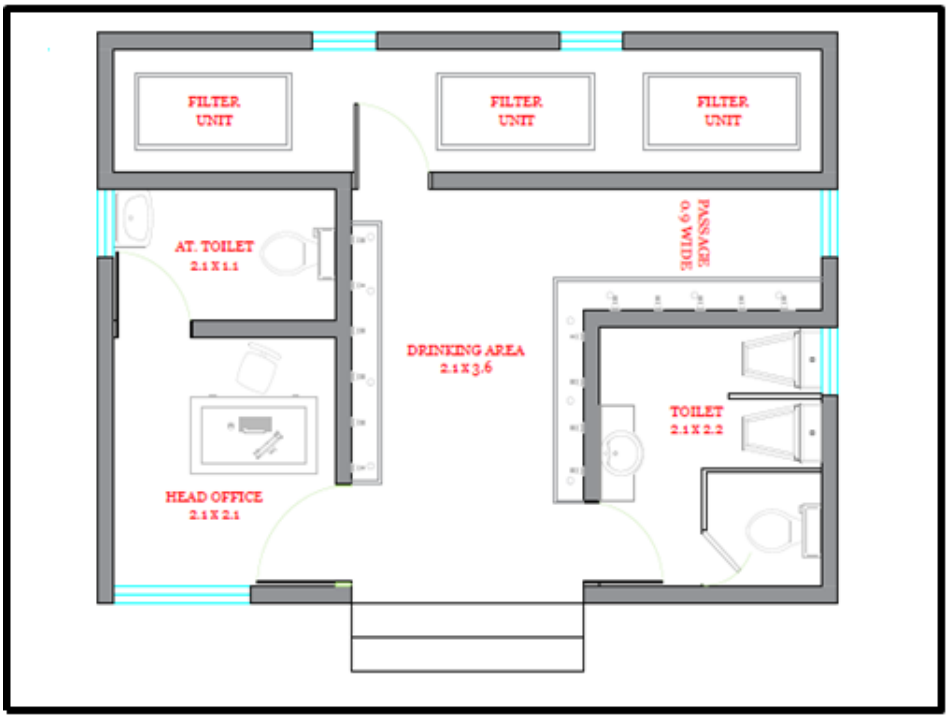
Narthan Village, Olpad, Surat

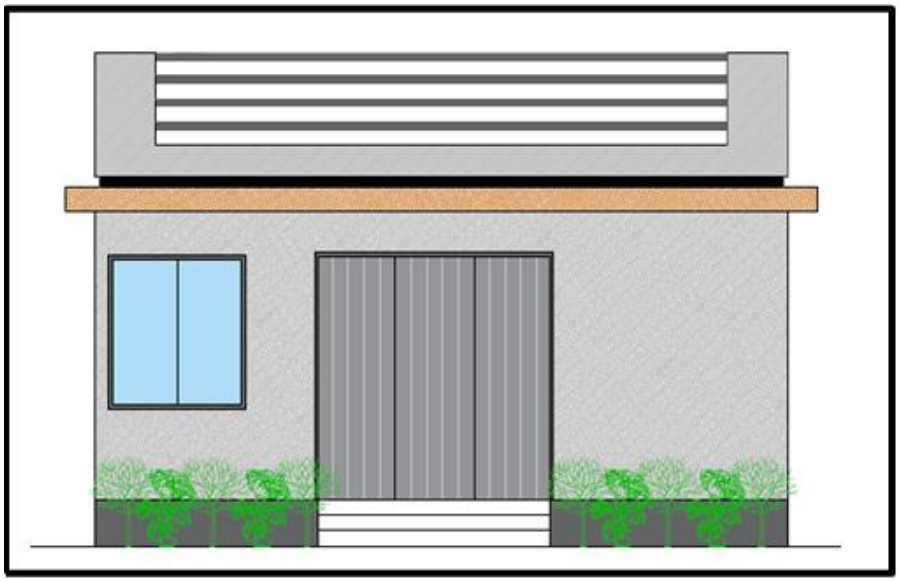




Design Infrastructure – Agro Storage Unit Village – Narthan Village, Surat

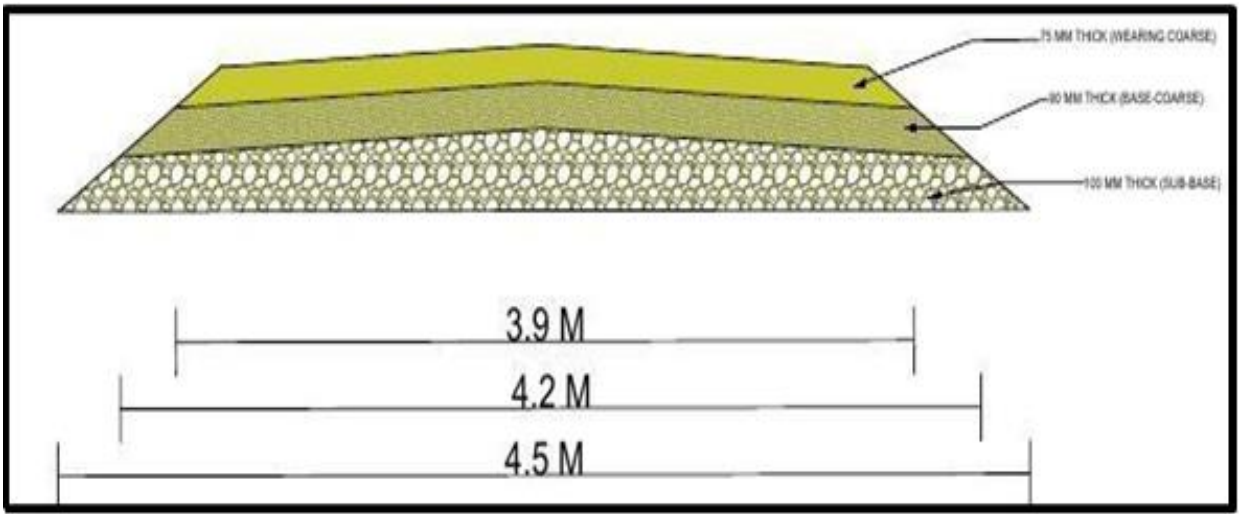
Narthan Village, Olpad, Surat

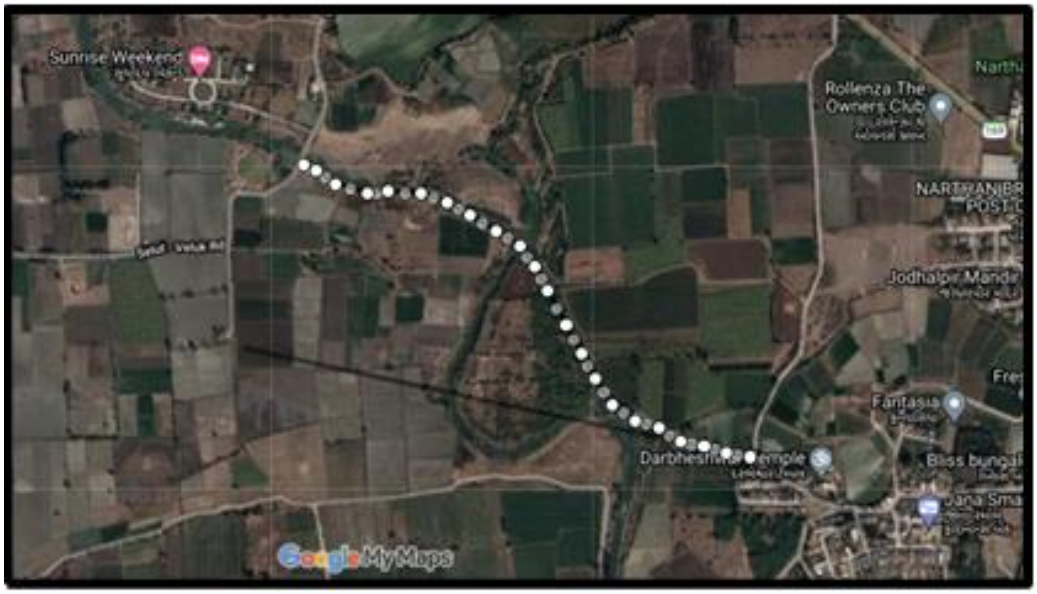




Design Infrastructure – Drinking Water Facility
Village – Narthan Village, Surat

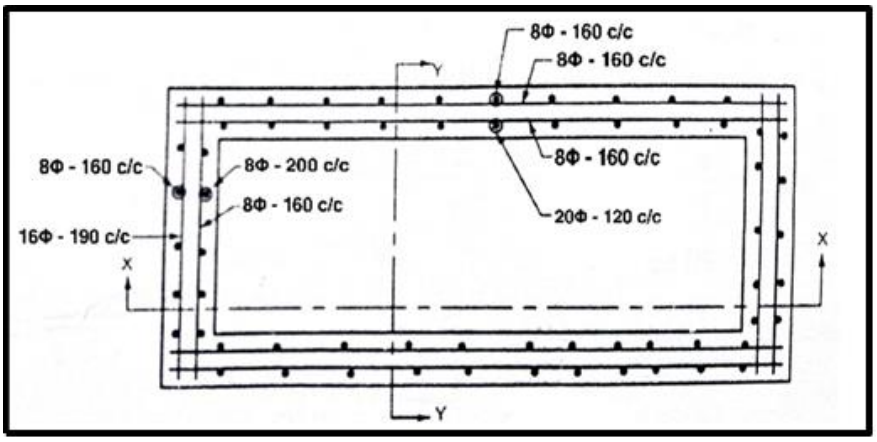
Narthan Village, Olpad, Surat

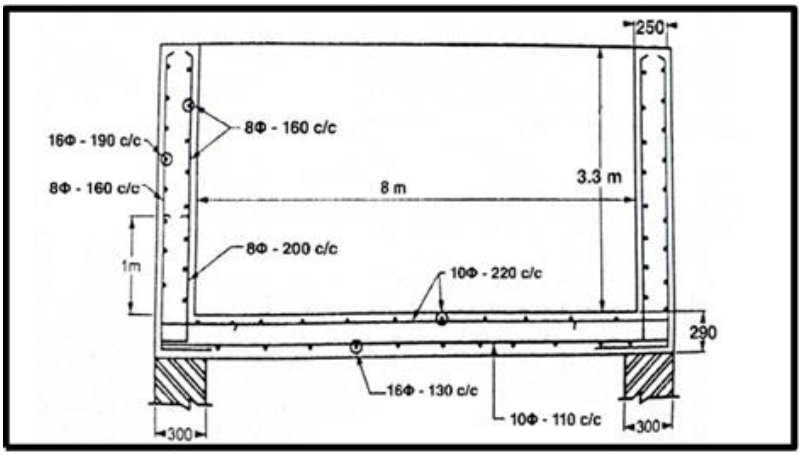


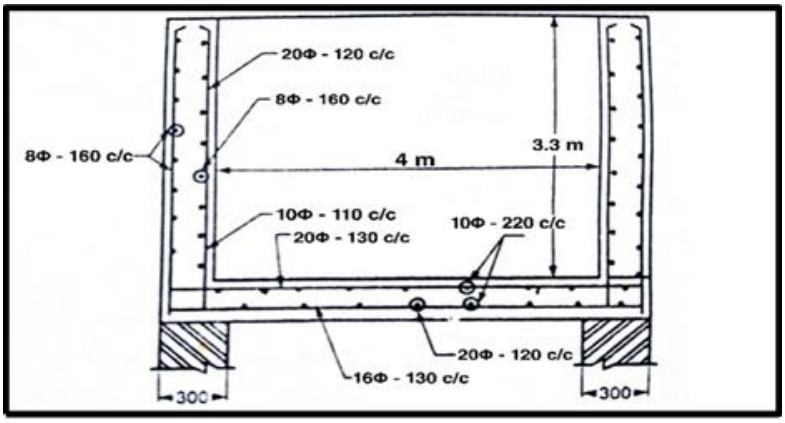


Design Infrastructure – WBM Road
Village – Narthan Village, Surat

Narthan Village, Olpad, Surat

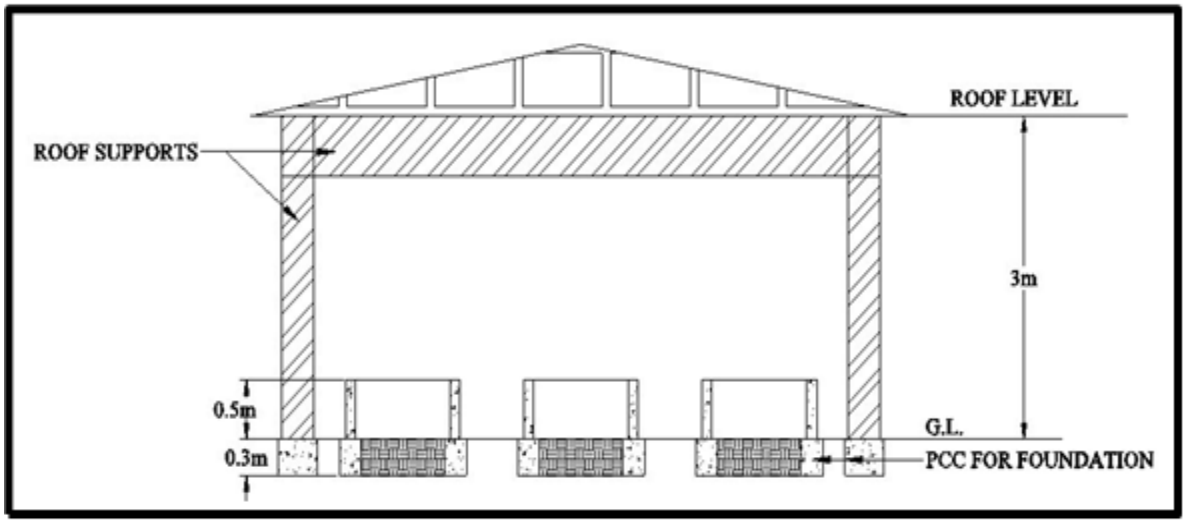






Design Infrastructure – Overhead Water Tank Village – Narthan Village, Surat

Narthan Village, Olpad, Surat



Design Infrastructure – Vermicomposting Unit Village – Narthan Village, Surat

Design Infrastructure – Maintenance of Bus Stand Village – Narthan Village, Surat

By providing this required facility to village, development and growth of village can be possible. So ultimately migration rate and urban city pressure can be reduced and livelihood of village dweller will increase

All the design which is given as above are very helpful for future development of village and village people for their enhancement and prosperity. I admire these students to do work related to civil engineering people and hope these works is help to improve and understand their skills and make it even batter. I am sure they got deep knowledge about development of village and various infrastructure facility design of village. Lastly, we all enjoyed the informational as well as practical journey of civil engineering work.

Nodal Officer

Dr. Boski Chauhan
Civil Engineering Department
C. K. Pithawala College of Engineering & Technology

Prof. Hetal Jivanramjiwala
Electrical Engineering Department
C. K. Pithawala College of Engineering & Technology