DETAIL PROJECT REPORT

VISHWAKARMA YOJNA: VIII
AN APPROACH TOWARDS RURBANISATION
Mota KhutavadaVillage,
Bhavnagar District

PREPARED BY

STUDENT NAME	BRANCH NAME	ENROLLMENT NO
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SHANTILAL SHAH ENGINEERING COLLEGE BHAVNAGAR

Nodal Officer

Prof. Mayur.K.Makwana

Asst. Prof. Civil Engineering Department

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 MOTA KHUTAVADA,

DISTRICT BHAVNAGAR

Under

Vishwakarma Yojana: Phase-VIII

in partial fulfillment of the project offered by

GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA

During the academic year 2020-21.

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

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Date of Report Submission:	
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VY-Nodal Officer Name and Signature:	**Prof. Mayur K. Makwana**
Internal(Evaluator) Guide Name and Signature:	**Prof. D P. Advani (Civil)** **Prof. A M. Upadhiyay (Electrical)**
College Name:	**Shantilal Shah Engineering college**
College Stamp:	

ABSTRACT

Vishwakarma Yojana would provide "Design to Delivery" solution for development of villages in 'Rurban' areas. The developmental work in villages that could undertake as per the need of the village in particular includes Physical infrastructure facilities (Water, Drainage, Road, Electricity, Solid waste Management, Storm Water Network, and Telecommunication & Other), Social infrastructure facilities (Education, Health, Community Hall, Library, Recreation Facilities & other) and renewable energy (Rain water harvesting, Biogas plant, Solar Street lights & Other) for Sustainable development.

The village name Mota Khutavada is situated near Mahuva town, it has approximate 10,334 population as per census 2011. It has one primary school, one secondary school and 9 anganwadi. The village has all types of house like kutcha house and pakka house.

Existing condition of village:
(1) There is no bus Stop.
(2) There is no overhead water tank facility available.
(3) The school building is in very poor condition.
(4) There are no solar roof tops.
(5) There are no solar street lights.

About our proposed designs and our view for village development:
(1) We have planned to do new design of bus Stop.
(2) Design of overhead water tank
(3) We give suggestion to peoples for solar roof tops.
(4) We make smart gram panchayat building with solar roof top system.
(5) We try to convince peoples for replace Simple Street light to solar street light.
(6) And last we requested to people for do not theft the electricity because theft of electricity is crime.

In future the village will have good education, better infrastructure, proper sanitation facilities, health facilities, waste management, renewable energy, environment protection, clean drinking water, resource use efficiency etc.

Key Words:
(1) Reurbanisation (2) Renewable energy option (3) Rural electrification (4) Rural Survey

ACKNOWLEDGEMENT

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

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

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

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

We express our sincere thanks to **DDO, TDO, Sarpanch, Talati and staff members of Ahmadabad** District for providing us with requisite data whenever we approached them. Especially our thanks are to all villagers and stake holders for their support during Survey.

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

An act of gratitude is expressed to our Nodal Officer,**Prof. Mayur K Makwana** and Internal guide **Prof.D.P. Advani & Prof.A.M Upadhyay** from college **Shantilal Shah Engineering college** for their invaluable guidance, constant inspiration and active involvement in our project work.

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

We are also thankful to **Ms. Darshana Chauhan, Vishwakarmrma Yojana**, for all support during our work. We therefore, take this opportunity for this Project work expressing our deep gratitude and sincere thanks for her cooperation to produce this project work in the present form.

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

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ABBREVIATIONS

SHORT NAME / SYMBOL	FULL NAME
ULB	Urban Local Bodies
CHC	Community health centre
PHC	Primary health centre
LED	Light Emitting diode
L.W	Long Wall
S.W	Short Wall
WIFI	Wireless fidelity
CCTVs	Close-Circuit Television
CDP	Community development programs
NES	National extension services
UNDP	United nations development program
ATM	Automatic teller machine
RO SYSTEM	Reverse osmosis
SWOT	Strengths, Weaknesses, Opportunities and Threats
NSSO	National sample survey organization
GDP	Gross domestic product
ICT	Information and communication Technology
MOOC	Massive Online Open courses
IFFCO	Indian farmer fertilizer corporative limited
CNG	Compressed natural gas
UDA	Urban development authority
ARWSP	Accelerated rural water supply program
MSBT	Multistage biological treatment plant
VR	Virtual Facility
NH	National Highway
SH	State highway
ESD	Electrostatic Discharge
RCC	Reinforced cement concrete

CHAPTER: 1

Ideal Village visit from district of Gujarat State

1.1 Background & Study Area Location:

- Budhel is a large village located in Bhavnagar Taluka of Bhavnagar district, Gujarat with total 1355 families residing. The Budhel village has population of 7760 of which 3974 are males while 3786 are females as per Population Census 2011.
- In Budhel village population of children with age 0-6 is 1024 which makes up 13.20 % of total population of village. Average Sex Ratio of Budhel village is 953 which is higher than Gujarat state average of 919. Child Sex Ratio for the Budhel as per census is 793, lower than Gujarat average of 890.
- Budhel village has lower literacy rate compared to Gujarat. In 2011, literacy rate of Budhel village was 75.89 % compared to 78.03 % of Gujarat. In Budhel Male literacy stands at 83.98 % while female literacy rate was 67.63 %.
- As per constitution of India and panchayati raaj Act, budhel village is administrated by Sarpanch (head of village) who is elected representative of village.

Place	**Budhel**
PIN Code	364002
District	Bhavnagar
Tehsil	Bhavnagar
Latitude	21.6951812
Longitude	72.156911

(Table 1 Location of ideal Village)

(Fig. 1 Satellite view of ideal village)

(Fig. 2 Grampanchayat of Budhel)

(Fig. 3 School building of Budhel)

(Fig. 4 house condition 1)

(Fig. 5 house condition 2)

1.2 Concept : Ideal Village

Concept of an Ideal Village is a community village with a Self Sustaining income producing projects, Independent electrification system generated from non-fuel based devices, clean water facilities for drinking and irrigation purpose, affordable quality housings, Schools, Medical facilities for human beings and animals both, proper sanitation System, Information Centre, bank, police station, retail outlet for household and agriculture needs, phone facility and connecting roads to nearby villages and towns.

1.2.1 Objectives:

- To provide all the basic facilities to the people to make their life easy and comfortable.
- To provide technical solution of their problem so that they do not need to migrate to urban areas.
- Creation of infrastructure – connectivity, civic and social infrastructure along with the provision of the alternative livelihood generation is the key pillars.
- Reduce migration from rural areas to urban areas due to lack of basic facilities and other Services which are available in rural areas.

- Promote integrated development to the rural areas with the provision of good quality of housing conditions, better quality of water, proper and good connectivity to roads etc.

1.2.2 Live case studies of Ideal village of India/Gujarat:

- **Top 10 ideal villages of India:-**

1. Mawlynnong - Asia's cleanest village
2. Punsari - The village with Wi-Fi, cctvs, ac classrooms
3. Hiware bazar - The village of 60 millionaires
4. Dharnai - First fully solar-powered village
5. Chappar - A village that distributes sweets when a girl is born
6. Kokrebellur - A village that really loves its birds
7. Ballia - The village that beat arsenic poisoning with an indigenous method
8. Pothanikkad - The village with a 100% literacy rate
9. Bekkinakeri - The village that rid itself of open defecation by 'greeting' lota-bearers
10. Shanishingnapur – A village so safe that people don't need doors.

- **Top ideal villages of Gujarat:-**

1. Punsari (Anand)
2. Aena (Surat)
3. Moviya (Rajkot)
4. ThamnaPunsari (Sabarkatha)
5. Dharmaj (Anand)
6. Baben (Surat)
7. Laxmanpura (Banaskantha)
8. Anandpura (Mehsana)

✓ **Punsari Village Gujarat:**

- Located in Gujarat‘s sabarkantha district, Punsari village has emerge as a model village with modern urban amenities such as 24x7 power
- Supply, wifi connectivity, cctv cameras to ensure security, and
- Pucca roads connecting the village with other villages and towns
- Other important features of the village include:
- A reverse osmosis plant which supplies 20 litres of water to each household at Rs.4.
- Use of solar power for agricultural purposes
- Accidental insurance cover to one member of every household
- Air-conditioned primary schools with no dropouts
- Bus facility for all households
- Focus on behavioral change through campaigns and awareness drives. For this purpose, 120 loudspeakers have been installed in different parts of the village.

- Punsari was awarded with the best gram panchayat award from the centre and the state in 2011.

(Fig.6 punsari village)

✓ **Hiware-Bazaar, Maharashtra:**

- This is a village located in the rain shadow region of the sahyadri mountain Range in Maharashtra's Ahmednagar district. Till the 1980s, farming in the village was largely rainfed, and farmers were forced to migrate seasonally to surrounding areas for work.
- From the 1990s onwards, things began to change. The village panchayat adopted a holistic focus on a variety of activities, with community groups responsible for various aspects of the village economy and social development.
- Women thrift groups, milk dairy society and youth clubs are examples of such community based organizations.
- The village panchayat also focused on family planning and reforestation, for which awareness program and drives have frequently been organized in the village.
- The village gram sabha also launched a watershed development program, and an annual water audits being conducted in the village since 2004 for more efficient and equitable management of water resources. It has also contributed to greater agricultural productivity.

1.2.3 The idea of a smart village:

The idea of model village aims to achieve the following:

i. Adopt people's participation as an end in itself – ensuring the involvement of all sections of society in all aspects related to the life of a village, especially in decision-making related to governance
ii. Adhere to Antyodaya (development unto the last) – enabling the "poorest and the weakest person" in the village to achieve well-being
iii. Affirm gender equality and ensuring respect for women
iv. Guarantee social justice
v. Instill dignity of labour and the spirit of community service and voluntarism
vi. Promote a culture of cleanliness

vii. Live in consonance with nature – ensuring a balance between development and ecology
viii. Preserve and promote local cultural heritage
ix. Inculcate mutual cooperation, self-help, and self-reliance
x. Foster peace and harmony in the village community
xi. Bring about transparency, accountability, and probity in public life, Nurture local self-governance

1.2.4 Ancient history of Civil/Electrical Concept about Indian villages and its development:

Following the Gandhian vision and dream of Gram Swaraj (village level self-governance) (Bardhan, 2007), rural development has always been given critical salience in the planning process of independent India. It began with launching of the Community Development Programmes (hereafter CDP) in 1952 followed by the National Extension Services (hereafter NES) in 1953. These two programmes had ambitious objectives and envisioned community participation but failed miserably due to their topdown development paradigm (see the works of Sreedhar & Rajasekhar, 2014; Patel, 2014; UNDP, 2000). Later, successive Five-Year Plans led to the creation of essential physical and institutional infrastructure to bring about socio-economic changes in rural areas (Patel, 2014). The Fifth Five-Year Plan proposed different approaches to rural development such as Area Development, Target Group Approach, and comprehensive development approach.3 Schemes involving special financial and fiscal concessions, bank loans on soft terms, and capital subsidies were also introduced into underdeveloped areas to attract increased investments for development. (Patel, 2014).

1.3 Detailed Study of smart village

- **Infrastructure Development:**

The most important concern in rural development is to provide basic amenities to each person living in the rural area. Punsari stands out in this regard as it has constructed a reverse osmosis plant and since then provided house-to-house piped connections to supply chlorinated water. It also has its own 66 KV substation for electricity generation and 100 per cent coverage of all streets with LED streetlights. A public address system with 120 waterproof speakers for announcing information and spreading messages has been another striking feature of this village. The village headperson uses this public announcement system to share what s/he thinks, plans, and is doing at the gram Panchayat. The entire village has been put under CC TV surveillance, which has helped to bring down crime rate to almost zero per cent. Each household has a personalized lavatory and the whole village has a well-designed drainage and storm water disposal system. Atal Express is a free bus service available for commutation to all the villagers. Punsari is the first fully Wi-Fi-covered village

in India. There are also plans to do GIS mapping for the better implementation of many government schemes. Some of the popular national banks and their ATM centers are now available as well.


(Fig.7 Infrastructure of village)

- **Education:**

Education for all and free for all is the mantra this village has aspired to adopt. Punsari has five primary schools and four secondary schools. The class rooms in these schools are fully equipped with CCTV cameras, LED screens used for teaching, mineral water plants, separate toilets for girls and boys, computer labs, and well-stocked libraries. MidMeals programs of the central government have been successfully implemented. Availability of these basic amenities within the premises of schools has also helped to reduce the dropout rate to zero.


(Fig.8 Anaganwadi) *(Fig.9 School Building)*

- **Health, Sanitation & Women Empowerment:**

Punsari has a 24/7 primary health centre equipped with a pharmacy and a library. It also has a 24/7 maternity ward to encourage institutional deliveries in the village. In fact, the village has been successful in achieving the goal of 100% institutional deliveries. It has also been able to materialize the objective of 100% immunization and zero per cent infant and maternal mortality rate. The waste collection system offers door-to-door collection service. The street polluters are heavily fined. There are 109 women self-help groups in the village, which has helped and changed the lives of more than 1200 women involved in them. They provide vocational training in order to make women self-reliant.

(Fig.10 Dispensary)

(Fig. 11 Door to door Waste collection system)

- **Democratic Governance:**

A team of 22 full-time and 47 part-time employees along with the elected officials of the gram Panchayat under the leadership of village headperson run this local unit. The village has developed an effective mechanism to redress grievances through a toll-free number. A complaint register is maintained in order to ensure timely grievance redress. A co-ordination committee involving elected representatives and government officials works tirelessly to achieve the goals of good governance.

1.4 SWOT analysis of Ideal Village / Smart village

STRENGTHS	WEAKNESS
• **Proper drainage facilities** • **Transportation facilities** • **Sanitation facilities** • **RO system** • **Cleanness of village**	• **Job insecurity** • **Less sustainable ecofriendly environment in terms of capacity to green development in future**

Opportunities	Threats
• **Involvement of government initiated health program.** • **WIFI spots development.** • **Developed green Infrastructures – Tech., Solar Panels, Waste Recycle**	• Very less sustainability to environment in future. ▪ Poor waste management can lead to increase in disease in the village.

(Table. 2 SWOT Analysis)

1.5 Future prospects of development of the Village / Smart village

In future they think to do installation of solar, biogas or any other renewable energy sources as per availability of sources in village and more suitable source for the particular area. If any other problems were occurs in future then try to solve that problem also.

- Solar Street light, Bio Gas Plant, Waste water treatment plant, Blood Bank, Water Meter

1.6 Benefits of smart village

1. Locally produced and locally consumed energy:

In villages if the mountains, hilly area are present then use of solar energy & wind energy then energy is produce in that village itself & use for development of village.

2. Creation of job:

Generally village people migrate from village to city for purpose of job. If village becomes smart so all the job requirements are fulfills & People not migrate from one place to another.

3. Contribution to global environment:

The system can reduce reliance on fossil fuels &contribute to reduction Of green house gases such as carbon dioxide .Energy consumption Optimization 25-30% average energy saving.

4. For farmer e-learning etc. facility that will be able to ask there Quarries online.

5. New technologies in education, e-learning, desktop publishing, horoscope generation of interested person of the village. Transportation of village into comfortable & safe pace that enhance quality

1.7 Electrical / Civil aspects required in smart village:

- **Electrical aspects:**

Street lights, Underground wiring, Solar Street lights, Solar roofs, Renewable Energy Source, Battery backup off grid Solar system

- **Civil aspects:**

Dams, Paved roads, Water supply for irrigation, Waste water treatment plant, Bio-gas plant, Community hall, Public toilet, Water tank, Bus station

CHAPTER: 2

Literature Review

2.1 Introduction: Urban & Rural village concepts:

Rural population of Gujarat as per census 2011 India has been decreased to 57.4% from 62.6% as per census year 2001 which indicates migration as one of the main reason for increase in urban population. Any area is considered as developed area which fulfills all the basic amenities that an individual expects from government. Keeping this in mind government of India under the keen guidance of former Chief Minister and present Prime Minister Mr. Narendra Modi has introduced a new concept for physical, social and socio cultural development of rural which was named as rurbanization. This project study is an initiative to draw the village towards the rurbanization. The Indian government has launched the idea of developing smart cities and before developing the cities a list of 20 top most cities is also announced. An rurban mission program is also passed by Mr. Shyam Prasad Mukherji in the cabinet. Under this program, there is a vision of converting 300 villages into smart villages. Smart describes the means of science and technology. Developing 300 villages to smart villages out of 7 lakh villages may or may not be proved to be beneficial. The smart cities and villages may be equipped with latest technology but, what villages actually need is pure drinking water, clean public toilets and better roads to travel. The present scenario of villages shows broken electricity wires, degraded public toilets and overhead tanks, unhygienic atmosphere, entries of villages filled with lots of rubbish and also the educational facilities of villages have not shown any progress. The same is with the public health centers (PHC).Some villages don't have PHC while the villages having PHC don't have sufficient doctors. It is shameful that due to lack of public toilets in villages, ladies have to hide out in farms for toilets. Villages need to be smart, but before technology public toilets should be priority. All over India in many village concept of aanganwadi is introduced; even there the low wages of workers are a major complaint. The midday meal for the children is not supplied on time

2.2 Importance of rural development:

In India, majority of the population resides in rural communities. The development of all aspects within rural communities is vital for the effective development of the country. These include, education, employment opportunities, infrastructure, housing, civic amenities and the environmental conditions. Furthermore, rural individuals need to be aware of all modern and innovative methods and techniques that are vital to augment productivity. Within the

country, the rural communities are still in an underdeveloped state. The individuals are residing in the conditions of poverty, they are illiterate and unemployed. Due to these factors, they are unable to sustain their living conditions in an appropriate manner. It is essential to formulate programs, schemes and measures that have the main objective of bringing about improvements in rural communities. The main areas that have been taken into account in this research paper include, concept of rural development, approaches to rural development, problems experienced by rural individuals, programs initiated by the Government for rural development.

2.3 Different definitions of: Rural & Urban villages

- **RURAL AREA:**

Rural areas are also known as 'Countryside' or a 'village' in India. It has a very low density of population. In rural area people practice agriculture for their livelihood. Town with a maximum population of 15,000 is considered rural in nature.

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

- An area with a population density of up to 400 per square kilometer,
- Villages with clear surveyed boundaries but no municipal board,
- A minimum of 75% of male working population involved in agriculture and allied activities.
- It is generally said that the rural areas house up to 70% of India's population. Rural India contributes a big chunk to India's GDP by way of agriculture, self-employment, services, construction etc.

(Fig. 12 Rural Area)

- **URBAN AREA:**

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

1. All places with a municipality, corporation, cantonment board or notified town area committee, etc.

(Fig. 13 Urban Area)

2. All other places which satisfy the following criteria:
   - ✓ A minimum population of 5,000,

- ✓ At least 75% of the male main working population engaged in nonagricultural pursuits; and
- ✓ A density of population of at least 400 persons per sq. km.

- **RURBANISATION:**

Reurbanisation generally refers to the process of improving the quality of life and economic well-being of people living in relatively isolated and less populated areas. Rural development has traditionally centered on the exploitation of land-intensive natural resources such as agriculture and forestry.

- **URBANIZATION:**

Urbanization is the process by which rural community together forms cities, or urban centers, and, by extension, the growth and expansion of those cities. Urbanization began in ancient Mesopotamia in the Uric Period as, it is speculated, a particularly prosperous and efficient village attracted the attention of other, less prosperous, tribes who then attached themselves to the successful settlement. This process, then, gave rise to the densely populated centers which came to be known as 'cities'.

2.4 Scenario: Rural/urban village of Indian population growth:

Nearly 70% of the country's population lives in rural areas where, for the first time since Independence, the overall growth rate of population has sharply declined, according to the latest Census. The 121 crore Indians, 83.3 crore live in rural areas while 37.7 crore stay in urban areas, said the Census of India's 2011 Provisional Population Totals of Rural-Urban Distribution in the country.

For the first time since Independence, the absolute increase in population is more in urban areas than in rural areas. The rural–urban distribution is 68.84% and 31.16% respectively. The level of urbanization increased from 27.81% in the 2001 Census to 31.16% in the 2011 Census, while the proportion of rural population declined from 72.19% to 68.84%.

The slowing down of the overall growth rate of population is due to the sharp decline in the growth rate in rural areas, while the growth rate in urban areas remains almost the same. However, according to the report, the number of births in rural areas has increased by 9 crore in the last decade. The statistics reveal that while the maximum number of people living in rural areas in a particular state is 15.5 crore in Uttar Pradesh, Mumbai tops the list having the maximum number of people in urban areas at five crore. The data also reflects that 18.62% of the country's rural population lives in Uttar Pradesh and 13.48% urban population lives in Maharashtra.

2.5 Scenario: Rural/urban village of Gujarat as per census 2011:

As per details from Census 2011, Gujarat has population of 6.04 Crores, an increase from figure of 5.07 Crore in 2001 census. Total population of Gujarat as per 2011 census is

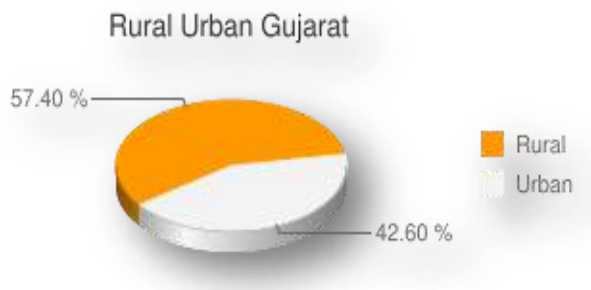
60,439,692 of which male and female are 31,491,260 and 28,948,432 respectively. In 2001, total population was 50,671,017 in which males were 26,385,577 while females were 24,285,440. The total population growth in this decade was 19.28 percent while in previous decade it was 22.48 percent. The population of Gujarat forms 4.99 percent of India in 2011. In 2001, the figure was 4.93percent.

Recently as per Gujarat census data, 83.92% houses are owned while 13.54% were rented. In all, 65.95% couples in Gujarat lived in single family. In 2011, 57.87% of Uttar Pradesh population had access to Banking and Non-Banking Finance Corporation. Only 3.13% of Uttar Pradesh population had internet facility which is likely to improve in 2021 due to Jio. 6.10% of family in Uttar Pradesh owned car while 34.14% owned two wheeler.

Description	2001	2011
Approximate Population	5.07 Crores	6.04 Crores
Actual Population	50,671,017	60,439,692
Male	26,385,577	31,491,260
Female	24,285,440	28,948,432
Population Growth	22.48%	19.28%
Percentage of total Population	4.93%	4.99%
Sex Ratio	920	919
Child Sex Ratio	883	890

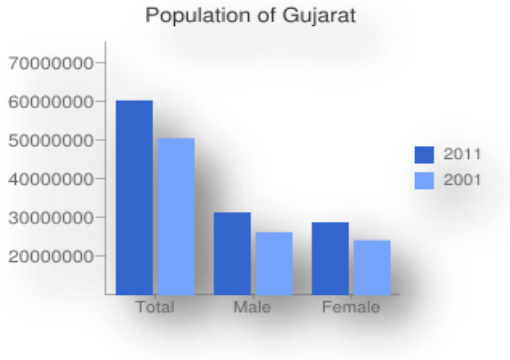
(Table 3 Population Data of Gujarat)

Rural/Urban Divide:



(Fig. 14 Rural/Urban Ratio of Gujarat)

Population bar Chart:



(Fig. 15 Bar chart of population of Gujarat)

As per Estimation, population of Gujarat in 2020 is 7.04 Crore

2.6 Rural Development Issues – Measures

- **Issues:**

1. Inability to develop a shared vision of development over a longer period
2. Disconnection between development inputs delivered and the genuine needs of the community
3. Lack of participation of all sections of society, especially the marginalized and the aged
4. Focus on infrastructure and expenditure ignoring the social aspects and sustainable outcomes
5. Reliance primarily on government grants and not emphasizing community contributions and self-help
6. Absence of organic convergence of different schemes
7. Unfair decisions regarding the allocation of benefits to locations and households leading to alienation
8. Political partisanship – perceived and real
9. Disregard for socio-cultural values of different sections of the community
10. Existence of multiple power structures and absence of a reconciling mechanism
11. Ignoring environmental concerns for immediate gains
12. Prevalence of social evils like drinking, dowry, casteism, communalism and discrimination against women

- **Measures:**

1. Welfare of the rural masses.
2. Increase in rural employment.
3. Minimum wages to landless labourers.
4. Uplift of the SC and ST people.
5. Growth of housing facilities.
6. New programs of family planning.
7. Extension of primary health facilities
8. Making primary education more effective.
9. Welfare of women and children.
10. Some other programs—drinking water facilities, public distribution system, increasing power production, etc.

2.7 Various Infrastructure guidelines with the norms for villages for the provisions of different infrastructure facilities:

There are the some government norms which are given in the following table.

Facilities	Planning Commission/UDPFI Norms	Required as per Norms
Education		
Aganwadi	Each Village	1
Primary School	Each Village	1
Secondary School	Per 7,500 Population	2
Higher Secondary School	Per 15,000 Population	0
College	Per 125,000 Population	0
Tech. Training Institute	Per 100,000 Population	0
Agriculture Research Centre	Per 100,000 Population	0
Medical Facility		
Gov./Panchyat Dispensary or Sub PHC or Health Centre	Each Village	1
PHC & CHC	Per 20,000 Population	0
Child Welfare and Maternity Home	Per 10,000 Population	1
Hospital	Per 100,000 Population	0
Transportation		
Internal Road Approach Road	Each village must have good quality roads.	
Bus/Auto Stand Provision	All Villages connected by PT (ST Bus or Auto)	1
Drinking Water		
Water Facilities		
Over Head Tank	1/3 of Total Demand	1.6 lac cap
U/G Sump	2/3 of Total Demand	3.2 lac cap
Public Latrines	Each Village	60
Cremation Ground	Per 20,000 Population	1
Post Office	Per 10,000 Population	1
Gram Panchayat Building	Each individual/group panchayat	1
APMC	Per 100,000 Population	0
Fire Station	Per 100,000 Population	0
Police Station	Per 15,000 Population	0
Community Hall	Per 10,000 Population	1

(Table 4 UDPFI Norms)

2.8 Ancient / Existing electrical concept study as a literature Review for village development:

- No one uses renewable energy sources. Try to convince and tell about the benefits of the solar system.
- In the village electricity comes 24 x 7.
- There is no CCTV camera, now a day's CCTV cameras are in need of development.
- Wi-Fi connectivity not available. So one internet connection must be available for rural development.

2.9 Schemes of Gujarat / Indian Government

1. Dr.Ambedkar Safai Kamdar Awaas Yojana

State Government has implemented the special scheme of Dr. Ambedkar Safai Kamdar Awaas Yojana for housing to safai kamdars and their dependents. Under the scheme, there is the provision of ₹ 43,500 subsidy and ₹ 60,000 (Urban Area) and ₹ 30,000 (Rural Area) interest-free loan for construction of house per beneficiary, who are employees of local bodies.

2. MGNREGA (mahatma gandhi national rural employment guarantee)

Mgnrega launched on 2nd february 2006 as a momentous initiative towards pro- poor growth. For the first time, rural communities have been given not just development program but also a regime of rights. The national rural employment guarantee act, 2005 (nrega) guarantees 100 days of employment in a financial year to.

3. E-GRAM

The present Gujarat government has resolved to make the rural citizens "World Citizens". That is the reason for the modernization of the villages and help the rural folk enter the digital age by implementing the E-Gram plan.

The Government has resolved to provide E-services at the Gram Panchayat which are at par with those provided in urban areas. Hence the E-Gram service is supposed to be the key part of the village Panchayat office. Moreover, the rural people will be able to avail accurate information quickly through the computer placed at the Gram Panchayat office.

13685 Gram panchayat have been equipped with computer hardware and software. Aim is Yojana is to make available to the village Panchayat details stored on the Taluka or District level server, regarding the 7/12 and 8/a papers which the village has to provide to the farmers.

CHAPTER: 3

Smart (village/city) concept idea and its Visit

3.1 Introduction: Concept & Definitions

- **Concept:**

The basic concept of smart village is to collect community efforts and strength of people from various streams and integrate it with information technology to provide benefits to the rural community. According to Mahatma Gandhi's philosophy and thoughts smart village project provides, "Global means to the local needs."

The concept of smart village is defined as below,

S	Social, skilled and simple	Zero tolerance for caste and creed and no discrimination on gender and religion. Skilled simple living and high thinking.
M	Moral, methodical and modern.	Moral values of Mahatma Gandhi and Swami Vivekananda using modern (latest) methods.
A	Aware, adaptive and adjusting.	Awareness about global, social and economic issues adaptive and adjusting the fast changing environment.
R	Responsive and ready	Ready to generate all resources for self-sufficiency and self-governance. Responsive for co-operative movements and collective wisdom.
T	Techno savvy and transparent	Techno savvy for IT and transparent mobile usage harmonic relations.

(Table 5 Smart Village Concept)

- **Definitions**

1) Smart City:

It is an innovation of sustainable planning approach at the city level that promotes knowledge-based development through the continuous learning of human resources as an integrative part of urban resource development, especially in encouraging urban built up area as a part of urban spatial system in the context of national development planning system. This leads to the effective and efficient development of economic sectors, especially tertiary and quarter sectors supported by appropriate technology to high

technology as a result of continuous learning which could induce primary and secondary sectors development of its surrounding area.

2) Smart region:

It is an innovation of sustainable planning approach at the regional level that promotes knowledge-based development through the continuous learning of human resources as an integrative part of regional resource development, especially in encouraging harmonization between conservation and developable areas in the context of national development planning system. This leads to the effective and efficient regional development of economic sectors supported by appropriate technology to high technology as a result of continuous learning.

3) Smart village:

It is an innovation of sustainable planning approach at the village level that promotes knowledge-based development through the continuous learning of human resources as an integrative part of village resource development, especially in encouraging rural areas development as a part of regional system in the context of national development planning system. This leads to the effective and efficient development of economic sectors, especially primary and secondary sectors supported by appropriate technology to high technology as a result of continuous learning which could facilitate sustainable rural urban linkages

4) Techno polis:

It is an innovation of sustainable planning approach at the part of city or regional site that promotes knowledge-based development through the continuous learning of human resources as an integrative part of urban or regional resource development, especially in encouraging technology readiness level from basic idea to full commercial application/product of urban and regional system in the context of national development planning system. This leads to the effective and efficient development of economic sectors, especially tertiary and quarter sectors supported by appropriate technology to high technology as a result of continuous learning which could facilitate sustainable linkages among verities economic sectors of particular areas, for instance: urban area, rural area, coastal area or small island, inland area, etc.

3.2 Vision - goals and performance Measurement indicators

- **Goals of Smart village:**

Smart security, efficient public transportation system, improving sanitation conditions, Solid and liquid waste management, Rain harvesting /Rain water drainage system, Safe drinking water facilities, Use of renewable energy, Energy conservation, Grievance redresser, Strengthening CBOs, Functional bank account, Facilities regarding to the agriculture, Latest& affordable medical facilities, E-governance, Use of modern

technologies for improvement of locality, Improvement on women empowerment, Educational facilities.

- **Performance Measurement indicators:**

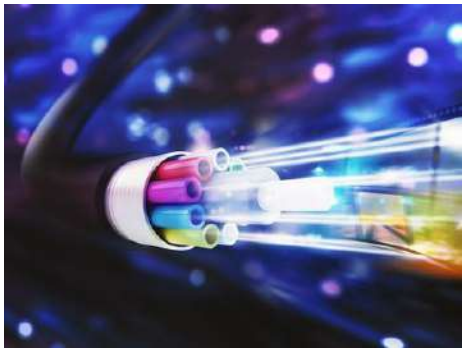
No	Dimensions	Aspects	Indicators
1.	Governance	Public Services	Administration services
			Utilization of ICTs to provide services to the community
			Complaint Service
		Transparency	Government Information transparency
			Financial transparency
		Policy	Leadership
			Public participation
2.	Technology	ICT	Internet availability
			IT infrastructure
		Appropriate rural technologies	Sensor
			Cloud Computing
3.	Resources	Natural resources	Land condition
			Water availability
			Energy uses
		Financial resources	Agriculture
			Fishing
			Livestock
		Human resources	Rural community
			Level of education
			Openness
4.	Village Services	Essential Services	Health services
			Education services
		Economic Services	Entrepreneurship
			Job availability
			Economic Institutions
			Distribution/Logistic facilities
5.	Living	Security and Convenience	Waste management
			Environmental protection
			Public Safety
			Disaster management
		Public Facility Access	Green space facilities
			Sport area facilities
			Banking facilities
			Road and bridge facilities
6.	Tourism	Village Potency	Village identity
			Tourist destinations
		Village Branding	Village branding platform
			Culture and traditions

(Table 6 Performance Measure Indicators)

3.3 Technological option

1. Enhanced Use of Smart Phones and Optical Fiber Technology for Internet Techniques:

India has become the second biggest Smartphone market in terms of unique Smartphone users, crossing 220 million users, surpassing the US market, as per the report by Counterpoint research. Over 20 mobile phone brands are now assembling their parts in India.



(Fig.16 Optical Fiber Technology)

With over 460 million internet users, India is the second largest online market, ranked only behind China. By 2021, there will be about 635.8 million internet users in India. Urban population is adopting latest technology so fast that within a short span of three months, there are more than 10 crore JIO users. Indians often turn to mobile internet, as the large majority of the digital population in India was mobile internet users in 2016. India had an estimate of 262 million mobile internet users living in urban communities and 109 million living in rural areas which is close to one third of urban users.

Alongside smart phone, there are alternative mediums for accessing fast internet in villages like optical fiber technology. This is one of the advanced technologies nowadays and is replacing cable network rigoursly. Optical fiber communication is more advantageous than cable network due to its comparatively low cost, easy to install, high data transfer speed and abundantly available raw material.

2. Online Library and E- Education:

After provision of internet facility at villages using various advanced technology, our next responsibility towards making villages smarter is to provide a quality education to the villagers. Internet is one of the easy way of accessing the data and information.

(Fig.17 E-Education System)

This technology can now be explored to more extent by providing online education in schools and colleges. Worldwide digital contents are available on internet which can be accessed by children in villages to make them compatible with rest of the world. All Schools shall be connected with broadband. Free wi-fi shall be provided in all secondary

and higher secondary schools (coverage would be around 250,000 schools). A program on digital literacy would be taken up at the national level. MOOCs –Massive Online Open Courses shall be developed and leveraged for e-Education.

3. Smart Agriculture:

Farming is our country's oldest profession for earning daily wages along with bread and butter and more than half of our population is directly dependent on this profession. But the agricultural productivity in our country is still lacking behind many of other developed countries. Also most of our farmers are dependent on natural resources like monsoon and old techniques of farming. Due to drought like situation, many of our farmers have committed suicide and this number is increasing day by day. Our Government is trying to control this number through various schemes but all is in vein. Smart agriculture can be life saver to such people if implemented in right direction. Following techniques can be adopted for implementing smart agriculture:

In Climate smart technology, a small weather forecasting centers can be opened for group of villages well equipped with advanced technology which will be able to monitor the upcoming weather changes with the help of satellites and same information shall be communicated with the nearby villagers in an advance so that farmers can plan their agricultural activities. This will save farmers from uncertainties of monsoon and other atmospheric effects.

(Fig.18 Solar irrigation system)

a) Smart apps for smart agriculture like IFFCO KISAN, AgriApp can be introduced in villages for providing timely updates regarding availability and cost of seeds, fertilizers, pesticides and other agricultural commodities. Present stock and shortage of seeds, fertilizers and pesticides can be communicated with farmers in an advance by using these apps. Government initiatives like water harvesting, subsidies on products, crop insurances, agricultural product exhibition, etc can directly be communicated with the farmers using these smart apps. Live streaming of agricultural commodities rates, market network can be done on these smart apps which will help farmers to sell their products with better prizes.

b) Training can be provided to farmers through which organic fertilizers and pesticides can be manufactured at community level to boost its better use than chemical fertilizers and fertilizers. This will help in maintaining soil quality and increasing productivity. Such types of training workshops can be arranged at Tehsil level for nearby farmers and they should be promoted to participate in it.

c) Water harvesting is the today's most essential need and is a part of smart agriculture. Government is running various schemes for rain water harvesting and providing financial support for the same. Recently Maharashtra Government have run "Magel tyala Shet tale" scheme and thousands of farmers have benefited through this scheme. Such types of projects can be explored at other ground like roof top rain water harvesting, industrial water recycling, and etc at large scales and should be financially supported by the state and central governments. The proper awareness can be created among villagers for water conservation, monitoring and harvesting.

d) Solar powered bore wells can be installed directly in fields to avoid both the water and electricity crisis. Due to lack of 24 x 7 electricity farmers are unable to install irrigation in their fields and remain dependent on natural sources. Solar powered bore wells can help them in increasing agricultural productivity through timely water supply along with overcoming power crisis.

4. Smart and Efficient Public Transport System:

Lack of transportation facility is the major reason behind isolating villages from rest of the world. Since last 70 years of freedom, roads and train network in rural part of India could not be spread to our expectations. There are thousands of villages in our country to which as such no transportation is available. The direct impact of this is on accessibility of villagers to urban areas, market and lack of any other facilities which is only available in big cities. To overcome this problem, smart transportation can be main melody for development of smart villages.

Our government is playing vital role in improving the situation and has already taken steps in right directions. A total of 599 highway projects covering around 12,903 km of national highways have been sanctioned till date incurring an expenditure of INR 108,000 crore over the next 5 years. Under the Smart Cities Scheme, Government of India has already earmarked INR 50,802 crore for the project with a proposed budget of INR 48,000 crore to be utilized for developing first 20 Smart cities. Similar type of bold initiative from government is expected for actual development of smart transportation in rural India too.

While supporting to the scheme of Clean and Smart cities & villages, we must promote use of clean fuels like Bio-fuels, ethanol, and compressed natural gas (CNG) for our vehicles. Besides these, electric and solar powered vehicles can also be promoted equally. Vehicles running on hydrogen as fuel and using fuel cell technology are also a clean option available with us. CNG has already become a popular fuel in India due to its low cost. However, it needs infrastructure support in terms of more number of fuelling stations and accessibility. This will definitely help us in fulfilling our dream of establishing clean and smart cities, smart villages along with saving our environment from pollution by lowering the use of carbon burning fuels like petrol, diesel, and coal.

5. Smart Sewage Management System and Sanitation:

No village or group of villages can be termed truly 'smart' without an effective sewage management system and there is a need for framing a proper sanitation plan for towns intended to become smart. Management of large quantity of household waste and garbage had become major headache for local managing bodies. Also dumping such garbage in locality is affecting common people's health. To solve the problem related with sewage management, an urgent and effective action plan is required. The knowledge enhancement and capacity building on sanitation diagnostics, town sanitation planning and decision making and analysis of cost effective and sustainable waste water treatment technologies for mainstreaming faucal sludge should be main focus for developing smart villages. Preparing our mind set for sewage management at personal level will be more fruitful. Every individual can have dust bin fixed outside their home where they can put their household garbage instead of throwing in open space. Different colored dust bins can be chosen for different categories of wastes like dry and wet, decomposable and non decomposable waste, etc. Ample number of waste collecting vehicles so called 'Ghantagadi' can be availed for each village to collect it. Waste material dumping yards shall be far away from civilization and shall have provision for categorising and recycling of collected waste. Also similar types of actions are required to manage bio waste generated in hospitals as well as e waste generated.

6. Renewable Energy Sources and Solar Energy:

(Fig.19 Solar Energy water pump)

Traditional sources of energy like wood, coal, diesel, petrol, oil, natural gas, etc are now on the verge of ending. Also excessive use of these sources is polluting earth's environment and is responsible for remarkable adverse effects, like abrupt climate change, drought and flood situation, green house effects, melting of ice caps on poles, de-thickening of ozone layer in atmosphere collectively known as global warming. Due to fast growing development of urban civilization, forests are reducing with greater rate. By the 1990s, the excess use of traditional sources in developing countries was marked as a leading environmental threat, with negative impacts linked with deforestation, desertification and widespread soil erosion. Thus to save our earth from the threat of global warming, alternative energy sources which burns less carbon are required to be invented and solar energy source can play vital role to overcome these global environmental effects.

3.4 Road Map and Safe Guards

(Fig.19-A Road map)

3.5 Issues & Challenges

Issues:

- Absence of organic convergence of different schemes
- Unfair decisions regarding the allocation of benefits to locations and households leading to alienation
- Political partisanship – perceived and real
- Disregard for socio-cultural values of different sections of the community
- Existence of multiple power structures and absence of a reconciling mechanism
- Ignoring environmental concerns for immediate gains
- Prevalence of social evils like drinking, dowry, casteism, communalism and discrimination against women

Challenges:

- Retrofitting existing legacy city infrastructure to make it smart, Financing smart cities, Availability of master plan or city development plan, Financial sustainability of ULBs, Technical constraints of ULBs, Three-tier governance, Providing clearances in a timely manner, Dealing with a multivendor environment, Capacity building program, Reliability of utility services

3.6 Smart Infrastructure

- What is Smart Infrastructure?

✓ Smart Infrastructure is the result of combining physical infrastructure with digital infrastructure, providing improved information to enable better decision making, faster and cheaper.

- ✓ Smart Infrastructure is a core aspect of this new digital world in the infrastructure sector. It has the potential to make a revolutionary impact on the efficient use of existing infrastructure as well as new build.

3.7 Cyber Security

Cyber security in the context of Smart Cities is a hot topic. The objective of Smart Cities is to optimize the city in a dynamic way to offer a better quality of life to the citizens through the application of information and communication technology (ICT). The range of areas where cities can become smarter is extensive: it is an evolution of "Connected Cities" with the prevalence of data exchange at a larger scale.

The increase of data exchange controls multiple services and assets leads to more automation in the city. As several critical services become interconnected, the need for cyber security surges to protect data exchanges, privacy as well as the health and safety of citizens. However, there is currently no harmonized guideline or standard to model these data exchanges. This leads IPT operators, municipalities, policy makers as well as manufacturers, solution providers and vendors to adopt specific solutions with low scalability and disparate requirements.

3.8 Retrofitting- Redevelopment- Greenfield Development District Cooling

- **Retrofitting:**

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

- **Redevelopment:**

Redevelopment will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizens. For instance, a new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage. Two examples of the redevelopment model are the Saifee Burhani Upliftment

Project in Mumbai (also called the Bhendi Bazaar Project) and the redevelopment of East Kidwai Nagar in New Delhi being undertaken by the National Building Construction Corporation.

- **Greenfield:**

Greenfield development will introduce most of the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, plan financing and plan implementation tools (e.g. land pooling/ land reconstitution) with provision for affordable housing, especially for the poor. Greenfield developments are required around cities in order to address the needs of the expanding population. One well known example is the GIFT City in Gujarat. Unlike retrofitting and redevelopment,Greenfield developments could be located either within the limits of the ULB or within the limits of the local Urban Development Authority (UDA).

3.9 Strategic Options for Fast Development

There are 6 key features on which smart city works

- ✓ Smart energy, Smart transportation , Smart data , Smart infrastructure , Smart mobility , Smart lot services

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

1. To describe exactly what is the community:

Maybe that definition can condition what you are doing in the subsequent steps; it relates to geography, links between cities and flows of people between them; that in some Countries the definition of City/community that is stated does not correspond effectively happens in the real life.

2. Study Community:

Before deciding to build a smart city, first we need to know that. This can be done by determining the benefits of such an initiative. Study the community to know the citizens, the business's needs – know the citizens and the community's unique attributes, such as the age of the citizens, their education, hobbies, and attractions of the city.

3. Develop a Smart City Policy:

Develop a policy to drive the initiatives, where roles, responsibilities, objective, and goals, can be defined. Create plans and strategies on how the goals will be achieved.

4. Engage The Citizens:

This can be done by engaging the citizens through the use of government initiatives, open data, sport events, etc.

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

Traditionally water supply in India was limited to the major cities within the spread of the process of urbanization. Declining health standards in the rural areas urged the post Independence government to take serious initiatives to improve the rural drinking water and sanitation. Now, one of the most important aims of the government is to ensure safe water supply to the rural areas. This initiative was first taken up by Accelerated Rural Water Supply Program (ARWSP) in 1972-73. Between the years 1972 to 1986, the aim of ARWSP was to ensure safe water supplies to rural areas. ARWSP was renamed Rajiv Gandhi National Drinking Water Mission in 1991-92 with further stress on rural water supply coupled with community planning and management of drinking water. Five factors were kept in focus:

- Sustainability of water supply, Portability, Adequacy, Convenience , Affordability & equity

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 – 600OC). Disposal of carcass is also being thought of using plasma pyrolysis.

3. Unique Multi Stage Biological Treatment Solution:

Multi Stage Biological Treatment Solution (MSBT) can be implemented on existing STP which is not able to process Sewage to optimum efficiency. MSBT can be implemented as a modular or container on the banks of rivers on Drains/Nalas which discharge waste water to the river. It can also be implanted in small urban societies and housing complex for better water management.

Benefits of MSBT are: No Surplus of Organic Sludge, No Odour problem, Drastic reduction of electrical Power usage which minimizes operating costs, No need for return sludge pumping.

3.11 Initiatives in village development by local self-government

The government project comes in village is as follows:

- Janani suraksha yojana , Kishori Shakti yojana Balika samriddhi yojan, Mid-day meal programme, Mahilamandal protsahan Yojana

3.12 Smart initives by district municipal corporation

- Stabilization pond system for waste water treatment, Duckweed based waste water treatment with pisciculture, Root zone treatment system, Anaerobic Decentralized Waste Water Treatment System, Aerobic DEWATS, Study Technological Options at Household Level Management like, Kitchen Garden with Piped Root Zone System, Kitchen Garden without Piped Root Zone System and Leach Pit, Pile Method, NADEP Method, Bangalore Method, Indor Method and Coimbatore Method, Vermi composting, Windrow Composting, Thermophilic Composting, MARC Method, Biogas Technology, Toilet Linked Biogas Plant

3.13 Any Projects contributed working by government/NGO/Other Digital country concept

➢ Charitable organization in Bangalore :

➢ The Sitaram Jindal Foundation is a **charitable organization in Bangalore** and was started with the sole objective to help with the moral and social uplift ment of the weaker sections of the society. The Foundation was envisioned by Dr. Sitaram Jindal and was instituted in 1969. This **charitable trust in Bangalore** has worked at setting up a number of educational institutions, NGOs, hospitals, (most notable is the world famous Jindal Nature cure Institute (JNI), Bangalore) and has contributed towards infrastructure development in rural areas as well.

➢ Being one of the most trusted **charitable organizations/trusts in India**; the Foundation has an independent functioning and doesn't entertain any affiliations whether commercial, political or religious. With 46 years of service and having supported more than 500 **charitable institutions in India,** the Foundation also runs vocational courses for women and has been a champion for women empowerment.

➢ The Foundation has been running various social initiatives for the upliftment of the poor and downstream,. some of the foundation are started as under:-

➢ **Rural Development Program**:-

This Foundation have constructed school building with all basic amenities in more than 100 villages and handed over them to govt. for conducting classes. Basic facilities for Education, health and portable water have been provided. The foundation has dug borwells and

conducted overhead water tanks in several villagers to provided safe drinking water to villagers.

1) Construction of school building (50 villages), Bangalore North Taluka, Bangalore District.
2) Drinking water Projects (15 villages), Bangalore North Taluka, Bangalore District.
3) Constructions of new rooms/buildings (21 village), Bangalore North Taluka, Bangalore District.
4) Bore wells etc. for drinking water in 28 villages, Bangalore North Taluka, Bangalore District.

- **Six Institutes at Village Nalwa, Haryana and Donated to Government:-**

The Foundation has constructed six institutions comprising of college. ITI, high school, Primary School, Civil Hospital and veterinary Hospital for the needy and deprived. The infrastructure of these institutes was constructed and handed over to the govt. for efficient functioning.

3.14 How to implement other countries smart villages

- The life in Indian villages is simple and isolated; although they are connected now a day with cell phones and digital television transmission, yet they are cut off from the main stream of urban areas due to poor road connectivity and market for their agricultural commodities.
- The villages do not have enough electricity supply and all those work dependents on electricity is affected. The health, educational and civil facilities are also either absent or not up to the mark. Making such villages as 'Smart Villages' is surely a noble program announced by Government".
- But no one in villages has seen what exactly, in the Indian conditions, smart village means. However, the government seems to have clarity of vision and the initiatives are coming from the Government through the scheme called "Shyama Prasad Mukherji Rurban Mission [SPMRM]".

3.15 Electrical concept:

- In Semester 8^{th,} we make a small model of a smart village or developed village. (Electrical Aspects)
  In this model we include,

✓ Wi-Fi connectivity, Solar street light system, Solar rooftop system, Battery Backup off Grid solar system, CCTV camera, Multi feeder connectivity, Solar water pump use in farming, Drip irrigation system, Use biomass, biogas for generation of electricity

CHAPTER: 4

Introduction about allocated Village: Mota Khutavada

4.1 Introduction:

4.1.1 Introduction about Mota Khutavada village:

The location code or village code of Mota Khutavada village is 516715. Mota Khutavada village is located in Mahuva Tehsil of Bhavnagar district in Gujarat, India. It is situated 25km away from sub-district headquarter Mahuva and 100km away from district headquarter Bhavnagar. As per 2009 stats, Mota Khutavada village is also a gram panchayat.

The total geographical area of village is 3225.86 hectares. Mota Khutavada has a total population of 10,334 peoples. There are about 2,058 houses in Mota Khutavada village. As per 2019 stats, a Mota Khutavada village comes under Gariadhar assembly & Amreli parliamentary constituency. Mahuva is nearest town to Mota Khutavada which is approximately 25km away.

PIN: 364290
District: Bhavnagar
State: Gujarat

4.1.2 Need of Study:

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

4.1.3 Study area:

Mota Khutavada Village is the village in Mahuva taluka in Bhavnagar district of Gujarat state, India; it is located 100 KM away from the Bhavnagar and 302 Km away from the state capital Gandhinagar.

Village has population about 10,334, and no. of houses are 2058, female population is 5039 and male population is 5295 and village has literacy rate is 67.47 %. 77.46% male and 57.17% female population is literate here.

(Fig.20 Location of Allocated Village Mota Khutavada)

The total area of the village is 3225.86 hector.

4.1.4 Objectives of the Study:

Following are the various objectives of study…….

- To provide sufficient basic physical infrastructure facilities like Water Supply, Transportation, Sewerage and Solid Waste Management etc.
- To provide sufficient Social infrastructure facilities like health and education facilities and to ensure proper delivery of facilities to village dwellers.
- To promote integrated development of rural areas with provision of quality housing, better connectivity, employment opportunities and supporting physical and social infrastructure.
- To provide internal roads within village settlement & efficient mass transportation systems between clusters of villages to improve connectivity.
- To Identification sanitation facilities that are needed to be improve like sewerage and drainage line, dumping facilities, Electricity connections.
- Refurbishing of village lakes, water tanks and wells, construction of rain water harvesting structures for sustainable Development.

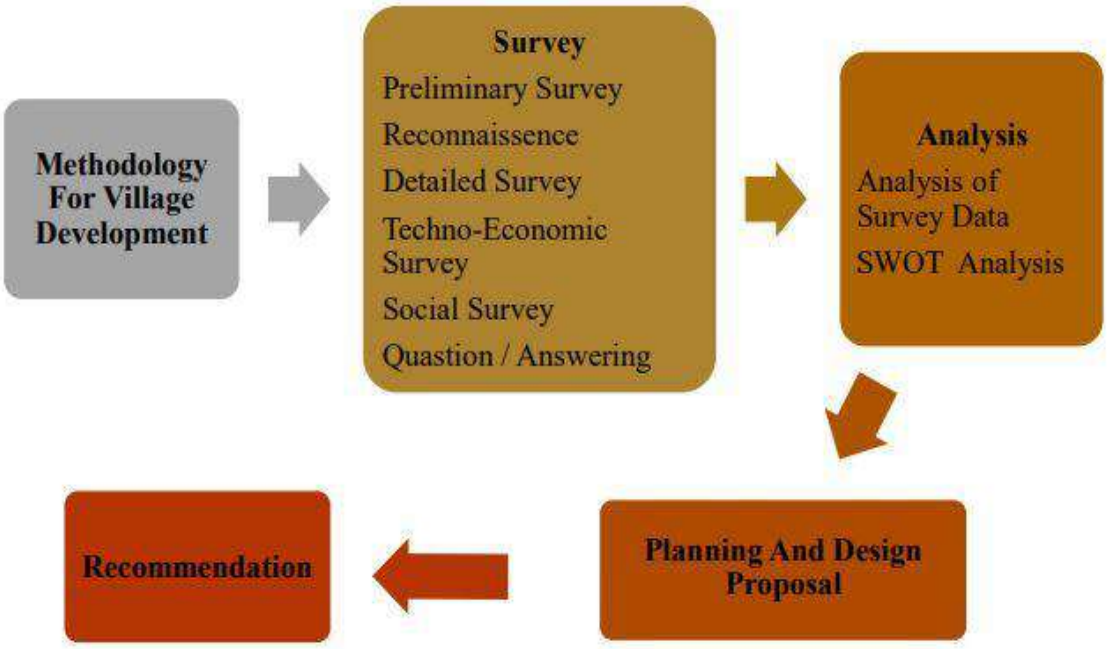
4.1.5 Scope of the Study:

By studying the present status and techno-economic survey of Mota Khutavada Village in Mahuva districts of the Gujarat state in terms of basic services, public amenities, other infrastructural facilities for the need of the people and to prepare a report on the expected socio- economic growth of the area with the consultation of TDO, DDO and Sarpanch; will help full in providing better facilities and services in village.

From the gap analysis, development strategies for village development will be proposed and planning proposals for Physical infrastructure, Social Infrastructure and Renewable energy Source will be suggested for the village. The study will focus the development

trend, growth of the village, and find out the problems related to the physical development of the area and infrastructure services of the village.

4.1.6 Methodology frame work for development of village:



(Fig.21 Methodology)

4.1.7 List of objects available related to civil methodology:

- For proper and sustainable development of village.
- For sustainable and ecofriendly development of village.
- By civil methodology the village can developed at greater rate and proper direction.
- To maintain bye-law it is necessary to implement civil methodology.
- The villagers will also get benefits by planned and advancement by civil methodology.

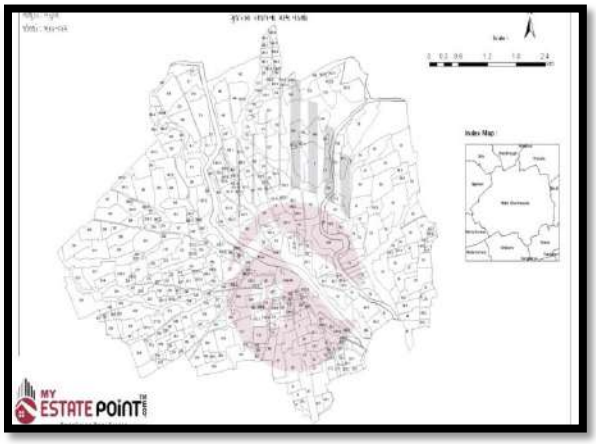
4.2 Study area profile:

4.2.1 Study Area Location:

Name of Village **:** Mota Khutavada
Taluka **:** Mahuva
District **:** Bhavnagar
State **:** Gujarat
PIN Code **:** 364290

4.2.2 Base Location map, Gram Tal map :

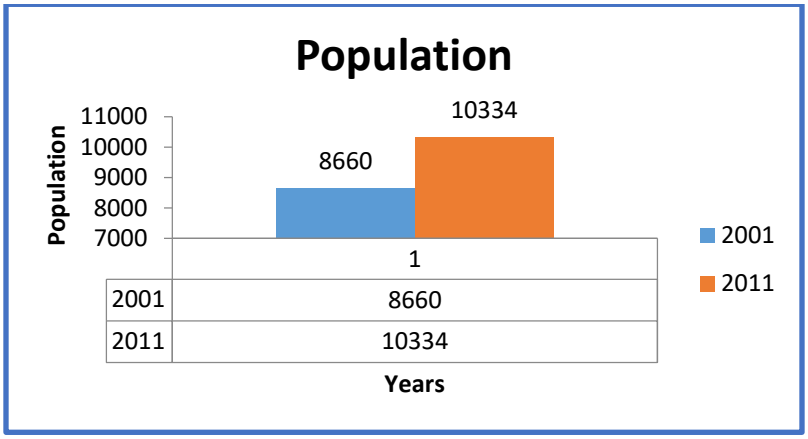
(Fig.22 Satellite view of Mota Khutavada Village)



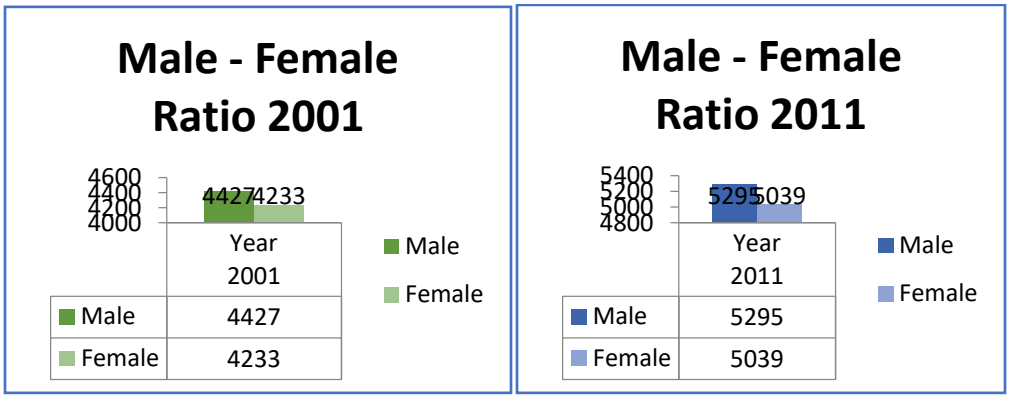
(Fig.23 Gam-tal map of Mota khutavada)

4.2.3 Physical & demographical growth:

This is demographical growth data of Mota Khutavada:



(Table 7 Demographical growth of Mota Khutavada as per census 2001 & 2011)



(Table 8 Male- Female Ratio as per Census 2001 & 2011)

4.2.4 Economic Profile / Banks:

About the economic profile of this village, many citizens‟ work interest is farming and labor work. The village doesn't have any better facilities regarding infrastructure but has good electrification system which distributed 24*7 hours for domestic use and 8 hours for agricultural use. Village does not have good drainage system because there is closed drainage etc. Farming and Job is also the prime source of income.

4.2.5 Actual Problem faced by villagers:

- Lack of 24 hours electricity , Falling off price of agriculture products, Basic hygiene is not available, Unemployment, Poverty, No internet service

4.2.6 Social scenario – Festival

Name	When	Where	Duration
Rann Utsav Gujarat	November - February	Great Rann of Kutch in the Kutch district	2-3 months
International Kite Festival	14th January	All over Gujarat	1 day
Modhera Dance Festival	Third Weekend of January	Sun Temple in Modhera	3 days
Bhavnath Fair	February-March	Bhavnath Mahadev Temple near Damodar Kund, at Girnar Taleti	5 days
Chitra Vichitra Fair	fortnight after Holi, around the month of March-April	Where: Gunbhakhari in Sabarkanta district	
Tarnetar Festival	August or September	Tanetar Village, Surendranagar District	3 days
Navratri	October or November	All over Gujarat	9 days
Shamlaji Fair	November	Shamlaji,Sabarkantha district	3 weeks

(Table 9 Festival celebrated in Gujarat)

4.2.7 Migration Reasons:

- Employment opportunities, For better education, Globalization, Sometimes crops failure forced villagers to migrate to cities

4.3 Data Collection: Mota Khutavada

4.3.1 Methods of data collection:

- First of all we studied various internet content available on websites.
- Then we have interected with gram-panchayat.
- Through techno-economic survey we found required details of facilities and infrastructure.
- Through interaction with villagers.
- By inspecting village
- Interaction with school teachers and staff.

4.3.2 Primary details of survey:

- In primary survey we visited village and know about village by meeting with sarpanch and gram-sevak
- After we interact with some elders of village,
- We surveyed village and seen the existing condition of all structures,
- We have collected data as per techno-economic form given in guidelines
- Also we have done feasibility survey for facilities as per criteria
- We have obtained details by question - answering with villagers

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

- **Average Size of the Houses:**

The average size of houses is 150sq.mt. And total number of houses is 2058 with population 10,334 as per census 2011.

- **Geo- tagging of house:**

There are total 2058 Houses as per census 2011 which is shown below in Gam-tal map.

Village is now developing at constant rate, shops, building, commercial and private offices are constructed with development of mahuva city.

(*Fig.24 Geo-tagging of house***)**

4.3.4 No. of human being in one house:

There are average 5 persons in one house.

4.3.5 Materials used locally in the village and material out sourced by the villagers

Material used for houses construction are OPC 43 grade, ordinary Bricks, sand, and steel for RCC structures, hard sand stone and marbles are imported from nearby Mahuva town. Fine aggregate is available locally from the malan river.

4.3.6 Geographical Details:

Description	Information
Total Area of Village	**3225.9 Hector**
Forest area	**482.94 Hector**
Agriculture area	**2443.06 Hector**
Residential area	**35.39 Hector**
Other area	**264.51 Hector**
Distance of the nearest railway station	**Mahuva (20 km)**
Nearest Town with the distance	**Mahuva (20km)**
Distance to the nearest bus station	**Mota Khutavada (0km)**
Nearest Airport	**Bhavnagar (100km)**
Connectivity to other roads	**VR,GJ SH 21**

(Table 10 Geographical Data)

4.3.7 Demographical Details:

No.	Census	Population	Male	Female
1	2001	8660	4427	4233
2	2011	10,334	5295	5039

(Table 11 Demographical Data)

Particulars	Total	Male	Female
Total No. of Houses	2,058	-	-
Population	10,334	5,295	5,039
Child (0-6)	1,694	911	783
Schedule Caste	378	208	170
Schedule Tribe	24	13	11
Literacy	67.47 %	77.46 %	57.17 %
Total Workers	3,422	2,821	601
Main Worker	3,284	-	-
Marginal Worker	138	85	53

(Table 12 Distribution of population in village)

4.3.8 Occupational Details:

Major occupation in village	1. Farming
	2. Labour work
	3. Diamond worker

(Table 13 Major Occupation)

4.3.9 Agriculture Details:

Major Crops	1. Peanuts
	2. Cotton
	3. Banana Trees

(Table 14 Major Crops)

4.3.10 Physical Infrastructure Facilities:

A. Main source of drinking water

- The main source of drinking water is tube well.
- There is need of elevated water tank (ESD) and filter plant.

B. Types of drainage facility

- Underground drainage facility is available

C. Road network

- The nearest state highway distance is 5km.
- Village approach road is in bad condition
- The main road is also in bad condition
- Internal streets roads are in good condition(RCC)

D. Transport Facility

- Railway station is not available in Mota Khutavada village, but the nearest railway station is in mahuva at a distance of 20kms.
- Bus station is available but not in a working condition, a new bus station is required.
- The local transportation like auto, jeep, chhakda is available.

E. Electricity distribution:

- There is a 66kv substation plant is available in the village.
- For domestic use, electricity is available for 24*7 hours.
- For the agriculture use, electricity is available 8 hours.
- Electrification in government building / schools / hospitals is present.
- There is no source of renewable energy.
- LED street light facility is not available.

F. Sanitation facility:

- Public latrine blocks are not available.
- Community toilet is also not available.
- Solid and liquid waste disposal system is not available.
- Door door waste collection facility is also not available.

G. Main source of irrigation facility:

- Pond, River, Canal, Tube wells, Bore wells

H. Housing conditions:

- The percentage of kutchha house is approx. 70%.
- The percentage of pucca house is approx. 30%.
- The ratio of kutchha / pucca house is 2.33.

4.3.11 Tourism development available in the village for attracting the tourist

No tourism in village

4.4 Infrastructure Details

4.4.1 Drinking water:

The main source of drinking water is tube well.
There is need of elevated water tank (ESD) and filter plant.

(Fig.25 Source of Drinking Water)

4.4.2 Drainage Network and sanitation Facilitates:

- Underground drainage facility is available
- Community toilet is also not available.
- Solid and liquid waste disposal system is not available.
- Door door waste collection facility is also not available.

4.4.3 Transportation and road network:

- The nearest state highway distance is 5km.
- Village approach road is in bad condition
- The main road is also in bad condition
- Internal streets roads are in good condition (RCC)
- Railway station is not available in Mota Khutavada village, but the nearest railway station is in mahuva at a distance of 20kms.

(Fig.26 Road Condition of Mota Khutavada)

- Bus station is available but not in a working condition, a new bus station is required.
- The local transportation like auto, jeep, chhakda is available.

4.4.4 Housing condition

The percentage of kutchha house is approx. 70%.
The percentage of pucca house is approx. 30%.
The ratio of kutchha / pucca house is 2.33.

4.4.5 Social Infrastructure facilities:

- **Health facilities in Mota Khutavada**
  - There is no availability of any PHC.
  - There are 2 sub-centers, CHC, Private Clinic, Private Hospital, AYUSH health facilities and private medicals.

(Fig.27 CHC)

(Fig.28 Ayushman Bhaart Health Centre)

- **Education Facilities:**
  - **Available**
    - Anaganwadi, Primary school, Secondary school, High secondary school (For boys & Girls)

- **Non-available**
  - ITI college, Arts/commerce/science college

(Fig.29 Condition of Higher secondary school)

(Fig.30 Condition Of Primary School)

4.4.6 Existing condition of public buildings and maintenance of existing public infrastructure:

- The existing condition of public building like gram panchayat, Schools building, Hospital is required.
- Maintenance of the road is highly recommended.

4.4.7 Technology Mobile/ WIFI / Internet Usage Details:

- Technological point of view internet users are limited to government offices only. No public WIFI is available in village.
- Mobile towers are available in the village.

4.4.8 Sports Activity as Gram Panchayat

- Currently no activities organized at Gram-Panchayat.

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

- There are number of temples, which serve as worshipping place for villagers.
- There is not any public garden, park, playground in village.
- The river name malan is passing through the village.

4.4.10 Other facilities:

There are no any other good facilities.

4.4.11 Any other details

No, all important details are covered

4.5 Electrical Concept:

4.5.1 Renewable energy source planning particularly for villages

Nowadays many issues using fossil fuel as a primary resource for generating electricity. The solution to such issues can be reduced by means of using renewable energy like a solar

power system. Using fossil fuel its causes of Global Warming. It's also effect on our health and its cause's environmental problem. Natural gas gives off 50% of the carbon dioxide, the principal greenhouse gas, released by coal and 25% less carbon dioxide than oil, for the same amount of energy produced. Coal contains about 80% more carbon per unit of energy than gas does, and oil contains about 40 percentages.

In the present scenario, generation of power is less than demand. And the difference between generation of power and demand increases day by day. This difference we solved using a solar rooftop system. We also try to reduce pollution from the environment. So in renewable energy sources we must use solar panels in different way, using solar radiation panel charge.

4.5.2 Irrigation Facilities

Current Irrigation facilities in village look good in the Mota Khutavada village because there is one water dam will be available. For Irrigation there is enough water. And people also use water submersible pump for irrigation.

4.5.3 Electricity Facilities with Area

Nowadays electricity is almost available 24 hours in this village. Power cuts rarely happen in this village. But in this village some places have solar street light but it's not in working condition. Solar roof tops are not available in these villages. And electricity theft is almost 20%.

4.6 Existing Institution like - Village Administration – Detail Profile

Village has one-gram panchayat office which is use as Administration office.

(Fig.31 Grampanchayat Building)

4.6.1 Bachat Mandali :

There is no any bachat mandali in this village.

4.6.2 Dudh mandali:

There are 2 to 3 milk dairy in village. Which are fulfilling the needs of village.

4.6.3 Mahila forum:

Many sakhi mandals are active in village doing many types of activities in the village.

4.6.4 Plantation for the Air population:

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

4.6.5 Rain water Harvesting:

No use of rain water harvesting methods in village.

4.6.6 Agriculture Development:

Mota Khutavada Villagers use advanced technology for irrigation and plantation of crop and advanced machinery for framing.

CHAPTER: 5

Technical Options with case studies

5.1 Concept(Civil):

5.1.1 Advanced sustainable construction techniques

The construction industry is repeatedly criticized for being inefficient and slow to innovate. The basic methods of construction, techniques and technologies have changed little since Roman times. But the application of innovation in the construction industry is not straight forward.

Incorporating advanced construction technology into practice can increase levels of quality, efficiency, safety, sustainability and value for money. However, there is often a conflict between traditional industry methods and innovative new practices, and this is often blamed for the relatively slow rate of technology transfer within the industry.

Every construction project is different, every site is a singular prototype, construction works are located in different places, and involve the constant movement of personnel and machinery. In addition, the weather and other factors can prevent the application of previous experience effectively.

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:

- 3D printing, Materials, Building information modeling (BIM), Cladding systems, Computer aided design and computer aided manufacturing (CAD/CAM), Computer numerical control, Construction Innovation Hub, Construction plant, Modern methods of construction, Modular construction, Offsite manufacturing, Prefabrication and preassembly, Research and development, Site investigations and surveying, Substructure works, Water engineering, Temporary works, Smart technology, Robotics, GPS controlled equipment

5.1.2 Soil Liquefaction :

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Liquefaction and related phenomena have

been responsible for tremendous amounts of damage in historical earthquakes around the world.

There are two types of soil liquefaction.

1) Flow liquefaction
2) Cyclic Mobility

- **Methods to reduce damage due to soil Liquefaction:**

1. Construction on saturated soil should be neglected.
2. Soil study survey should be conducted before construction on saturated soil site.
3. Liquefaction-proof structure system
4. Soil condition should be improved

(Fig.32 Soil Liquefaction)

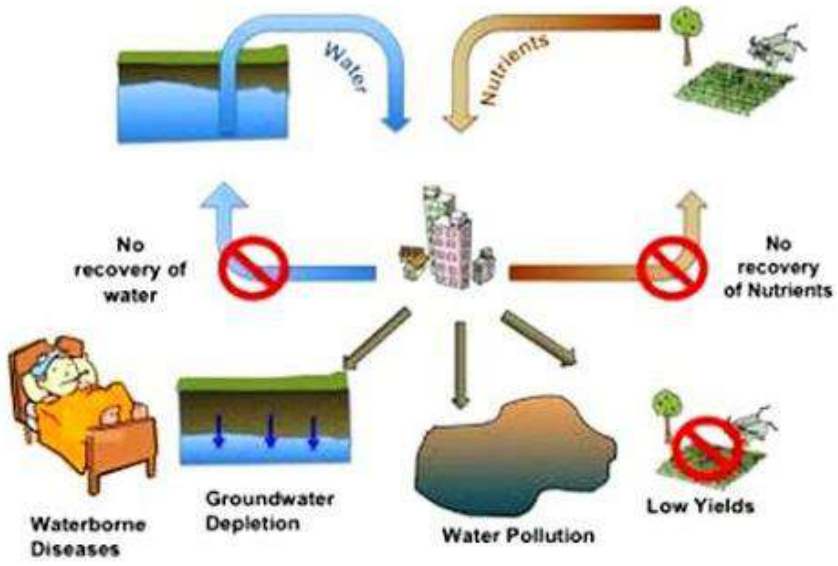
5.1.3 Sustainable sanitation:

Sustainable sanitation refers to public health condition related to drinking clean water and adequate treatment and disposal of human excreta and sewage.

Sanitation is important for all, helping to maintain health and increase life-spans. However, it is especially important for children. Around the world, over 800 children under age five die every day from preventable diarrhea-related diseases caused by lack of access to water, sanitation and hygiene. In addition, diarrhea causes children to lose their appetites, which can lead to malnourishment. Limited access to sanitation has become such a worldwide problem that 1 in every 4 children suffer from stunted growth. This leads to “irreversible physical and cognitive damage."

How to maintain sustainable sanitation in public places:

- Use of dustbin for throwing garbage
- For urination public toilet should be used
- While sneezing or coughing in order to prevent airborne diseases, handkerchief or mask should be used.



(Fig.33 Sanitation Process)

5.1.4 Transportation Infrastructure:

Transport infrastructure is composed of the fixed installations of canals, waterways, airways, railways, roads, and terminals, as well as pipelines such as seaports, refueling depots, trucking terminals, warehouses, bus stations, railway station, and airports.

- **Roads:**
  Road is a paved surface to facilitate the movement of people and goods with means of transportation like, bicycle, buses, vans of trucks
- **Rails:**
  Rails are the infrastructure for rail transport. A rail road which connects to locations is called rail line.
- **Airports**
  An airport is a location where aircrafts, helicopters and blimps take offs and land.

5.1.5 Vertical Farming:

Vertical farming has been a science fiction topic as far back as the 1950s and perhaps further, and now it's not only scientifically viable but will be financially viable within the decade. Vertical farm technology Vertical farming a component of urban agriculture is the practice of producing food in vertically stacked layers. This offers many advantages. Perhaps the most obvious is the ability to grow within urban environments and

(Fig.34 Vertical Farming)

Thus have fresher foods available faster and at lower costs. However, vertical farming won't be limited to just urban environments like initially expected. Farmers in all areas can use it to make better use of available land and to grow crops that wouldn't normally be viable in those locations.

5.1.6 Corrosion mechanism, Prevention & Repair Measures of RCC Structure:

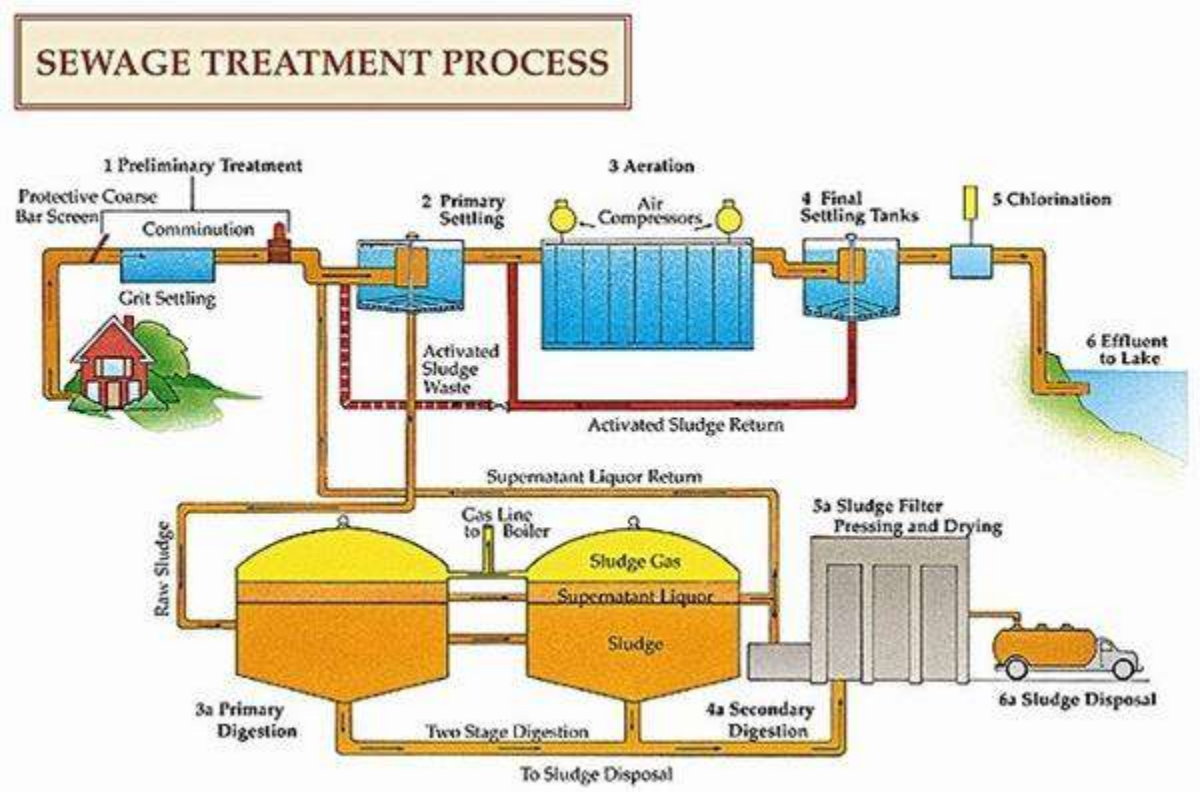
- The durability of concrete structures is influenced by various factors, for example, ecological presentation, electrochemical responses, mechanical stacking, affect harm and others. Of all of these, consumption of the fortification is likely the primary driver for the disintegration of steel strengthen cement structures.

(Fig.35 Corrosion of Beam)

- Consumption administration is ending up progressively important because of the developing number of maturing foundation resources and the expanded prerequisite for impromptu upkeep with a specific end goal to keep these structures operational all through their outline life.
- The primary RC repair, restoration and recovery approaches by and large utilized can be extensively arranged under ordinary surface medications, electrochemical medicines and outline arrangements.
- The overall point of this examination was to recognize the key consumption administration strategies and embrace exact examinations concentrated on full-scale RC structures to explore their long-haul execution
- To accomplish this, singular research bundles were recognized from the above expansive five approaches for repair, substitution and recovery.
- These were Patch repairs and nascent anodes, Impressed Current Catholic Protection, Galvanic Catholic Protection, what's more, hydrophobic medications.
- The determination of the above research bundles depended on over a wide span of time use by the development industry to repair, renovate and restore RC structures.

5.1.7 Sewage Treatment Plant:

- It includes physical, biological and sometimes chemical processes to remove pollutants. Its aim is to produce environmentally safe sewage water, called effluent, and a solid waste, called sludge or biosolids, suitable for disposal or reuse. Reuse is often for agricultural purposes, but more recently, sludge is being used as a fuel source.
- Water from the mains, used by manufacturing, farming, houses (toilets, baths, showers, kitchens, sinks), hospitals, commercial and industrial sites, is reduced in quality as a result of the introduction of contaminating constituents. Organic wastes, suspended solids, bacteria, nitrates, and phosphates are pollutants that must be removed.



(Fig.36 Sewage Treatment Plant)

5.2 Concept (Electrical)

5.2.1 Programmable Load Shedding

ABSTRACT:

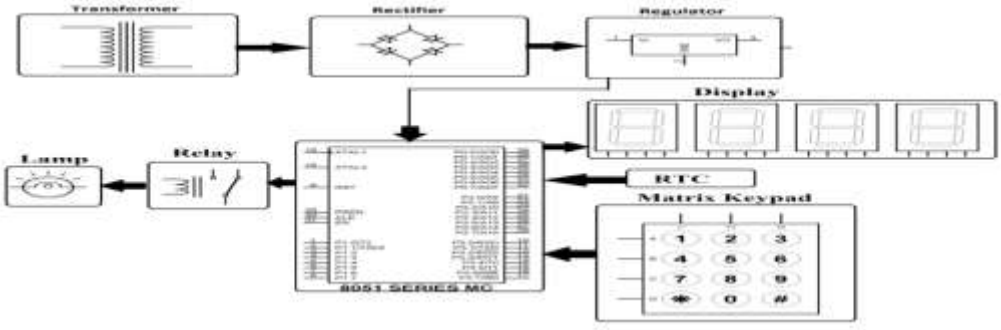
- Electricity is one of the most important requirements of modern civilization. Without which various Indispensable applications will bind to bring to a standstill. As we know that demand of electricity is increasing now days. So electric utilities prefer load shedding when the

demand exceeds the supply. Thus in a distribution system it needs to be precisely measured for specific period of time. Programmable load shedding time management system is a reliable & effective load shedding technique that takes over the manual task of switch ON/OFF the electrical supply with respect to time .It uses real time clock (RTC) interfaced to the 8051 family microcontroller. The paper "effective load shedding technique for utility department" will provide real & competent load shedding techniques such that distribution substation can be monitored & load shedding from one particular place.

INTRODUCTION:

The project is an automatic load operation system that controls load operation, multiple numbers of times according to programmed instruction. The project eliminates the manual ON/OFF switching of load. A real time clock (RTC) is used to track the time and automatically switch ON/OFF the load. This project is required for load shedding time management which is used when the electricity demand exceeds the supply and there comes a need for manually switching ON/OFF the electrical devices in time. Hence this system eliminates the manual operation by automatically switching the load ON/OFF. A matrix keypad is interfaced with the microcontroller from where the specified time is input to the microcontroller When this input time equals to the real time, based on the commands the microcontroller initiates that particular relay to switch ON/OFF the load. The time is displayed on a seven segment display.

Block Diagram:



(Fig.37 Programmable load shedding)

Components Used:

Regulator, RTC, LCD, Key-Pad, Relay, Arduino, Transformer, LED

Circuit Operation:

A. The programmable load shedding time management for utility department circuit consists of an 8592 microcontroller ic,16*2 LCD module,7805 voltage regulator ic,4*3 keypad ,DS12887 RTC IC, relay, a Crystal oscillator.

B. The 7805 voltage regulator converts the input voltage to 5V and is given to the Vcc (pin: 40) of the 8952 microcontroller. This voltage is necessary to enable the microcontroller .A DS12887 RTC interfaces with port0 of the microcontroller i.e. from pins 32 to 39.The rtc shows the real time at every instant. Once the RTC is programmed, it will work continuously even though the power goes off in between. The keypad is interfaced with port2 of the microcontroller i.e. from

pins21 to28.The keypad is used to set the real time, the time for load shedding time and the time duration. The 16*2 LCD is interfaced to port1of the microcontroller i.e. from pins 1 to 8.The crystal oscillator helps to provide the working frequency 11.059MHz for the microcontroller.
C. The microcontroller programmed in such a way that we can set the actual time and load shedding time. Using the program we can monitor both real time and load shedding time. Program always check the equality and whenever it get matched output relay turn off. Then it began to check equality with target time and real time, whenever it get matched relay turns on.

Working:
The AC power supply from mains first gets converted into and unregulated DC and then into a constant regulated DC with the help of this circuit. The circuit is made up of transformer, bridge rectifier made up from diodes, linear voltage regulator 7805 and capacitors. If you observe, the working of the circuit can be divided into two parts. In the first part, the AC Mains is converted into unregulated DC and in the second part, this unregulated DC is converted into regulated 5V DC. So, let us start discussing the working with this in mind. Initially, a 230V to 12V Step down transformer is taken and its primary is connected to mains supply. The secondary of the transformer is connected to Bridge rectifier (either a dedicated IC or a combination of 4 1N4007 Diodes can be used). A 1A fuse is placed between the transformer and the bridge rectifier. This will limit the current drawn by the circuit to 1A. The rectified DC from the bridge rectifier is smoothened out with the help of 1000µF Capacitor. So, the output across the 1000µF Capacitor is unregulated 12V DC. This is given as an input to the 7805 Voltage Regulator IC. 7805 IC then converts this to a regulated 5V DC and the output can be obtained at its output terminals.

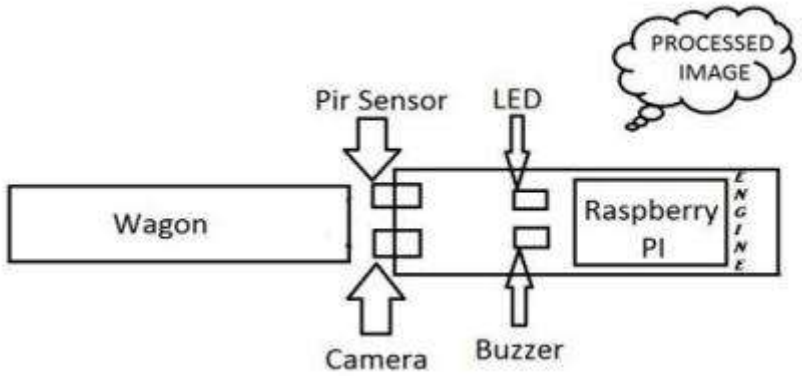
Application:
1. Power distribution companies to shade load automatically, reduce down time for critical load, reduce spinning reserve requirement etc.
2. Implemented in factories to manage the on off time of different generator sets.
3. Owner homes to switch on and off different generator set.

Conclusion:
According to our observations real time clocks (RTC) work more accurate than other time-keeping alternatives, it allows the main system to perform important tasks, and they do not consume much power. Functionality of Electronic devices can even increase by using real-time clocks (RTC). Certain electronic devices can rely on real time clocks when comparing the times of previous functions. If the functions have taken place within a selected period of time, device functions can be reduced drastically. Hence real time clocks interfaced with AT89S52 microcontrollers could be used extensively in load shedding time management system by utility departments.

5.2.2 Railways Security System using IOT

Introduction:
There are many cases reported for coal mines thief near the rural areas when the train halts for some time. This has affected a lot in the Indian railways economy. So this paper devices a new technique for Indian railways to remotely monitor the system. The proposed model has a motion detection sensor which detects the motion of the object which performs skin detection and then

sends the image to the railway server using IoT. So that immediately an action can be taken to avoid coal thief. The conceptual diagram is given in the Figure 1



(Fig.38 Railway security system)

Related Works:

- Design and development of an integrated and heterogeneous network was proposed by Sandro Chiocchio and which concentrates on board communication through an 868 MHz Wireless Sensor Network component, data communications across a mobile network through M2M (Machineto-Machine) communication, data collection on the Cloud for processing and detection of anomalies.
- To reduce the energy consumption to values sustainable by energy harvesters without penalizing the quality of service, a bi-periodic communication scheme for the local wireless transmission was proposed by Alessandro with a dynamic management and consumption model of receiver and GPRS transceiver, which optimize the sleep modes. The proposed solutions are compared and the theoretical predictions are validated by measurements using different operating conditions.
- Several key aspects when applying sensor networks such as radio wave propagation, energy scavenging and performance of the WSN aboard the wagon were investigated by Mathias. The aboard network communicates at 2.45 GHz, and the external communication is an 868 MHz radio frequency radio link. Though WSN node energy is limited, appropriate energy scavenging schemes are proposed and evaluated using prototypes. Effort has been proposed to improve the identified gaps. The work suggests that piezoelectric harvesting technique is adoptable in which experiments scavenged 2.32 mW.
- Bidhan proposed train over speed protection system. Application of RFID was studied in detail over complex railway system automation. Application of RFID technology can improve the operating efficiency, safety of men and machines, and improve economy.
- A feasibility study was presented by Eugen and considered a real-world deployment on one of Europe's busiest railroad sections. Raw data obtained was from there which was annotated with the help of video footage and contains vibration patterns of 186 trains of six various types with accuracy of 97%. Length of the train wagons was measured using mean-squared error method. Visual inspection of the data shows further opportunities to improve the measurement of speed and detection of worn-out wheels.

- Traffic monitoring is the search for moving trains in SAR images where trains are located, their velocity is determined, and type & number of wagons are identified. Commuter trains in the area of Munich, Germany are considered for their case study by Gottfried and they concentrated on feature extraction of TerraSAR-X images.
- In the proposed work, Camera captures snapshots of the intruder only when motion is detected. This will not lead to unnecessary wastage of storage of space. Also, the system has capability of detecting animal, leaves etc. against human intervention. The image of the intruder will be sent to the driver node.

Components Used:

1. Raspberry pi 3b
2. PIR Sensor (SB0061)
3. Pi Camera Module

System Integration:

After testing the modules mentioned above individually, they have been integrated together with the Raspberry PI. Now, as soon as the motion is detected by the PIR Raspberry PI invokes the camera to take an image of that instance. Once the image is taken the Rasp Image Processing i.e. Skin Detection Algorithm to make out whether the image captured is a human. If it was a human then that picture will be uploaded to the drop box and also images are sent to railway node using IOT. Any official can have a look at that picture provided if he has internet connection. So using this system it will become easy for the officials to carry out further investigation.

5.2.3 Management through energy harvesting concept

What Is Energy Harvesting

- Energy harvesting is the conversion of small amounts of available energy in the environment into usable electrical energy. The electrical energy is conditioned for either direct use or energy accumulated and stored for later use. This provides an alternative power source for applications in locations where there is no grid power and it is inefficient to install wind turbines.
- The harvested energy is low powering a device; it can still be used to extend the life of a battery. Energy harvesting is also known as micro energy harvesting.

Why Harvest Energy

- Remote sensor and embedded devices are low power electronics and this powered by batteries. These batteries have limited life span and also replaced every few years. Replacement of battery become costly to use in remote location there are hundreds of sensor. So the energy harvest needed because it provides unlimited operating life of low power equipment battery replacement eliminated. So we can also save money.

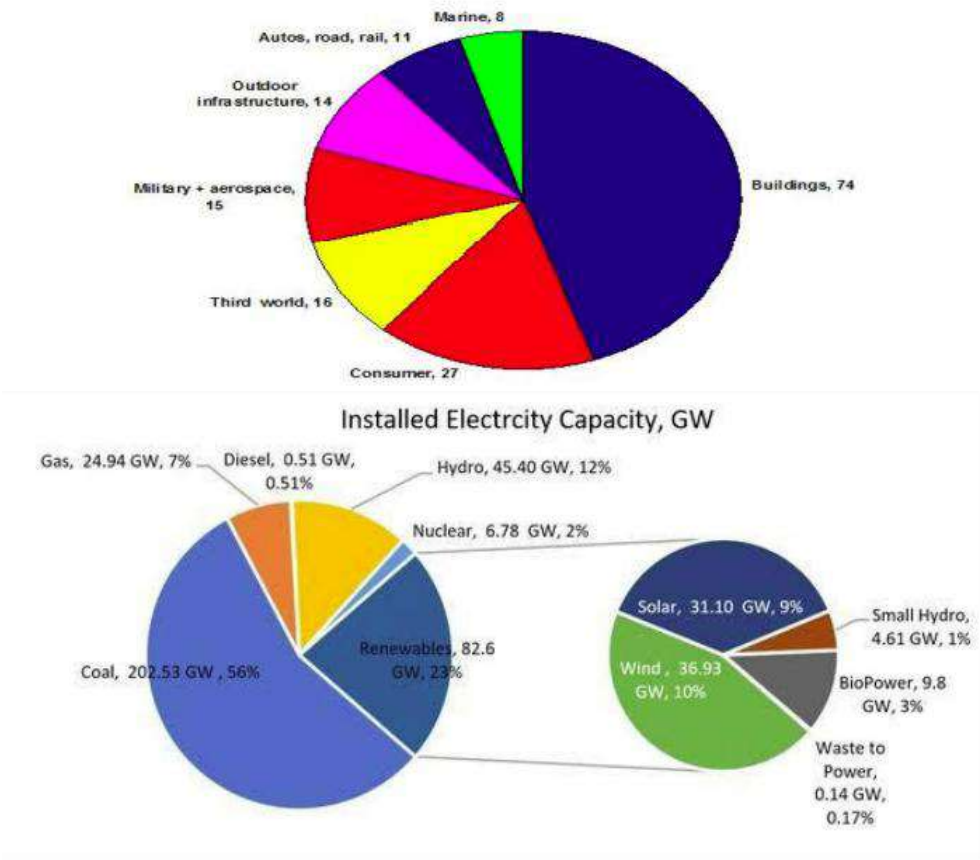
- Energy harvesting most of application are designed to be sustainable, cost efficient, and less service. Using this we eliminate transmission loss and long cable. If power is enough to device directly so device can operate battery less

Common Sources of Energy
Light energy comes from sunlight or artificial light.
Kinetic energy comes from vibration, mechanical stress or strain.
Thermal Energy comes from Waste energy from heaters, friction, engines.
RF Energy comes from RF signals.

Application:
Circuits receiving harvested energy for application should, Consume the less power when it active, Consume the lowest standby current, Its capable of turning on and off with minimal delay, Operate at the low-voltage range

Energy Harvesting Techniques:
Photovoltaic Energy Harvesting, Wind Energy Harvesting, Piezoelectric Energy Harvesting, RF Energy Harvesting, Thermal Energy Harvesting.

Case Study:



(Fig.39 Management through energy harvesting concept)

Conclusion:
Past few years, harvesting energy from nonconventional source in environment received interest increase. And it design as alternative source for low power appliances. Energy harvesting with the ambient energy resources is reliable, safe and clean, and it has the potential to power Wireless sensor network endlessly. Where not available grid connections in remote village, use this type of harvesting to store energy and management the energy as per need

5.2.4 Moisture Monitoring System:

INTRODUCTION:
India is a country where majority of our population are dependable on the agriculture to live their daily life. In this modern technological era poor farmers of India cannot get enough assistance from others to help them with technology and make their work easier. This project made automatic field monitoring system that can be utilize to improve the condition of green houses. Arduino Uno microcontroller is the main controlling unit of whole system.
India is a developing nation with a very large population. Due to increasing population, the basic need such as food and water is increasing day by day. Thus there is a need of saving these resources and utilize them in an efficient manner. Since water is one of the most important elements in our daily life, thus we must use efficient ways to utilize water and save it for future generations. One of method is efficient irrigation management practices for fields. Irrigation water management practices could greatly benefit by the knowledge of moisture in the soil. To determine the soil moisture we have designed and developed a nickel probes based soil moisture sensor and a response monitoring system. By knowing the moisture value, we can estimate when to water and how much to water the fields so that there is no overwatering or wilting of crops. These practices will increase crop yield, improve quality of crops, conserve water resources, save energy, and decrease fertilizer supplies

SOIL MOISURE SENSOR:
A soil moisture sensor as the name indicates is used to determine the moisture present in the soil. The moisture of the soil depends upon various factors such as type of soil whether its sandy, clay, loam, sandy loam and salts present in soil such as iron, manganese, calcium, phosphorus, nitrogen, sulphur etc. it also depends upon temperature. Based on the reading of moisture sensor, irrigation is done. Soil moisture sensors can be classified into following types based on the methods to determine the soil moisture:-

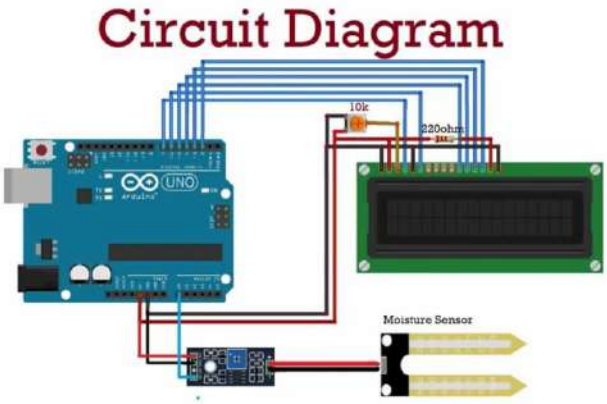
CASE STUDY:
A. Soil Volumetric Water Content-based soil moisture sensors:
These sensors are used to determine the amount of water present in the soil. VWC can be calculated by mass (g/g) or volume (cm^3 / cm^3). It gives output in per cent content.

B. Soil Water Tension-based soil moisture sensors:
These sensors measure energy of water in the soil. Water tension is measured in energy/mass of the soil. Units are Joules/kg (J/kg) or kilopascal (kPa). It tells how much difficult or easy it will be for the plant to extract water from the soil.

HARDWARE REQUIRES:

(1) Arduino UNO (2) 9V Battery (3) Jumper Wires (4) Moisture Sensor (5) 16*2 LCD (6) 10k Ω Potentiometer

PROTOTYPE:



(Fig. 40 Circuit Diagram of Moisture Monitoring System)

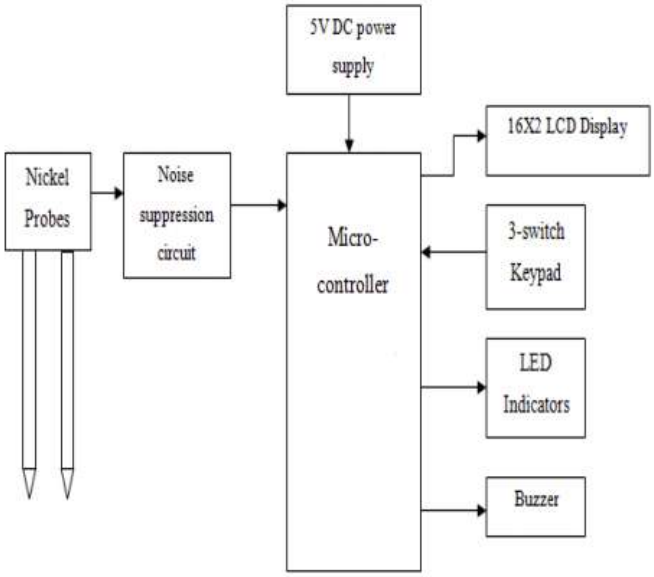
ARDUINO CODE:

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(7, 6, 5, 4, 3, 2);
int sensorPin = A0;
int sensorValue = 0;
int percentValue = 0;
void setup() {
  Serial.begin(9600);
  lcd.begin(16, 2);
}
void loop() {
  sensorValue = analogRead(sensorPin);
  Serial.print("\n\nAnalog Value: ");
  Serial.print(sensorValue);

  percentValue = map(sensorValue, 1023, 200, 0, 100);
  Serial.print("\nPercentValue: ");
  Serial.print(percentValue);
  Serial.print("%");
  lcd.setCursor(0, 0);
  lcd.print("Soil Moisture");

  lcd.setCursor(0, 1);
  lcd.print("Percent: ");
  lcd.print(percentValue);
  lcd.print("%");
  delay(1000);
  lcd.clear();
```

SOIL MOISTURE SENSOR BASED RESPONSE MONITORING SYSTEM:



(Fig. 41 Block diagram of soil moisture sensor based response monitoring system)

DESIGN PARAMETERS:

Parameters	Values
Dimensions	9.5cm x 0.7cm x 0.5 cm
Power Supply	5V
Output	0-100%VWC
Voltage Signal	0-4.2V
Area of Influence	25 cm
Conversion Time of ADC	72µs
Resolution	4.8mV

(Table 15 Technical Details of Moisture Monitoring Sensor)

MODEL:

The results of the moisture values are displayed on the LCD as shown in below figure.

(Fig. 42 Arduino Based Moisture Monitoring System)

COST:
Overall cost of this system(model) is approximately 1000 ₹
Arduino Uno Cost – 500 ₹
16*2 LCD Cost – 200 ₹
Moiture Sensor Cost – 150 ₹
Connecting Wires Cost – 150 ₹

CONCLUSION:
The soil moisture response monitoring system designed is very simple to understand and handle. It can be operated by all age-groups of farmer. It can be reprogrammable to add more features. The moisture is measured up to the root zone of the crop. Thus it can be used to check the moisture value for any crop. Sensor can be placed vertically in the soil to check the depth of irrigated water and also it can be placed horizontally at different heights in the soil according to the crop. It is user friendly and can also be used by uneducated farmers. The moisture is checked in the morning and the evening and it is found that moisture is linear up to 20%VWC (volumetric water content) and afterwards output voltage becomes almost constant.

5.2.5 Home Automation using loT / Any other methodology

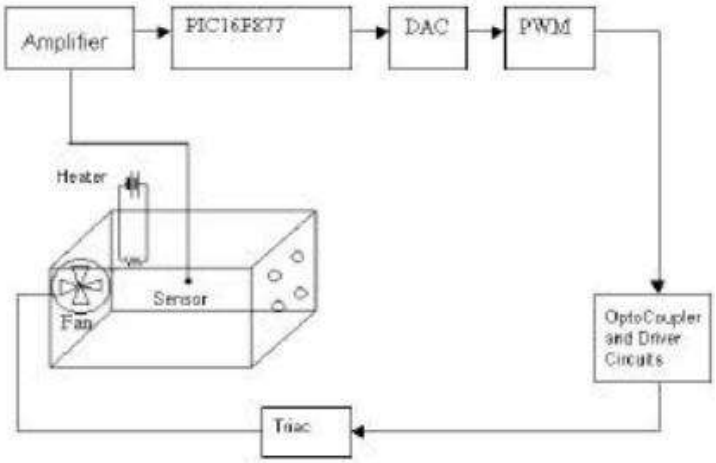
Introduction:

- Home automation is providing home safety for dwellers. It automatically turn lights on in closets, stairways, and other dark places. Thus accidentally tripping or running into thing is decreased. Everywhere environmental issues are raised before introducing any technology. In this regard home automation provides a better solution. Devices included in home automation consume less power. Besides, it saves energy. Thus home automation technology is so far environmentally suitable. Moreover, the technology keeps mind in peace. In most cases, guardians face problems and always they keep tensioning for the safety of their children staying in home.
- In home automation system internet access is used to control from far away. For years, internet is used only for surfing pages, searching information and downloading software and other things. Advancement of technology is forcing to make interaction internet with machineries and devices. In home automation system comfort and security of houses have been enhanced. Besides, people are concerning over costs. In offices, a division of people are employed only to make supervision of some manual means typed work. Home automation is replacing those arrangements. For this, cost is highly reduced. Besides, for manual labour engaged to control appliances waste energy in cases. It is seen that appliances continue to run though people are not present in their respective places. For this energy cannot stop consuming. If this happens for a long time then there have possibility to misuse energy in a huge amount. To overcome this obstacle home automation is encouraged to apply. Home automation does that challenging work. That‘s why; home automation is presented as energy efficient. In recent years home automation is gaining much popularity. The trend is also in favour of using home automation technology. If we look around residences, malls, offices, use of home automation systems will draw attention.

Existing System:

Temperature Control Using PIC16G877

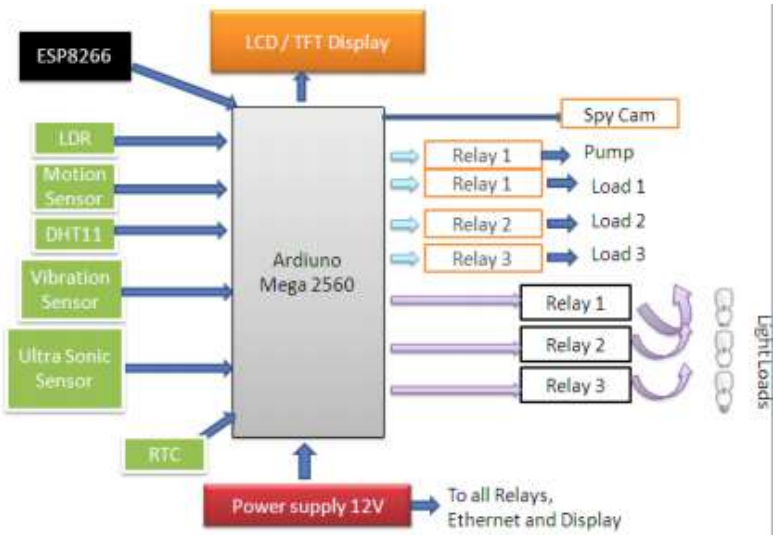
The system is composed of a 300W heater resistance, a temperature sensor, a measurement amplifier, a controller, a digital/analog converter, a pulse width modulator, a TRIAC triggering circuit and a 220V AC fan. It is shown in the figure 1.



(Fig.43Home automation using loT)

Description of the system and Hardware Model:

A block diagram is a diagram of a system in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks. They are heavily used in engineering in hardware design, electronic design, software design, and process flow diagrams.A diagram showing in schematic form the general arrangement of the parts or components of a complex system or process, such as an industrial apparatus or an electronic circuit.



(Fig.44 Hardware model)

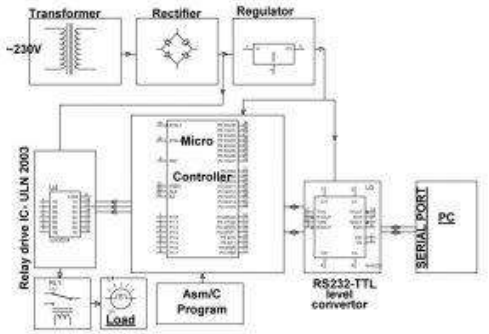
The proposed block diagram is shown in figure 3. The main block of our project is the arduino module which falls next in line. There are two relays to serve the purpose of on and off. The power supply provided for arduino is 5V.It is given through an adapter. The power supply given to the relays is 12V and it is given from a step down transformer. The LCD display is used in

future extension of the project. The relays used act as Main Switchs. The relays are programmed to operate without delay. The signals for the relay are given from arduino board.
The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila. It is shown in figure.

Conclusion:
Today in this century home and offices are equipped with various machineries. Besides, people have various devices for surfing in web. That‘s why we have introduced a system that can be accessed from all sorts of devices and database can be updated from anywhere. If particular device works on, the other means of devices will be easily operated. The database is developed such a way that can be accessed from any sort of device that supports internet. In this regard motion and vibration sensor is brought here because of its high quality sensing. The system is very easy to install. For this, just need HD spy camera connection for recording and for motion detection a motion sensor and vibration sensor, the ultrasonic range detector is to detect the distance of the object, temperature and humidity sensors to maintain the room temperature.Water level sensor to filling the overhead tank. These are controlled by arduino controller. Home Automation is definitely a resource which is capable of make a home setting automated. People can be in command of their electrical devices via these Home Automation devices and set up the controlling actions in the workstation. We think this device have high potential for marketing in the future.

5.2.6 PC Based Electrical Load Control

The PC based electrical load control system can be built with 8051 series Microcontroller, Level Shifter IC, DB Connector, Relays, Relay Driver, Transformer, Diodes, Capacitors, Resistors, LED, Crystal, Lamps, Keil compiler and Language: Embedded C or Assembly.

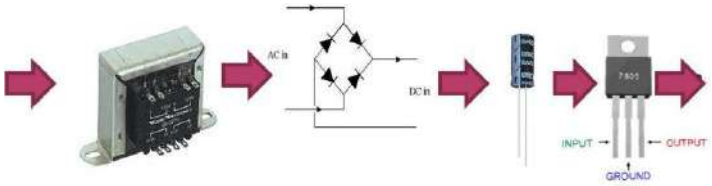


(Fig.45 PC based electrical Load Control)

- Keil an ARM Company makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards, and emulators for ARM7/ARM9/Cortex-M3, XC16x/C16x/ST10, 251, and 8051 MCU families.
- Compilers are programs used to convert a High Level Language to object code. Desktop compilers produce an output object code for the underlying microprocessor, but not for other microprocessors.
- i.e the programs written in one of the HLL like 'C' will compile the code to run on the system for a particular processor like x86 (underlying microprocessor in the computer).
- For example compilers for Dos platform is different from the Compilers for Unix platform So if one wants to define a compiler then compiler is a program that translates source code into object code.

Power Supply:

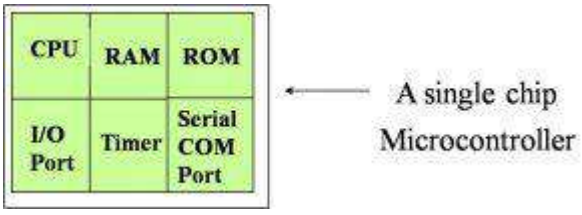
- The 230V AC supply is first stepped down to 12V AC using a step down transformer.
- This is then converted to DC using bridge rectifier.
- The AC ripples is filtered out by using a capacitor and given to the input pin of voltage regulator 7805.
- At output pin of this regulator we get a constant 5V DC which is used for MC and other ICs in this project.



(Fig.46 Power Supply)

Microcontroller:

It is a smaller computer; it has on-chip RAM, ROM, I/O ports. The features of this microcontroller include the following.

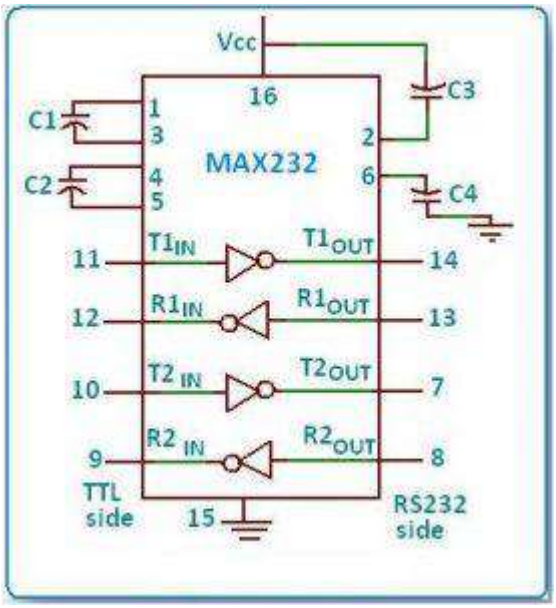


8K Bytes of In-System Programmable (ISP) Flash Memory, 4.0V to 5.5V Operating Range, Fully Static Operation: 0 Hz to 33 MHz, 256 x 8-bit Internal RAM, 32 Programmable I/O Lines, Three 16-bit Timer/Counters, Eight Interrupt Sources, Full Duplex UART Serial Channel

MAX232:

- The MAX232 is an integrated circuit that converts signals from an RS-232serial port to signals suitable for use in TTL compatible digital logic circuits.
- The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals.

- When a MAX232 IC receives a TTL level to convert, it changes a TTL Logic 0 to between +3 and +15V, and changes TTL Logic 1 to between -3 to -15V, and vice versa for converting from RS232 to TTL

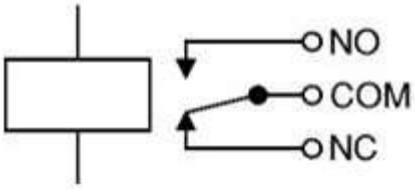


DB Connector

Db9 Connector:

The DB9 (originally DE-9) connector is an analog 9-pin plug of the D-Sub miniature connector family.

Relay:



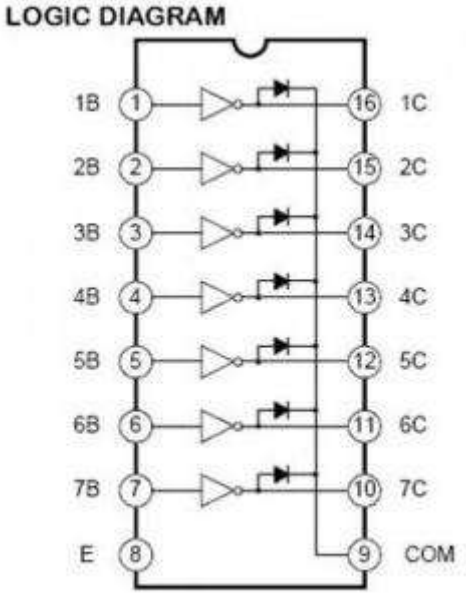
Relay

- A relay is an electrically operated switch.
- Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts.
- The coil current can be on or off so relays have two switch positions and have double throw (changeover) switch contacts as shown in the diagram.
- Relays allow one circuit to switch a second circuit which can be completely separate from the first.
- For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit.
- There is no electrical connection inside the relay between the two circuits, the link is magnetic and mechanical.
- To drive relay through MC ULN2003 relay driver IC is used.
- Relay Driver ULN2003

ULN is Relay Driver Application:

- The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays.

- It consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diode for switching inductive loads.
- The collector-current rating of a single Darlington pair is 500mA.
- The Darlington pairs may be paralleled for higher current capability.
- The ULN functions as an inverter.
- If the logic at input 1B is high then the output at its corresponding pin 1C will be low.



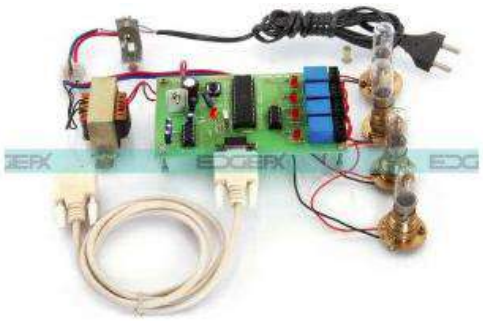
Relay Driver ULN2003

Project Working:

The main goal of this project is to control the electrical load through a PC (personal computer). For example, lighting in the theatre can be controlled form the PC for superior stage management.

At present, they are physically controlled which makes it complex to organize the lighting with the particular scene. By employing this system, one can manage the electrical load ON/OFF by just being seated at one place using a PC.

This system is incorporated with the electrical loads and also associated to the PC where centralized control takes place. It uses an MAX 232 protocol from the microcontroller to communicate with the PC.



PC Based Electrical Load Control System Project Kit

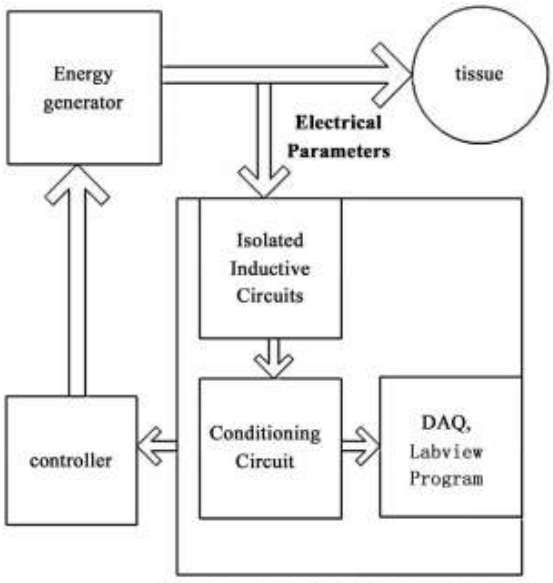
(Fig.47 Project kit)

To switch the appliances, we employ Hyper Terminal on personal computer. Once the connection is established with the PC, then the system begins working. The 8051 family microcontroller is used in this project.
Further, this project can be improved by implementing a GUI based control board on the PC with suitable embedded system software. The power control can also be integrated using power electronics devices.

5.2.7 Electrical Parameters measurement

Introduction:

The electrosurgical instrument is a kind of high frequency power energy generator with an output energy frequency ranging from 200 kHz to 3.3 MHz and an power from dozens to hundreds of watts [1,2]. The mechanism it functions by is that the heat effect resulted from high frequency energy is used for the vaporization in biological tissues, ionization, and the breakage of hydrogen bond, coagulation and degeneration of proteins [3, 4]. Compared with traditional surgical appliance, electrosurgical instrument can perform cutting and coagulation simultaneously so as to reduce operation bleeding, make surgical vision clear and shorten the length of operation. Yet, since the value and duration of its outputenergy are generally subject to the subjective judgment of doctors according to their own experience, it also brings along some side effects, such as causing thermal damage for an over releasing of energy or the failure of sealing due to the inadequacy of energy. To reduce this kind of unwanted effects caused by human factors, the development of the instrument from a single combination of cutting and sealing to intellectualization is just in flight, promising a real-time monitoring of tissue status and therefore a self-regulated output of energy. The experiment results show a close connection between biological impedance and tissue status. So the voltage and current parameters working on biological tissues can be used as feedback quantity for monitoring the states of biological tissues and determining the amount of energy output. The detection of such feedback needs to be conducted under a high-frequency power environment. In this sense, it is a matter of priority to ensure protection of the detection circuit from the possible damage to be resulted from such power energy and a timely monitoring. In addition, as the voltage and current data measured by the electrical parameters measurement system have undergone something of reduction and processing, it is one of the keys to precisely transform them into the effective values of the real voltage and current.



electrical parameters measurement system.

Based on the thoughts stated above, an electrical parameters measurement system is designed on the basis of Labview. It detects voltage and current from an energy generator in an isolated way, regulates the signals, and adjusts the measured data in Labview. The detailed design and experiment are stated below.

CHAPTER: 6

Swatchh Bharat Abhiyan (Clean India)

6.1 Swatchhta needed in allocated village – Existing Situation with photograph:

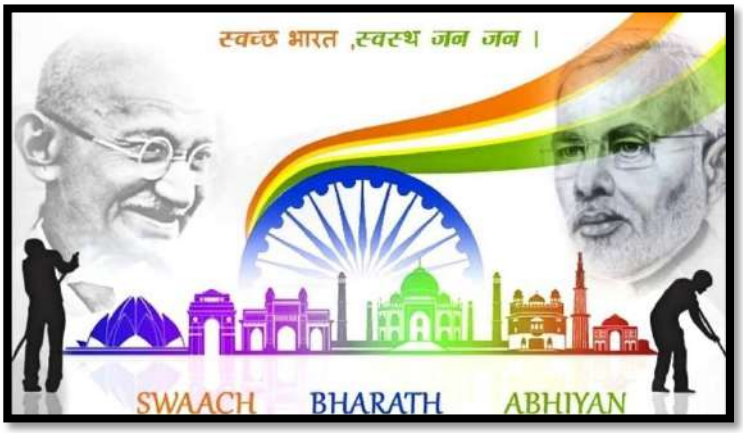
Swachh Bharat Mission is a mass movement for cleanliness launched on 2nd October 2014 by the Prime Minister of India. The Swachhta Abhiyan has turned into a National Movement with citizens now becoming active participants in cleanliness activities across the nation. The dream of a 'Clean India' once seen by Mahatma Gandhi is being realized with millions of people across the country

(Fig.49 Swatchh Bharat Abhiyan)

joining the cleanliness initiatives of the government departments, NGOs and local community centers to make India clean as a part of this 'Jan Andolan'.

Swachh Bharat Mission – NIRD & PR Perspective:

In response to Prime Minister of India's call for Clean India (Swachh Bharat) by 2nd October 2019, every individual and organization in India has joined hands and is geared up towards realizing that splendid dream. For the size of the population (1.27 billion, in Jan. 2015), and given the culture of open defecation for decades, this deadline (2nd October 2019) puts across the typicality of a herculean or superhuman task'. Yet, we have our sleeves rolled up and are on the task. The Central Government of India has proposed to the state governments a number of financing-options, technology-choices, and



(Fig.50 Swatchh Bharat Abhiyan)

promotional strategies with a view to giving them the administrative freedom to be able to take on this task. This task entails construction of over 110 million toilets, and bringing over 600 million people to use toilets regularly. One must note that Swachh Bharat Abhiyan - SBA (Clean India Mission) is not merely about toilet construction and use, the focus of SBA is given in box – 1. SBA, by strategy, is a people‘s movement initiated by the government. Therefore, the government uses many strategies including _social marketing techniques‘ in order to achieve Clean India by 2019. Box - Focus of Swachh Bharat Abhiyan, Elimination of open defecation, Conversion of insanitary latrines into pour flush toilets, Eradication of manual scavenging , Prevention of pollution of water sources, Ensuring cleanliness and hygiene in public areas

6.2 Guidelines – implementation in allocated village:

Mission Objectives:

- Elimination of open defecation
- Eradication of Manual Scavenging
- Modern and Scientific Municipal Solid Waste Management
- To effect behavioral change regarding healthy sanitation practices
- Generate awareness about sanitation and its linkage with public health Capacity Augmentation for ULBs to create an enabling environment for private sector participation in Capex (capital expenditure) and Ovex (operation and maintenance) Mission Strategy. The components are Rs. 62,009 Crore. The Government of India share as per approved funding pattern amounts to Rs. 14,623 Crore. In addition, a minimum additional amount equivalent to 25% of GoI funding, amounting to Rs. 4,874 Crore shall be contributed by the States as State/ ULB share.

Mission Components:

- Household toilets, including conversion of insanitary latrines into pour-flush latrines
- Community toilets,
- Public toilets and urinals
- waste management
- IEC & Public Awareness
- Capacity building and Administrative & Office Expenses (A&OE)

6.3 Activities Done by students for allocated village

While traveling doesn't throw any wrapper, paper or any dry waste on road. Keep it in your bag or pocket (as it is a dry waste you can keep them in your bag/pocket).

- Keep paper bags with yourself to store wet waste and throw them in dustbin only.

- Spitting on roads (as it can be the reason of viral disease).
- Avoid chewing Pan-Masala, Gutka and Tobacco.
- Avoid use of plastic bag
- Follow government's rules and regulations.
- Spread awareness to keep our village clean.

Proposed Activities:

(Fig.51 Swatchh Bharat Abhiyan)

- Collection of door to door garbage on daily basis from all staff quarters, office rooms, schools and Guest Houses.
- Segregation of the waste into bio-degradable/semi-degradable/non-degradable and proper disposal.
- Putting up dustbins at major public areas for collection of public waste.
- Awareness building among campus residents, school children and employees about segregation of waste.
- Helpline number and Nodal Officer to look into the matter and receive complaints about garbage collection / disposal etc., has been setup.

CHAPTER: 7
Village Condition due to Covid-19

7.1 Take steps in allocated village related to existing situation with photograph:

Following information was given by the student to the villagers with respect to the existing condition of Covid-19:

(Fig.52 Rules & Regulation COVID-19 Followed by villagers)

- Maintain at least 1m distance between two people, to reduce risk of infection due to coughing and sneezing.
- Maintain an even greater distance between yourself and others when you are indoors.
- Wearing of mask should be compulsory.
- Wash your hands before entering house.
- For cleaning hands, sanitizers must be used.
- Avoid un-necessary out going from home.
- Do not touch your mouth, eyes or nose.
- If you have a fever, cough and difficulty in breathing, seek medical attention.

- COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization.
- **Most common symptoms:**
  Fever, Dry cough, Tiredness
- **Less common symptoms:**
  aches and pains, sore throat, Diarrhoea, Conjunctivitis, Headache, Loss of taste or smell, A rash on skin, or discoloration of fingers or toes
- **Serious symptoms:**
  difficulty breathing or shortness of breath, chest pain or pressure, loss of speech or movement

7.2 Activities done by Students for allocated village with photograph

- We conducted surveys needed for our project work for making Mota Khutavada village a “Smart Village”.

- We have unable to conduct door to door survey because of Covid – 19 restrictions and strict command of Sarpanch. However, Sarpanch was very helpful and kind.
- We conducted mainly Techno-Economic Surveys needed for our project work.
- After conducting surveys, we decided to have designs related to building planning after consulting the Sarpanch & our Guide.

(*Fig.53 Rules & Regulation followed by villagers)*

- We went to the school of the village which is more than 50 years old and is in severe bed condition. This building requires immediate attention and rebuilding work from respected authorities.
- Student of the school of this village are safe at home because of this bed condition of the school structure and also Covid – 19.

We visited Mota Khutavada village after being allocated to us after 2 & half months after the lockdown was partially ended or we can call travelling without passes were allowed. Because no one would believe us that we are going to make a smart villagr when the collage is also closed. So past few months were tough for us.

- Before we went to the village we took and used gloves, masks and sanitizes.
- Also, we contacted Sarpanch of the Mota Khutavada village (Panchiben) before visited to the village.
- Instead of handshake, we did ‘namaste’ and also insisted others to wear masks properly to whom we greeted (if found not wearing mask properly).
- We kept our self-updated with covid news from the online sources as well as offline sources.
- We took measures before visiting and scheduled the meeting as per our talks on phone prior to visit so that we didn’t get in touch with any other not associated with our work at this peek moment of pandemic.
- We took warm water and food cooked from home.
- We met “Talati Mantri” also and discussed about our work and asked for the data. He was very helpful and kind.

7.3 Any other step taken by student

Due to Covid-19 situation this activity is not done for the safety reason.

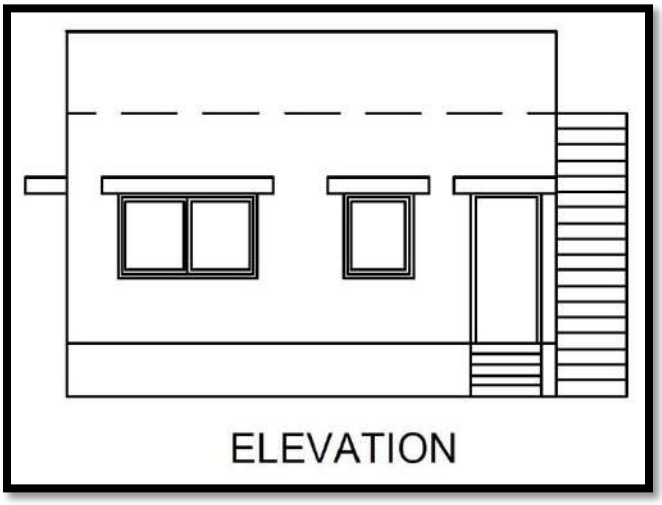
CHAPTER: 8

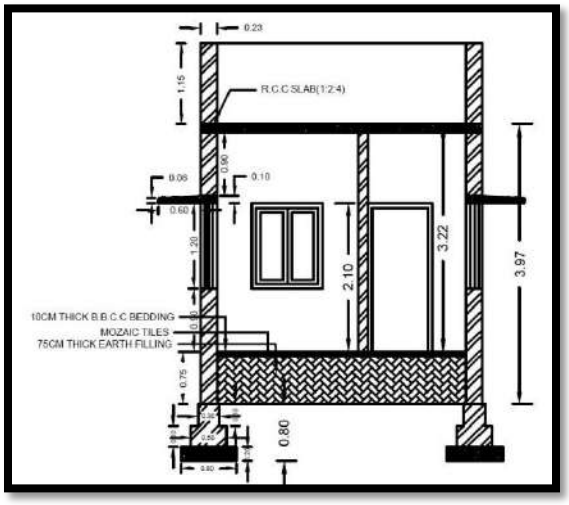
Sustainable Design Planning Proposal (Prototype Design) Part I

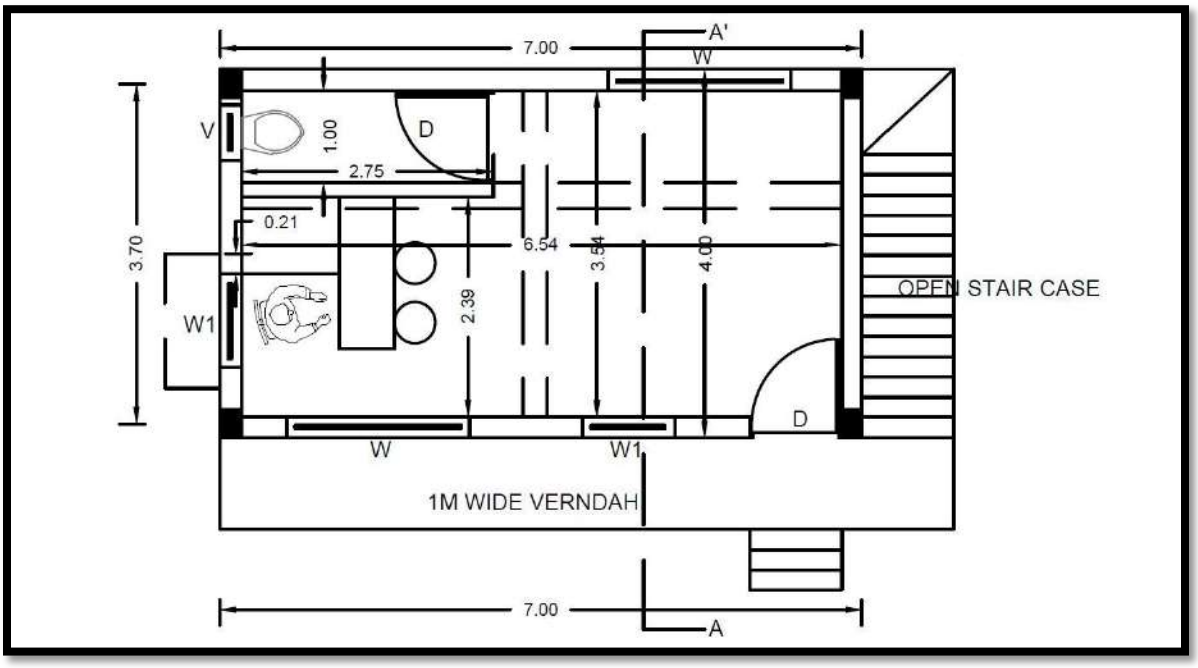
8.1 Design Proposal

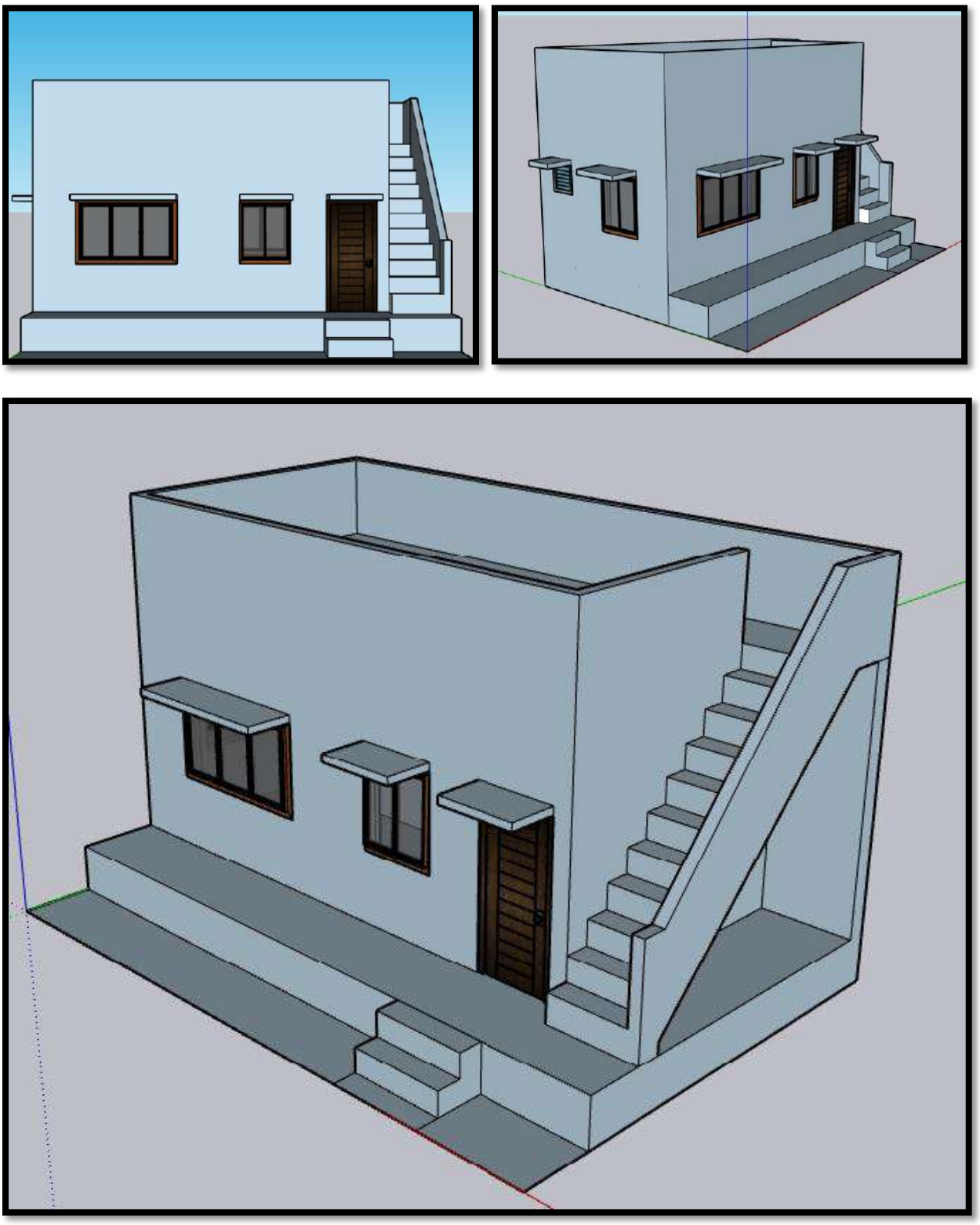
8.1.1 Social Design (Civil)

Dispensary:









(Fig.54 2D and 3D view of dispensary)

MASUREMENT SHEET						
Sr.	**Description**	**No**	**L**	**B**	**H**	**QUANTITY**
1.	**Excavation for foundation**					
	L.W:1	2	7.67	0.8	0.8	9.8176
	L.W:2	1	3.76	0.8	0.8	2.4064
	S.W:1	2	2.8	0.8	0.8	3.584
	Steps	1	1	0.4	0.8	0.32
						16.128
2.	**P.C.C in Foundation**					
	L.W:1	2	7.67	0.8	0.2	2.4544
	L.W:2	1	3.76	0.8	0.2	0.6016
	S.W:1	2	2.8	0.8	0.2	0.896
	Steps	1	1	0.4	0.2	0.08
						4.032
3.	**Brickwork up to plinth level**					
	0.5m Wide					
	L.W:1	2	7.37	0.5	0.3	2.211
	L.W:2	1	3.46	0.5	0.3	0.519
	S.W:3	2	2.5	0.5	0.3	0.75
	0.3m Wide					
	L.W:1	2	7.17	0.3	0.3	1.2906
	L.W:2	1	3.26	0.3	0.3	0.2934
	S.W:3	2	2.3	0.3	0.3	0.414
						5.478
4.	**D.P.C @ Plinth level**					
	L.W:1	2	7.1	0.23	0.1	0.3266
	L.W:2	1	3.19	0.23	0.1	0.07337
	S.W:3	2	1.73	0.23	0.1	0.07958
5.	Brickwork in super structure					
	L.W:1	2	7.1	0.23	3.22	1.4812
	L.W:2	1	3.19	0.23	3.22	2.362514
	S.W:3	2	1.73	0.23	3.22	2.5624
						28.491
	Deduction for door and window					
	D	2	1	0.23	2.1	0.966
	W	2	2	0.23	1.2	1.104
	W1	2	1	0.23	1.2	0.552
	V	1	0.6	0.23	0.6	0.0828
	Total deduction for door and windows = 2.7048					

	Deduction for lintel above door and window with 10 cm offset on both faces					
	D	2	1.46	0.23	0.1	0.0671
	W	2	2.46	0.23	0.1	0.113
	W1	2	1.46	0.23	0.1	0.0671
	V	1	1.06	0.23	0.1	0.0243
						0.2718
	Total brickwork in super structure 28.49 - 2.70 – 0.27 = 25.52 cu.m					
6.	Providing 15mm thick cement plaster in single coat on Rough (Similar)side of single or half brick walls for interior plastering up to floor two level And finished even and smooth in (ii) Cement : mortar 1:4(1-cement : 4sand)					
	Room					
	L.W:1	2	6.54		3.22	42.1176
	S.W:1	2	3.54		3.22	22.7976
	W.C					
	L.W:1	1	2.75		3.22	8.855
						73.7702
	Deduction for door and window					
	D	1	1.2		2.1	2.52
	W	1	2		1.2	2.4
	W1	1	1		1.2	1.2
	V	0.5	0.6		0.6	0.18
	Total deduction for plaster = 6.3					
	Total interior plaster work 73.77 - 6.3 = 67.47 sq.m					
7.	Providing 20 mm thick double coat cement plaster on exterior brick / concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 (1 Cement : 2 Coarse sand) finished with trovel including scaffolding curing etc. complete					
	L.W.:1	2	7		3.37	47.18

	S.W.:1	2	4		3.9	31.2
						78.38
	Deduction for door and window at exterior					
	side					
	D	1	1.2		2.1	2.52
	W	2	2		1.2	4.8
	W1	2	1		1.2	2.4
	V	1	0.6		0.6	0.36
						10.08
	Net exterior plaster 78.38 – 10.08 = 68.30 sq.m					
8.	Providing and laying Vitrified tiles 8 to 10 mm thick , 24" x 24" in flooring on 10mm thick cement plaster 1:3 (1cement : 3 coarse sand) and jointed with white cement slurry	1	6.54	3.54		**23.1516**
9.	Providing and fixing 35 mm thick shutters for Doors including anodized steel butt hinges with necessary screws. (A) Indian teak wood. (i) Fully Paneled.					
	D	2	1.2		2.1	5.04
	W	2	2		1.2	4.8
	W1	2	1		1.2	2.4
	V	1	0.6		0.6	0.36
	Total wood work for door and window shutter = 12.6					
10.	R.C.C work for slab	1	7	4	0.205	5.74
11.	R.C.C work for lintel					
	D	2	1.2	0.23	0.1	0.0552
	W	2	2.2	0.23	0.1	0.1012
	W1	2	1.2	0.23	0.1	0.0552
	V	1	0.8	0.23	0.1	0.0184
	Total lintel work = 0.23					
12.	Quantity of concrete in beam	3	6.54	0.23	0.3	1.35378
		3	3.54	0.23	0.3	0.73278
13.	**Formwork for beams**					
	Bottom	1	7	0.23		1.61
	Sides	2	4		0.3	2.4
	Ends	2		0.23.	0.3	0.138
						4.148
14.	Quantity of Steel bars for beams					

	20 mm dia. straight bar			
	L = 6.5m + (0.23 + 0.23) + 2 (9 x 0.020) - (2 x0.025) = 7.27 m total weight of straight bar is = 4 x 69.82 = 279.28 kg	6	7.27 @ 2.47 kg/m	107.74
	20 mm dia. bent up bars x = [0.3 – 2 x 0.025 -2 x 0.008 – 2 x 1] / 2 x 0.020 = 0.214 m L = 7.27 + 2 x (0.45x) = 7.07 + 2 x (0.214 x 0.45) = 7.23 m No of bars = 2 **For 6 nos. of beams total weight of steel** **= 6 x 35.8** **= 214.8 kg**	2	7.46 @ 2.47 kg/m	36.86kg
	16 mm dia. anchor bar L = 6.53 + 2 x 9 x 0.016 – 2 x 0.025 = 6.768 For 4 Nos. of beam total wt. of anchor bars = 4 x 28.83 = **115.33 kg** B = 0.3 – 2 x 0.025 – 2 x 0.008 = 0.234m A = 0.230 – 2 x 0.025 – 2 x 0.008 = 0.174m L = 2 (0.174 + 0.234) + 0.15 = 0.966m No. of stirrups = 6.53 – 2 x 0.02 / 0.3 **= 21.63 say 22 nos.**	22	0.966@ 0.35 kg/m	7.552 kg

(Table 16 Measurement Sheet of Dispensary)

ABSTRACT

ITEM NO	QUANTITY	DESCRIPTION OF ITEM	RATE	UNIT	AMOUNT
1.	16.12 Cu.m	**Excavation for foundation** up to 1.5 Mt. depth including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 Mt. lead in (B) Dense or hard soil (S.O.R.P. 18/l.No.10.0(B))	106.00	Cu.M.	1708.0
2.	2.46 Cu.M.	Providing and laying Cement concrete 1:4:8 (1- Cement : 4 – coarse sand 8 crushed stone aggregate 40 mm nominal size) and curing excluding cost of form work in (A) Foundation and Plinth (As per R.A.)	2397.50	Cu.M.	5896.6
3.	5.93 Cu.M	Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg./Sq.M. in foundation and plinth in C.M. 1:5 (1-Cement, 5- Fine Sand) (B) Conventional (S.O.R.P. 40/I. No. 6.12 (B))	3539.00	Cu.M.	20986.27
4.	4.15 Cu.M.	Providing and laying ordinary cement 1:1.5:3 (1- Cement : 1.5- coarse sand :3 graded stone aggregates 20 mm nominal size) and finishing smooth with, curing etc. complete including the cost of formwork but excluding the cost of reinforcement for R.C.C. work in (A) BEAMS : (1) Having cross – sectional area more than 0.05 Sq.M. and up to 0.08 Sq.M. (As per R.A.)	6659.00	Cu.M.	27634.8
5.	25.52 Cu.M	Brickwork using common burnt clay building bricks having crushing strength not less than 35	3653.0	Cu.M.	104079.9

		Kg./Sq.M. in super structure up to G.F. in cement Mortar 1:5 (1-Cement : 5-fine sand) (B) Conventional (S.O.R.P. 40/I. No. 1- 6.12 B+P.41/I.No. 6-6.19 B)			
6.	16.50 Cu.M.	Filling in foundation and plinth with marum or selected soil in layers of 20 cm. thickness watering ramming and consolidation etc. complete. (S.O.R.P. 20/I.No.8-0.0)	354.00	Cu.M.	5841.00
7.	0.23 Cu.M.	Providing and laying ordinary cement concrete 1:1.5:3 (M-200) (1- cement, 1.5-course sand, 3-graded stone aggregate 20 mm.Nominal size) and curing complete including the cost of formwork for R.C.C. lintel (excluding the cost of reinforcement) (As per R.A.)	5996.00	Cu.M.	1379.0
8.	2.0 Cu.M.	Providing and laying ordinary cement 1:1.5:3 (1- Cement :1.5-coarse and sand :3 graded stone aggregate 20 mm nominal size) and finishing smooth with , curing of formwork but excluding the cost of reinforcement for R.C.C. work in (A) BEAMS : (2) Having cross sectional area more than 0.08 and up to 0.12 Sq.M. (As per R.A.)	6133.00	Cu.M.	12266.0
9.	5.74 Cu.M	Providing and laying ordinary cement concrete 1:1.5:3 (1-cement, 1.5- coarse sand aggregate 20 mm. nominal size) and finishing smooth with curing etc. complete including the cost of form work but excluding the cost of reinforcement for R.C.C. work in slab having more than 10 cm and up to 13 cm thickness. (As per R. A.)	5581.00	Cu.M.	32034.9
10.	107.74 kg.	Providing Thermo Mechanically	55.00	Kg.	59257.0

		Treated Bars (TMT bars) FE-415 of IS standard for R.C.C. works including bending, binding and placing in position etc. complete. (S.O.R.P. 40/I. No. 1-6.12 B+P.41/I.No. 6-6.19 B)			
11.	12.60 Sq.M.	Providing and fixing 35 mm thick shutters for doors, windows and clearstory windows including Indian teak wood frames 10 cm.x 7 cm. size including anodised alluminium fixures and fastenings including primer coat of approved quality and two coats of oil painting etc.complete.(ii)Fully paneled (S.O.R.P. 59/I. No.30(ii)) (S.O.R.P. 40/I. No. 1-6.12 B+P.41/I.No. 6-6.19 B)	5413.00	Sq.M.	68203.8
12.	67.47 Sq.M	Providing 10 cm thick cement plaster in singal coat on brick/concrete walls for interior plastering upto floor two level and finished even smooth in (i) Cement mortar 1:3 (1- cement :3- sand) including floting coat of neat cement slurry. (S.O.R.P. 102/I. No. 1-17.58 (i)+ S.O.R.P. 103/I. No. 17.69)	132.30	Sq.M.	8906.0
13.	68.30 Sq.M.	20mm thick sand faced cement plaster on walls upto height 10 meters above ground level consisting of 12 mm thick backing coat of C.M. 1:3 (1- cement:3-sand) and 8 mm thick finishing coat of C.M. 1:1 (1- cement : 1-sand)etc. complete. (S.O.R.P. 104/I.No. 9- 17.95)	230.00	Sq.M.	15709.0
14.	10.60 Sq.M.	Finishing wall with water proofing cement paint of wall surfaces (two coates) to give an approved brand and manufacture and of required	41.50	Sq.M.	439.9

		shape even shade after thoroughly brushing the surface to remove all surfaces to remove all dirt and remains of loose powered materials.			
15.	12.60 Kg.	Providing and fixing M.S. grill of required pattern to wooden frame of windows etc. with M.S. flats and of required spacing and frame around square or round bars with round headed bolts and nuts or by screws plain grills.(As per R.A.)	79.78	Kg.	1005.22
16.	23.15 Sq.M.	Providing and laying 24''x 24'' vitrified 8 mm thick tiles flooring over 20 mm (Average) base of cement mortar 1:6 (1- cement, 6-coarse sand) on new surface or fixing on existing flooring by adhesive material including dismentalling of existing flooring and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete for light shade. (S.O.R.P. 88/I No. 22- 14.36)	923.00	Sq.M.	21367.4
Total Rs.					3,97,898.09
Add 1 % Q.C. Rs.					3978.98
Add 3 % Conti. L.S. Rs.					11936.94
Total Rs.					4,13,814.01
Say Rs.					4,14,000.

(Table 17 Abstract sheet of Dispensary)

STRUCTURAL DESIGN OF SLAB

DESIGN OF SLAB

- Effective depth
  Say d = 110 mm
  D = 135 mm

DESIGN OF BEAM

Reinforcement
- Along l_x
Provide 8 mm Ø @ 190mm c/c

DESIGN OF COLUMN

MAIN STEEL IN COLUMN
Provide 4-20 mm dia. bar + 4-12mm dia. bar (1256 + 452 = 1706 2)
LATERAL TIES
Provided lateral ties 6 mm- 230 mm c/c

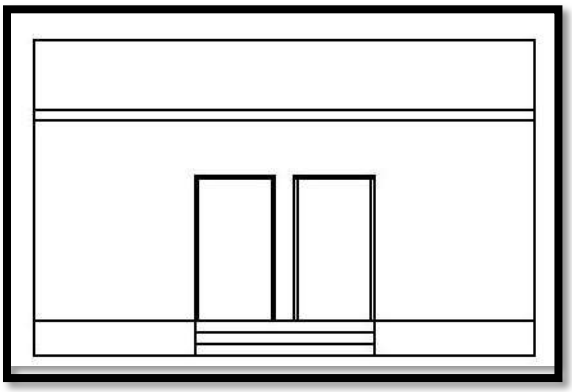
DESIGN OF FOOTING

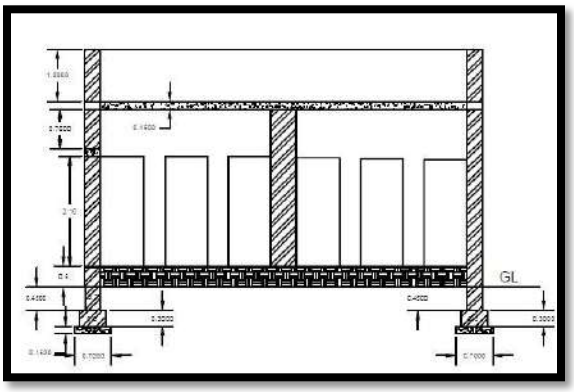
Size of footing
Size of footing 2.20 m x 2.20 m = 4.84 > 3.81 m2

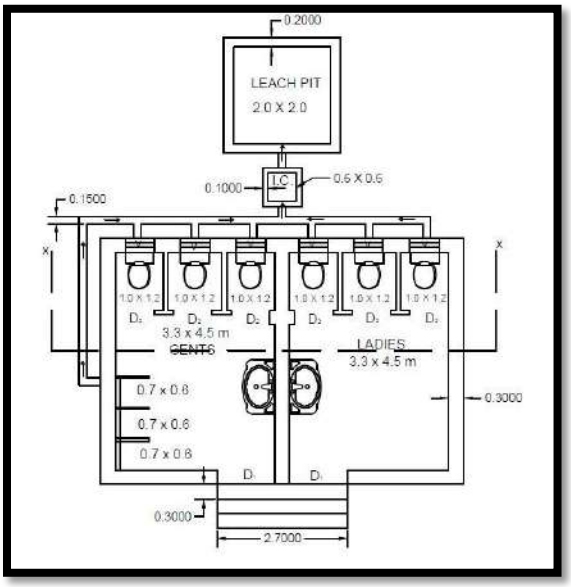
$A_{st\ provide}$ = 264 mm2 - Along l_y Provide 8 mm Ø – 200 mm c/c • STEEL IN TOP OF BEAM Provide 3-10mm bars (Ast = 235mm2) • STEEL IN BOTTOM OF BEAM Provide 4-20mm (provide Ast = 12562) Provide 8mm @300 mm c/c VERTICAL STIRRUPS	D = 700 mm Edge depth = 300mm Reinforcement In both direction, Provide 12 -14mm dia. bar on both faces **Ast = 1470 mm^2**

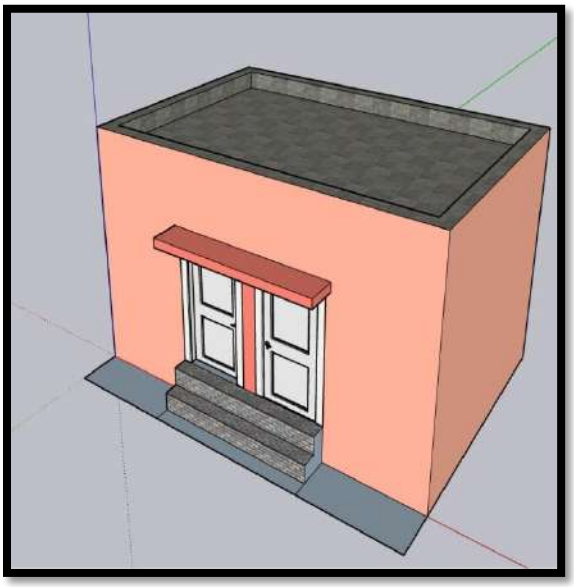
8.1.2 Physical design (Civil)

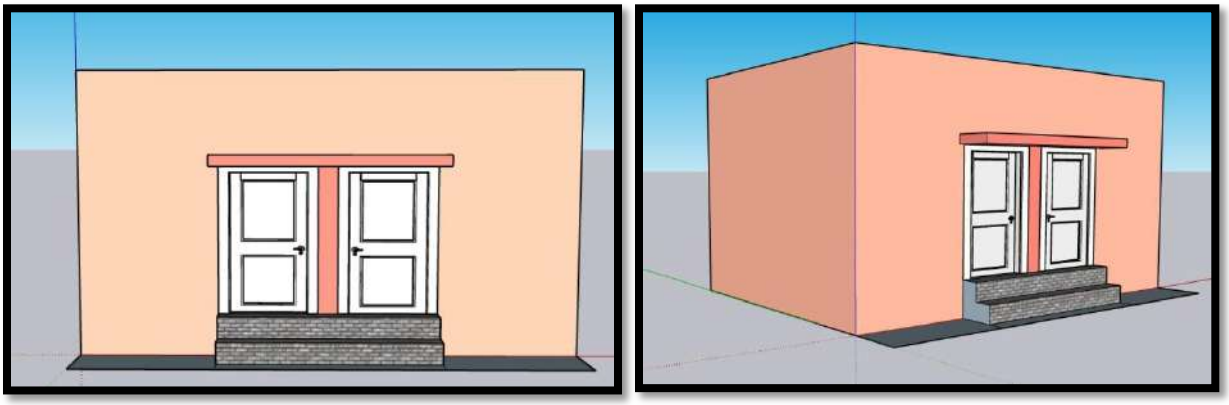
Public Toilet Block







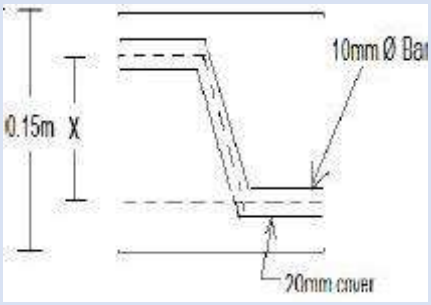




(Fig.55 2D and 3D View of Public Toilet Block)

MEASUREMENT SHEET						
Sr.	Description	No	L	B	H	QUANTITY
1.	**Excavation for Foundation** L=42 –14 x (0.7/2) = 37.1	1	37.1	0.7	0.9	23.37 Cu.m
2.	**P.C.C. for foundation** L =42 – 14 x (0.7/2) = 37.1	1	37.13	0.7	0.15	3.89 Cu.m
3.	**Brick work in foundation** L = 37.1 m **Step no:1** L = 42 – 14 x (0.5/2) = 38.5	1	38.5	0.5	0.30	5.77 Cu.m
	Step no.2 L = 42 – 14 x (0.3/2) = 39.9	1	39.9	0.3	0.95	11.37 Cu.m
						Total = 17.14 Cu.m
4.	**Brick masonry work in super structure** L =39.9m	1	39.9	0.3	3.0	35.91 Cu.m
	Deduction for door & ventilator					
	Door 1	2	1.2	0.3	2.1	1.512 Cu.m
	Door 2	6	0.9	0.3	2.1	3.40 Cu.m
	Ventilator	6	0.6	0.3	0.5	0.54 Cu.m
	Lintel work					
	Ventilator	6	0.9	0.3	0.15	0.243 Cu.m
	Door:1	2	1.5	0.3	0.15	0.135 Cu.m
	Door :2	6	1.2	0.3	0.15	0.320 Cu.m

						Total = 6.148 Cu.m
						Total brick work in Super Structure = (35.91 - 6.148) = 29.762
5.	**Internal plaster work**					
	For open space	2	3.3	-	3.0	19.8 Sq.m
		2	-	3.0	3.0	18 Sq.m
	For toilet	2X6	0.9	-	3.0	32.4 Sq.m
		2X6	-	1.2	3.0	43.2 Sq.m
						Total = 113.4 Sq.m
	Deduction					
	Door 1	0.5X2	1.2	-	2.1	2.52 Sq.m
	Door 2	6	0.9	-	2.1	11.34 Sq.m
	Ventilation	0.5X6	0.6	-	0.5	0.9 Sq.m
						Total = 14.76 Sq.m
						Total Deduction =(113.4 - 14.76) = 98.64 Sq.m
6.	**External plaster work**					
	Side :1	2	7.5	-	4.5	67.5 Sq.m
	Side:2	2	5.1	-	4.5	45.9 Sq.m
	Deduction					
	Door :1	0.5X2	1.2	-	2.1	2.52 Sq.m
	Door :2	0.5X6	0.6	-	0.5	0.9 Sq.m
						Total = 113.5 Sq.m
						Total Deduction =(113.4 – 3.42) = 109.98 Sq.m
7.	**Dedo work**					
	For toilet					
	Side :1	2X6	0.9	-	1.0	10.8 Sq.m
	Side:2	2X6	1.2	-	1.0	14.4 Sq.m
	For urinal	2	2.8	-	1.0	5.6 Sq.m
	Deduction					
	Door :2	6	0.9	-	1.0	5.4 Sq.m
						Total Dedo work = (30.8 – 5.4) = 25.4 Sq.m
8.	**Flooring work**					
	For open space	2	3.3	3.0	-	19.8 Sq.m
	For toilet	6	0.9	1.2	-	6.48 Sq.m
	For door sill					
	Door :1	2	1.2	0.3	-	0.72 Sq.m
	Door :2	2	0.9	0.3	-	0.54 Sq.m
						Total flooring work = 27.54 Sq.m
9.	**For R.C.C. slab**	1	7.5	5.1	0.125	4.781 Cu.m
10.	**Internal white wash** = (internal P.L. - Dedo work) =(98.64 - 30.8) = 67.84	-	-	-	-	67.84 Sq.m
11.	**External white wash (as per external plaster work)**	-	-	-	-	109.98 Sq.m
12.	**Excavation work for leach pit**	1	2.4	2.4	2.5	14.4 Sq.m

13.	**Brick work in leach pit** L=4(0.20+2.0+0.20) = 8.8m	1	8.8	0.20	2.5	4.4 Sq.m
14.	**Internal plaster work in leach pit**					
	Side:1	2	2.0	-	2.5	10 Sq.m
	Side:2	2	2.0	-	2.5	10 Sq.m
15.	**Excavation work in inspection chamber**	1	0.8	0.8	0.7	0.448 Cu.m
16.	**Brick work in inspection chamber**	1	2.8	0.10	0.7	0.20 Cu.m
17.	**R.C.C.cover for inspection chamber(precast cover)**	1	0.8	0.8	0.10	0.064 Cu.m
18.	**CALCULATION OF WEIGHT OF BAR** **10mm Ø @180mm c/c (along L_x)** L=3.9+(18x0.01) - (2x0.05) = 3.95m  X = 0.15 - (2x0.020) - (0.010) = 0.10m Total length = L + 0.45X = 3.98 + (0.45 x 0.10) = 4.025m No. of bars = [5.1 – (2 x 0.5/0.180)] + 1 = 29 Nos.	2 x 29	4.025	0.62 kg/m		144.74 kg

	10mm Ø@125mm c/c (along L_y) L=5.1+(18x0.01) - (2x0.05) = 5.18 m X = 0.15 – (2 x 0.020) – (0.010) = 0.10m Total length = L + 0.45x = 5.18 + (0.45 x 0.10) = 5.22m No. of bars =[3.9 – (2x0.05)/0.125] + 1 = 32 Nos.	2 x 2	5.22	0.62kg/m	207.13kg

(Table 18 Measurement Sheet of Public Toilet Block)

ABSTRACT

ITEM NO	**DESCRIPTION**	**QUANTITY**	**RATE**	**UNIT**	**AMOUNT**
1.	Excavation for foundation up to 1.5 M Depth including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 meter lead. (c) Dense or Hard soil {(S.O.R. Page No.-35 (04001C) }	38.22	147.00	Cu.m	5618.34
2.	Providing and laying cement concrete 1 : 4 : 8 (1- Cement : 4-Course sand : 8-Hand broken stone aggregate 40 mm nominal size) and curing complete including cost of form work in : Foundation and plinth {(S.O.R. Page No.- 41 (5004) }	3.986	1987.00	Cu.m.	7920.18
3.	Brick work using common burnt clay building bricks having crushing not less than 35 kg / Sq. cm. in Cement Mortar 1 : 6 (1-Cement : 6 - Fine sand) in Foundation And plinth in cement mortar 1:5 (1-cement : 5 – fine sand) {(S.O.R.Page No.- 63 (06001A))}	22.00	3188.00	Cu.m	70136.00

4.	brick work in super structure above plinth level up to floor two level (A) Modular {(S.O.R.Page No.- 63 (06001A))}	30.36	3342.00	Cu.m	101463.12
5.	Providing 10 mm thick cement plaster in Single coat on brick/concrete walls for interior plastering up to floor two level And funished even and smooth in (iii) cement mortar 1:6 (1- cement : 6- sand) {(S.O.R.Page No.-127(17001C))}	118.88	68.50	Sq.m	8143.28
6.	Providing 15 mm thick cement plaster in Single coat on rough side of single or half brick walls for external plastering up to G.L to level and finish even and smooth in (ii)cement mortar 1:4 (1 - cement : 4 – sand) {(S.O.R.Page No.-127(17002B))}	109.98	103.00	Sq.m	11327.94
7.	White washing with lime on wall surface all two coat) to give an even shade including (thoroughly booming the surface to remove dirt, dust mortar drops and other foreingn matter {(S.O.R.Page No.-130 (18001))}	177.68	7.60	Sq.m	1350.37
8.	Colour washing with lime on wall surface all two coat) to give an even shade including(thoroughly booming the surface to remove dirt, dust mortar drops and other foreingn matter {(S.O.R.Page No.-130 (18007))}	98.64	7.70	Sq.m	759.52
9.	Providing and laying cement concrete work) 1:2:4 (1- cement : 2- coarse sand : 4-graded stone aggregate 20 mm nominal size and curing complete excluding cost of formwork and reinforcement for reinforced concrete work in (B) slabs, landing, shelves, balconis, lintels, beams, gurder and cantilever up to floor two level	5.478	3141.00	Cu.m	17206.39

	{(S.O.R.Page No. -43(05011B))}				
10.	PVC pipes 10 kg/sq.cm 150mm dia. (market rate)	15.5	350.00	Rmt	5425.00
11.	Gully trap (150mmx100mm size)	6	64.00	NOS	384.00
12.	Urinal flat back	3	437.00	NOS	1311.00
13.	W/C pan	6	320.00	NOS	1920.00
14.	Wash basin	2	1114.00	NOS	2228.00
15.	Elbow T- Pipe	3 7	20.00 24.00	NOS NOS	60.00 168.00
16.	Pre - cast R.C.C slab (For leach pit And inspection chamber)	1.00	3000.00	Cu.m	3000.00
17.	Providing H.Y.S.D Bar reinforcement For R.C.C work including bending, Binding and placing in position Complete up to floor two level {(S.O.R.Page No.-45(05014A))}	210	41.10	Kg	8631.00
				Total Rupees	288589.63
				Conti……..05.00% Rupees	14429.48
				10% contractor charges	28858.96
				2% water charges	5771.79
				2% unexpected site situation	5771.79
				Total Amount Rupees	343421.65
				Say Rupees	344000.00

(Table 19 Abstract Sheet of Public Toilet Block)

Slab Design (design for single block)

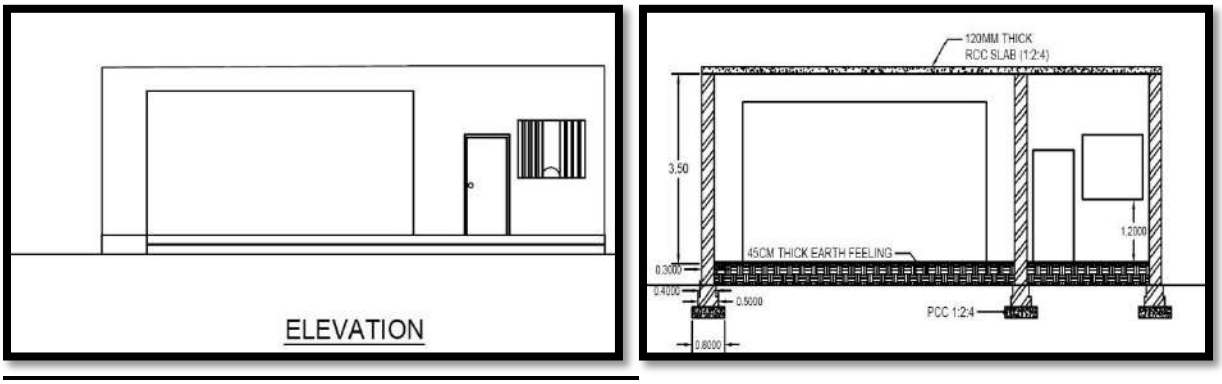
Effective depth
d = 100mm
Assume 10 mm Ø bars
D = 100 + 5 + 20 = 125 mm

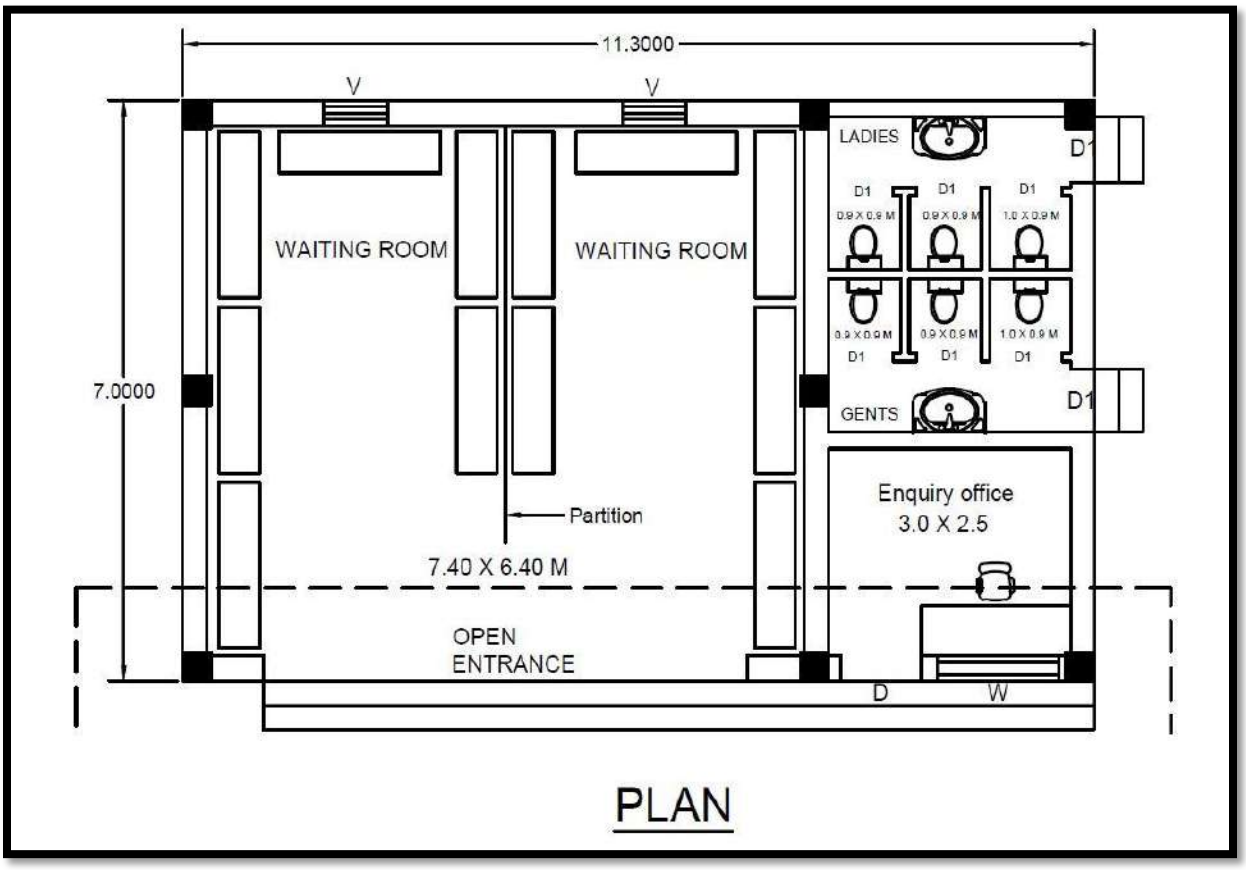
Main Steel
Along lx
Provide 10 mm Ø @ 180mm c/c (436 mm^2)

Along ly (d=90mm)
Provide 10 mm Ø @ 125mm c/c (314 mm^2)

8.1.3 Smart Village design (Civil)

Bus stop Design





(Fig.56 2D & 3D view of bus station)

MASUREMENT SHEET						
Sr.	**Description**	**No**	**L**	**B**	**H**	**QUANTITY**
1.	**Excavation in foundation** Net center line = 48.8 – ½ x 4 x 0.8 = 47.2m	1	47.2	0.8	0.6	**22.66 cu.m**
2.	**P.C.C work in foundation** Net C.L = 47.2	1	47.2	0.8	0.2	**7.55 cu.m**
3.	Excavation for foundation for column footing	9	2.20	2.20	1	**43.56 cu.m**
4.	**Brick work up to plinth level** Net CL = 48.8 – ½ x 0.3 x 4 = 48.2m	1	48.2	0.3	0.45	**6.507 cu.m**
5.	**Brickwork in super structure** Deduction for door and window	1	48.2	0.3	3.50	**50.61 cu.m**
	Open entrance	1	6	0.3	3	5.4 cu.m
	D	1	1	0.3	2.1	0.63 cu.m
	D1	2	0.8	0.3	2.1	0.50 cu.m
	W	1	1.5	0.3	1.2	0.50 cu.m
	V	2	0.8	0.3	0.6	0.288 cu.m
		Total deduction = 7.362 cu.m				
	Total brickwork after deduction = 50.61 – 7.362 **= 43.249 cu.m**					
6.	**Earth filling at plinth level**					
	Waiting room	1	7.4	6.4	0.45	21.31 cu.m
	Toilet	1	3	3.7	0.45	4.995 cu.m
	Enquiry office	1	3	2.5	0.45	3.375 cu.m
		Total earth filling = **29.68 cu.m**				
7.	**Providing 15mm thick cement plaster in single coat on Rough (Similar)side of single or half brick walls for interior plastering up to**					
	floor two level and finished even and smooth in (ii) Cement mortar 1:4(1- cement :4-sand)					
	Waiting room					
	Side wall 1	2	7.4		3.5	51.8 sq.m
	Side wall 2	2	6.4		3.5	44.8 sq.m

	Ceiling	1	7.4	6.4		47.36 sq.m
	Enquiry room					
	Side wall 1	2	3		3.5	21 sq.m
	Side wall 2	2	2.5		3.2	17.5 sq.m
	Ceiling	1	3	2.5		7.5 sq.m
	Toilet					
	Side wall 1	2	3		3.5	21 sq.m
	Side wall 2	2	3.7		3.5	25.9 sq.m
	Ceiling	1	3	3.7		25.9 sq.m
	Deduction for door and window					
	OE	½	6		3	9 sq.m
	D	½	1		2.1	1.05 sq.m
	D1	1	0.8		2.1	1.68 sq.m
	W	½	1.5		1.2	0.9 sq.m
	V	1	0.8		0.6	0.48 sq.m
					TOTAL = 13.11 sq.m	
	TOTAL PLASTER WORK = 247.96 – 13.11 = **234.85 sq.m**					
8.	**Providing 15mm thick cement plaster in single coat on Rough (Similar)side of single or half brick walls for interior plastering up to floor two level and finished even and smooth in (ii) Cement mortar 1:4(1-cement :4-sand)**					
	Side wall 1	2	11.3		3.95	89.27 sq.m
	Side wall 1	2	7		3.95	55.3 sq.m
		Total plaster = **144.27 sq.m**				
	Deduction for door window					
	OE	1	6		3	1.8 sq.m
	D	1	1		2.1	2.1 sq.m
	D1	2	0.8		2.1	3.36 sq.m
	W	1	1.5		1.2	1.8 sq.m
	V	2	0.8		0.6	0.96 sq.m
		Total deduction = 26.22 sq.m				

	TOTAL PLASTER WORK = 247.96 – 13.11 = **234.85 sq.m**					
9.	**R.C.C concrete in slab**	1	11.3	7	0.2	**15.88 cu.m**
10.	**Providing and laying Vitrified tiles 8 to 10 mm thick , 24'' x 24'' in flooring treads of steps and landing laid on a bed of 30mm thick cement mortar 1:5 (1-cement :5-coarse sand) finishing with flush pointing in white cement.**					
	Waiting room	1	7.4	6.4		47.36 sq.m
	Enquiry office	1	3	2.5		7.5 sq.m
	Toilet	1	3	3.7		11.1 sq.m
		Total flooring = **65.96 sq.m**				
11.	**Providing and fixing 35 mm thick shutters for Doors including anodized steel butt hinges with necessary screws. (A) Indian teak wood. (i) Fully Paneled.**					
	D	1	1		2.1	2.1 sq.m
	D1	2	0.8		2.1	3.36 sq.m
	W	1	1.5		1.2	1.8 sq.m
		Total wood work = 7.26 sq.m				
12.	**Concrete work for beam**	3	7.3	0.25	0.4	**2.19 cu.m**
13.	**Steel work in BEAM**					
	20mm dia. Straight bars L = 7.3 + 0.3 +0.3 + 2 x 9 x 0.02 – 2 x 0.05 = 8.16 m 4 nos. in one beam, For 3 same beam No of bars = **12 nos.**	12	8.16 @ 2.5 kg/m			244.8 kg
	16 mm dia. bar in compression	9	8.16 @ 1.58 kg/m			116.05 kg

	zone at top of the beam L = 8.16 m 3 nos. in one beam, For 3 same beam No of bars = **9 nos.**					
	6 mm dia. stirrups A = 0.25 – 0.025 x 2 – 2 x 0.006 = 0.188m B = 0.4 – 2 x 0.02 – 2 x 0.006 – 0.016 = 0.338 m L = 2(A + B) + 0.15 = 2(0.338 + 0.188) + 0.15 = 1.202 m No of stirrups = (7.3 – 2 x 0.025/0.3) + 1 = 25.16 ≅ **26 nos.** 26 nos. in one beam, For 3 same beam No of bars = **78 nos.**	78	1.202 @ 0.22kg/m			20.62 kg
14.	**Formwork or centering or shuttering work for slab**					
	Bottom	1	11.3	7		79.1 sq.m
	Side 1	2	11.3		0.135	3.51 kg
	Side 2	2	7		0.135	1.89 kg
		Total formwork for slab =84.5 sq.m				
15.	**Steel work for slab**					
	10 mm dia. @ 250 mm c/c straight bars with alternate bent up.	52	3.56 @ 0.62 kg/m			144.77 kg

	L =3.025+0.23+0.23+2 x 9 x 0.08 – 2 x 0.05 = 3.529 m (straight length) Span=7.6 +2x 0.23 – 2 x 0.05 = 7.66 m No of bars =(7.66/ + 0.15) + 1 **= 52 NOS.** Extra length of bent up bars = 0.45x Where x = 0.135 – 2 x 0.02 - 0.008 =0.087m L=3.529+ 0.45x = 5.529 + 0.45 x 0.087 = 3.5681 m			
	8 mm dia@280 mm c/c distribution bars Hook length = 9d = 9 x 0.008 = 0.072 < 0.075 L = 7.3 + 0.23 + 0.23 + 2 x 0.075 – 2 x0.05 = 7.81m Width of slab = 3.025 + 0.23 + 0.23 -2 x 0.05 =3.385m No of bars = (3.385/0.28) + 1 = 13.089 nos. **Say 14 nos.**	14	7.81 @ 0.4 kg/m	43.74 kg
			Total weight of steel in slab = **188.5kg**	

16.	**Excavation for foundation** H = 0.3 + 0.4 + 0.3 + 0.1 = 1.1 m For 10 nos. of column Quantity of foundation = 5.324 x 10 = 53.24 cu.m	1	2.2	2.2	1.1	**5.324cu.m**
17.	**P.C.C in foundation below footing** No of footing is 10	10	2.2	2.2	0.1	**4.84cu.m**
18.	**Concrete of proportion of (1:2:4) in column footing**					
	Footing without slope	10	2.2	2.2	0.3	**14.52 cu.m**
	Footing without slope Area of bottom of footing A1 = 2.2 x 2.2 =4.84 cu.m Area of top of footing A2 = 0.35 x 0.35 =0.1225 cu.m Volume of sloping portion = h/3 (A1 + A2 + √$A1A2$) =0.4/3(4.84+0.12+√4.84x0.1225) = 0.7643 cu.m	10	0.7643			7.643cu.m
	Part of column below g.l.	10	0.35	0.35	0.3	0.367cu.m
	Column 0.35 x 0.35 above GL	10	0.35	0.35	0.75	0.92 cu.m
19.	**Steel for column footing**					
	Vertical bars of column **20 mm dia. bars** L = 3.35 +0.1 – 9 x 0.020 = 3.27 m For 10 nos. of column total weight = 29.060 x10 = 290.060 kg	4	3.27 @ 2.22 kg/m			29.06 kg

	12 mm dia. Bars L = 3.35 + 0.1 – 9 x 0.020 = 3.34 m For 10 nos. of column total weight =10.68 x 10 = 106.8 kg	4	3.34 @ 0.8 kg/m			10.68 kg
	Lateral ties for column A = 0.3 – 2 x 0.02 – 2 x 0.06 = 0.248 m B = 0.248 m L = 2(A + B) + 0.15 = 2 (0.248 + 0.248) + 0.15 = 1.142 m No of ties = (3.35 + 1.1) + 0.3 – 0.05-2 x 0.020/0.15 = 31.06 say 32 Nos. for 1 column For 10 nos. of column total weight 7.3088 x 10 = 73.088 kg	32	1.142 @ 0.22 = 7.3088 kg For 10 column 73.088kg			73.088
	Footing bars 12 mm dia 13 nos (162 mm c/c) L = 2.2 – 2 x 0.05 + 2 x 9 x 0.012 = 2.32 m For 10 column weight = 268 kg	13	2.32 @ 0.89 kg/m			26.80 kg
20	**Formwork of column and footing**					
	a) Column above plinth	4		0.35	3.35	4.69 sq.m
	b) Column below plinth	4		0.35	1.1	1.54 sq.m
	c) Sloping part of footing					1.88 sq.m
	d) Vertical part of footing	4		2.2	0.3	2.64 sq.m

(Table 20 Measurement Sheet of Bus Station)

ABSTRACT SHEET					
Sr. no	**Description**	**Quantity**	**Rate**	**Per**	**Amount**
1.	Brick work using common burnt clay building bricks having crushing strength not less than 35 kg./Sq.Cm. in super structure in Cement Mortar 1:5. (1-Cement : 5 -fine sand)(A) Modular	49.76	4536.50	cu.m	225718.09
2.	Providing and laying ordinary cement concrete 1:2:4 (1-Cement 2- coarse sand : 4-graded stone aggregates 20 mm nominal size) and finishing smooth with,curing etc. complete including the cost of formwork but excluding the cost of reinforcement for R.C.C work in COLUMNS:	23.50	3901.63	cu.m	91829.19
3.	Providing and laying ordinary cement concrete 1:2:4 (1-Cement 2- coarse sand : 4-graded stone aggregates 20 mm nominal size) and finishing smooth with, curing etc. complete including the cost of formwork but excluding the cost of reinforcement for R.C.C work in BEAM	6.70	3907.63	cu.m	26181.09
4.	Providing and laying ordinary cement concrete 1:2:4 (1-Cement 2- coarse sand : 4-graded stone aggregates 20 mm nominal size) and finishing smooth with, curing etc. complete including the cost of formwork but excluding the cost of reinforcement for R.C.C work in SLAB	15.82	3907.63	cu.m	61818.63

5.	Providing and laying ordinary cement concrete 1:2:4 (1-Cement 2- coarse sand : 4-graded stone aggregates 20 mm nominal size) and finishing smooth with, curing etc. complete including the cost of formwork but excluding the cost of reinforcement for R.C.C work in LINTAL,CHAJJA, STAIR,LOFT etc.	0.29	3907.63	cu.m	1141.03
6.	Providing H.Y.S.D. Bar as per I.S. Standard reinforcement for R.C.C. work including bending, binding and placing in position complete up to floor two level	1307.95	61.28	Kg	80144.64
7.	Providing wood work in frames of Doors, windows cleare story windows and other similar works wrought framede and fixed in position. (A) Indian Teak Wood	8.00	84710.0	sq.m	677680.00
8.	Providing 15mm thick cement plaster in single coat on Rough (Similar)side of single or half brick walls for interior plastering up to floor two level and finished even and smooth in (ii) Cement mortar 1:4 (1-cement :4-sand)	234.85	137.60	sq.m	32315.36
9.	Providing 20 mm thick double coat cement plaster on exterior brick / concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 (1 Cement : 2 Coarse sand) finished with trovel including scaffolding curing etc. complete.	118.05	225.75	sq.m	26649.79

10.	Providing and laying Vitrified tiles 8 to 10 mm thick , 24" x 24" in flooring treads of steps and landing laid on a bed of 30mm thick cement mortar 1:5 (1-cement :5-coarse sand) finishing with flush pointing in white cement.	65.96	891.18	sq.m	58781.90
11.	Providing and laying Vitrified tiles 8 to 10 mm thick , 24" x 24" in flooring treads of steps and landing laid on a bed of 12mm thick cement mortar 1:3 (1-cement : 3-coarse sand) finishing with flush pointing in white cement.	-	940.63	sq.m	
12.	Wall painting (two coats) with plastic emulsion paint of approved brand and manufacture including putty finished on interior undecorated wall and ceiling surface to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papered smooth.	144.27	241.88	sq.m	34895.31
13.	Wall painting (two coats) with acrylic paint of approved brand and manufacture on exterior undecorated wall surface to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papered smooth.	118.05	150.50	sq.m	17766.53
	Total amount				**1388389.89**

(Table 21 Abstract Sheet of Dispensary)

Design of slab

d = 120 mm Assume 10 mm Ø bars D = 120 + 5 + 10

D = 135 mm

Main Steel

- At end span (at D & E)

  Provide 10 mm Ø @ 250 mm c/c

  $A_{st_{provide}}$ = 314 mm2

- At Support next to end support (at B)

  50 % Ast from span

  E = 314/2 = 157 50 % Ast

  from span F = 314/2 = 157

  Ast required at support B = 297.6 < 314 (314 mm^2)

  No required for additional reinforcement.

Distribution steel

Provide min^m 0.12% of 6mm Ø @ 200mm c/c

DESIGN OF BEAM

Steel in bottom of beam:

Provide 4-20mmØ (provide Ast = 1256 mm^2)

Stirrups:

Provide 8mm Ø @300 mm c/c

DESIGN OF COLUMN

Size of column = 350 x 350 mm

MAIN STEEL BAAR = 4 – 12mmØ + 4 -16 mmØ bar

= 452 + 804

$=1256\ mm^2$

LATERAL TIES AND PITCH:

Provide 6mm dia for lateral ties

Provide lateral ties 6 mmØ190 mm c/c

Design of footing

Size of footing

Provide size of footing 2.20 m x 2.20 m = 4.84 > 4.74 m2

Depth of footing,

Provide D = 700 mm

d = 700-50-10-5 = 635mm

Edge depth = 300mm

Reinforcement

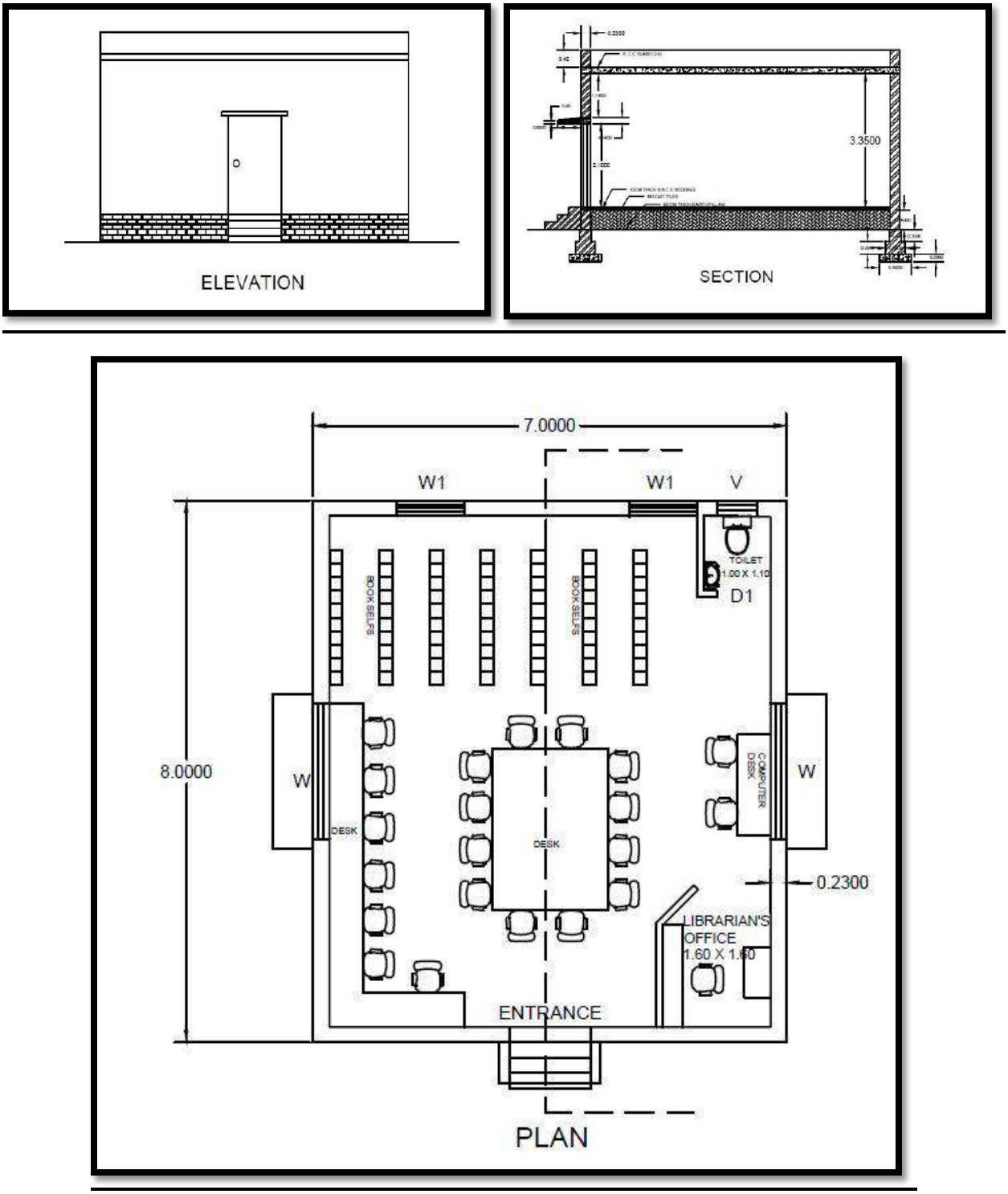
In both direction,

Provide 13-12mm dia bar on both faces

Ast = 1470 mm^2

8.1.4 Sustainable Design:

Public Library



(Fig.57 2D view of Public Library)

MASUREMENT SHEET						
Sr.	**Description**	**No**	**L**	**B**	**H**	**QUANTITY**
1.	Excavation for foundation for column footing	9	2.20	2.20	1	43.56 cu.m
	Brickwork in super structure	1	29.88	0.23	3.35	23.02 cu.m
	Deduction for door and window Entrance	1	1.2	0.23	2.1	0.58 cu.m
	D1	1	0.8	0.23	2.1	0.39 cu.m
	W	2	2.0	0.23	1.2	1.104 cu.m
	W1	2	1.0	0.23	1.2	0.552 cu.m
	V	1	0.6	0.23	0.6	0.089 cu.m
	Total deduction for door and window					2.72 cu.m
2.	Deduction for lintel above door and window with 15 cm offset on both faces					
	Entrance	1	1.5	0.23	0.15	0.05 cu.m
	D1	1	1.1	0.23	0.15	0.04 cu.m
	W	2	2.3	0.23	0.15	0.16 cu.m
	W1	2	1.3	0.23	0.15	0.084cu.m
	V	1	0.9	0.23	0.15	0.031 cu.m
	Total deduction					0.37 cu.m
	Total brickwork in super structure	**23.02 - 2.72 – 0.37 = 20 cu.m**				
3.	Providing 15mm thick cement plaster in single coat on Rough (Similar)side of single or half brick walls for interior plastering up to floor two level and finished even and smooth in (ii) Cement mortar 1:4 (1-cement :4 - sand)					
	Room					
	Side wall 1	2	7.54		3.35	50.51 sq.m
	Side wall 2	2	6.54		3.35	43.082 sq.m
	Ceiling	1	7.54	6.54		49.31 sq.m
	Total					143.63 sq.m

	Deduction for door and window					
	Entrance	½	1.2		2.1	1.26 sq.m
	D1	½	0.8		2.1	0.84 sq.m
	W	12	2.0		1.2	2.4 sq.m
	W1	1	1.0		1.2	1.2 sq.m
	V	½	0.6		0.6	0.18 sq.m
	Total deduction for plaster					5.88 sq.m
	Total interior plaster work	**143.63 – 5.88 = 137.95 sq.m**				
4.	Providing 20 mm thick double coat cement plaster on exterior brick / concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 (1 Cement : 2 Coarse sand) finished with trovel including scaffolding curing etc. complete					
	Side wall 1	2	8		3.9	62.4 sq.m
	Side wall 2	2	7		3.9	54.6 sq.m
	Deduction for door and window at exterior side					
	Entrance	1	1.2		2.1	2.52 sq.m
	D1	1	0.8		2.1	1.68 sq.m
	W	2	2.0		1.2	4.8 sq.m
	W1	2	1.0		1.2	2.4 sq.m
	V	1	0.6		0.6	0.36 sq.m
	Total					11.76 sq.m
	Net exterior plaster	117 – 11.76				105.24 sq.m
5.	Providing and laying Vitrified tiles 8 to 10 mm thick , 24" x 24" in flooring on 10mm thick cement plaster 1:3 (1- cement : 3 - coarse sand) and jointed with white cement slurry	1	6.54	7.54		50.07 sq.m
6.	Providing and fixing 35 mm thick					

	shutters for Doors including nodized steel butt hinges with necessary screws. (A) Indian teak wood. (i) Fully Paneled.					
	Entrance	1	1.2		2.1	2.52 sq.m
	D1	1	0.8		2.1	1.68 sq.m
	W	2	2.0		1.2	4.8 sq.m
	W1	2	1.0		1.2	2.4 sq.m
	V	1	0.6		0.6	0.36 sq.m
	Total wood work for door and window shutter					11.76 sq.m
7.	R.C.C work for slab	7	8	0.20	5	11.48 cu.m
8.	Formwork for beams					
	Bottom	1	6.3	0.23		1.449 sq.m
	Sides	2	6.53		0.3	3.918 sq.m
	Ends	2		0.23	0.3	0.138 sq.m
	For total 4 no of beams	4 x 5.505				22.02 sq.m
9.	Quantity of Steel bars for beams					
	1) 20 mm dia straight bar L = 6.3m + (0.23 + 0.23) + 2(9 x 0.020) – (2 x0.025) = 7.07 m For 4 nos of beam total weight of straight bar is = 4 x 69.82 = 279.28 kg	4	7.07 @ 2.47 kg/ m			69.82 kg
	2) 20 mm dia. bentup bars x = 0.3 – 2x0.025 - 2x0.008 - 2x1/2x0.020 = 0.214 m L = 7.07 + 2 x (0.45x) = 7.07 + 2 x (0.214 x 0.45) = 7.26 m No of bars = 2 For 4 nos of beams total weight of steel = 4 x 35.8 = 143.4 kg	2	7.26 @ 2.47 kg/m			35.8kg
	3) 16 mm dia anchor bar L = 6.53 + 2 x 9 x 0.016 – 2 x 0.025 = 6.768 For 4 nos. of beam total wt. of anchor bars = 4 x 28.83 = 115.33kg	3	6.768@ 1.42kg/m			28.83kg
	B = 0.3 - 2x0.025– 2 x 0.008	22	0.966 @ 0.35kg/m			7.552kg

	= 0.234 m A = 0.230 – 2 x 0.025 – 2 x 0.008 = 0.174 m L = 2(0.174 + 0.234) + 0.15 = 0.966m No of stirrups = 6.53 – 2 x 0.02 /0.3 = 21.63 say 22 nos For same size of 4 beams no of stirrups = 22 x 4 = 88 nos total weight for 4 beams is 7.552 x 4 = 30.225 Total weight of steel in all 4 same size beam = 568.28 kg					
Quantity for column and footing						
10.	Concrete of proportion of (1:2:4)					
	a) Footing without slope	10	2.2	2.2	0.3	14.52 cu.m
	b) Footing without slope Area of bottom of footing A1 = 2.2 x 2.2 = 4.84 cu.m Area of top of footing A2 = 0.35 x 0.35 = 0.1225 cu.m Volume of sloping portion = h/3 (A1 + A2 + $\sqrt{A1A2}$) = 0.4/3(4.84 + 0.1225+$4.84x0.1225$ = 0.7643 cu.m	10				7.643 cu.m
	c) Part of column below g.l.	10	0.35	0.35	0.3	0.367cu.m
	d) Column 0.35 x 0.35 above GL	10	0.35	0.35	0.75	0.92 cu.m
11.	Steel for column footing a) Vertical bars of column (i) 20 mm dia. bars L = 3.35 +0.1 – 9 x 0.020 = 3.27 m For 10 nos. of column total weight = 29.060 x10 = 290.060kg	4	3.27 @ 2.22 kg/m			29.06 kg

	(ii) 12 mm dia. bars L = 3.35 + 0.1 – 9 x 0.020 = 3.34 m For 10 nos. of column total weight =10.68 x 10 = 106.8 kg	4	3.34 @ 0.8 kg/m			10.68 kg
	b) Lateral ties for column A = 0.3 – 2 x 0.02 – 2 x 0.06 = 0.248 m B = 0.248 m L = 2(A + B) + 0.15 = 2 (0.248 + 0.248) + 0.15 = 1.142 m No of ties = (3.35 + 1.1) + 0.3 – 0.05 - 2 x 0.020/0.15 = 31.06 say 32 Nos. f or 1 column For 10 Nos. of column total weight	32	1.142 @ 0.22 kg/m			7.3088 kg
	c) Footing bars 12 mm dia. 13 nos. (162 mm c/c) L = 2.2 – 2 x 0.05 + 2 x 9 x 0.012 = 2.32 m	13	2.32 @ 0.89 kg/m For 10 column weight			26.80kg
12.	Rcc work in slab					
	1. Cement concrete Slab 1. L = 7.0 + 0.23 + 0.23 = 7.46 m B = 2.65 + 0.23 + 0.23 = 3.11m	7.46	3.11	2.35	0.115	5.33cu.m
	Slab 2. L = 7.46 m B = 2.35 m	1	7.46	2.35	0.115	2.01cu.m
	2. Centering and shuttering for slab					
	Slab 1					
	Bottom	1	7.0	0.35		18.55 sq.m
	Side 1	2	7.46		0.115	1.715 sq.m
	Side 2	2	3.11		0.115	0.715 sq.m
	Total					**20.9811sq.m**
	For 2nos of slab	20.981 x 2				**41.96 sq.m**
	Slab 2					
	Bottom	1	7.0	2.35		16.45 sq.m
	Side 1	2	7.0		0.115	1.61 sq.m
	Side 2	2	2.35		0.115	0.54 sq.m

ABSTRACT SHEET					
Sr. no	**Description**	**Quantity**	**Rate**	**Per**	**Amount**
1.	Brick work using common burnt clay building bricks having crushing strength not less than 35 kg./Sq.Cm. in super structure in Cement Mortar 1:5. (1- Cement : 5 –fine sand) (A) Modular	22.72	4431.00	cu.m	100672.32
2.	Providing and laying ordinary cement concrete 1:2:4 (1- Cement 2- coarse sand : 4- graded stone aggregates 20 mm nominal size) and finishing smooth with, curing etc. complete including the cost of formwork but excluding the cost of reinforcement for R.C.C work in COLUMNS:	23.50	3816.75	cu.m	89693.63
3.	Providing and laying ordinary cement concrete 1:2:4 (1- Cement 2- coarse sand : 4- graded stone aggregates 20 mm nominal size) and finishing smooth with,curing etc. complete including the cost of formwork but excluding the cost of reinforcement for R.C.C work in BEAM	1.73	3816.75	cu.m	6617.79
4.	Providing and laying ordinary cement concrete 1:2:4 (1- cement 2 - coarse sand : 4- graded stone aggregates 20 mm nominal size) and finishing smooth with, curing etc. complete including the cost of formwork but excluding the cost of reinforcement for R.C.C work in SLAB	11.48	3816.75	cu.m	43816.29
5.	Providing and laying ordinary cement concrete 1:2:4 (1-		3990.00	sq.m	0.00

	Cement 2- coarse sand : 4-graded stone aggregates 20 mm nominal size) and finishing smooth with, curing etc. complete including the cost of formwork but excluding the cost of reinforcement for R.C.C work in LINTAL,CHAJJA,STAIR,LOFT etc.				
6.	Providing H.Y.S.D. Bar as per I.S. Standard reinforcement for R.C.C. work including bending, binding and placing in position complete up to floor two level	645.15	59.85	kg	38612.23
7.	Providing 15mm thick cement plaster in single coat on Rough (Similar)side of single or half brick walls for interior plastering up to floor two level and finished even and smooth in (ii) Cement mortar 1:4 (1-cement :4-sand)	137.95	134.40	sq.m	18540.48
8.	Providing 20 mm thick double coat cement plaster on exterior brick / concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 (1 Cement : 2 Coarse sand) finished with trovel including scaffolding Curing etc. complete.	126.00	220.50	sq.m	27783.00
9.	Providing and laying Vitrified tiles 8 to 10 mm thick , 24" x 24" in flooring treads of steps and landing laid on a bed of 30mm thick cement mortar 1:5 (1-cement :5 - coarse sand) finishing with flush pointing in white cement.	50.07	870.45	sq.m	43583.43
10.	Providing and fixing 35 mm	11.76	4935.00	sq.m	58035.60

	thick shutters for Doors including anodized steel butt hinges with necessary screws. (A) Indian teak wood. (i) Fully Paneled.				
11.	Providing and fixing 35 mm thick shutters for windows including anodized steel butt hinges with necessary screws. (A) Indian Teak Wood (iii) Partly paneled and partly glazed.		3990.00	sq.m	0.00
12.	Wall painting (two coats) with plastic emulsion paint of approved brand and manufacture including putty finished on interior undecorated wall and ceiling surface to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papered Smooth.	126.40	236.25	sq.m	29862.00
13.	Wall painting (two coats) with acrylic paint of approved brand and manufacture on exterior undecorated wall surface to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papered smooth.	137.95	147.00	sq.m	20278.65
	Total Amount				**1984203.10**

(Table 23 Abstract Sheet of Public Library)

DEPTH OF SLAB

d = 90mm

assume 10mm Φ bars

D = 90 + 5 + 20

= 115 mm

MAIN STEEL

Provide 10 mm Φ@250mm c/c

Ast_{pro} = 314 mm_2

DISTRIBUTION STEEL

Provide 6 mm Φ@200mm c/c

DESIGN OF BEAM

STEEL IN TOP OF BEAM = Asc = 400.61 mm^2

Provide 3-16mm Φ bars (Ast = 603 mm^2)

STEEL IN BOTTO OF THE BEAM = Ast = 662.4 mm^2

To find Ast2

Ast2 = 381.80m^2

Total Ast = 662.4 + 381.80

= 1044.2 mm^2

Total steel in bottom of beam provide 4-20mmΦ (Provide Ast = 1256 mm^2)

DESIGN OF COLUMN

MAIN STEEL IN COLUMN

= provide 4-20mm dia. Bar + 4-12mm dia. Bar (1256 + 452 = 1706mm^2)

Lateral ties:

1. 1 x 16 = 4mm
2. 6mm

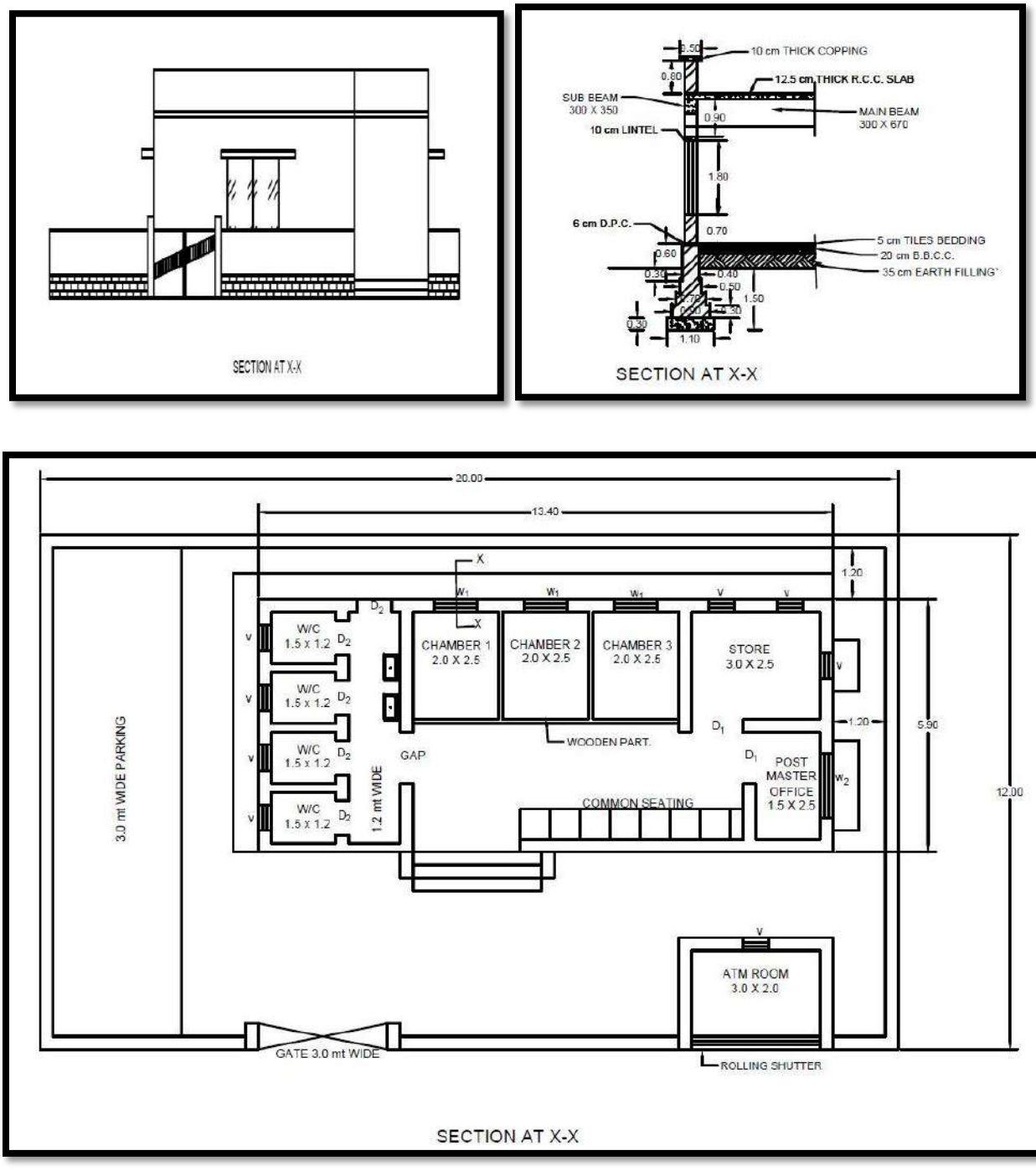
Provide 6mm dia. For lateral ties provide lateral ties 6mm dia. 230 mm c/c

DESIGN OF FOOTING

1. **Size of footing**
   Provide size of footing 2.20 m x 2.20 m > 3.81 m^2
2. **Depth of footing**
   D = 700mm
   d = 700-50-10-5 = 635 mm
   edge depth = 300mm
3. **Reinforcement**
   In both direction,
   Provide 13-12mm dia. Bar on both faces
   Ast = 1470 mm^2

8.1.5 Sustainable Design

Post Office



(Fig.58 2D view of Post Office)

MASUREMENT SHEET						
Sr.	**Description**	**No**	**L**	**B**	**H**	**QUANTITY**
1.	Excavation for foundation in loose or soft soil up to 1.5 M Depth Net length = 64.3 m	1	64.3	1.10	1.50	106.090 m3
2.	P.C.C. in foundation (1:4:8) Net length= 64.3 m	1	64.3	1.10	0.30	21.220 m^3
3.	Brick masonry work up to plinth level For step of 0.9 m width Net length= 65.1 m	1	65.1	0.90	0.30	17.577m3
	For step of 0.70 m width Net length= 65.9 m	1	65.9	0.70	0.30	13.840m3
	For step of 0.5 m width Net length= 66.7 m	1	66.7	0.50	0.30	10.00m3
	For step of 0.4 m width up to plinth Net length= 67.1 m	1	67.1	0.40	0.84	22.540m3
	Total brick masonry work up to plinth level					63.957m3
4.	Earth filling in foundation	106.090 – 21.220 - 49.469				35.401m3
5.	**Brick work in super structure** Net length= 67.5 m Height = 0.70+1.80+0.6 = 3.1	1	67.5	0.3	3.1	62.775m3
	Deduction for door & windows					
	D1	2	1.2	0.3	2.5	1.800m3
	Gap	1	1.2	0.3	2.5	0.900m3
	W1	3	1.0	0.3	1.8	1.620m3
	W2	1	1.5	0.3	1.8	0.810m3
	V	7	0.6	0.3	0.8	1.008m3
	D2	5	0.8	0.3	2.5	3.000m3
	Main gate	1	2.5	0.3	2.5	1.875m3
	Total Deduction					11.013m3
	Adding parapet wall	2	13.10	0.30	0.80	6.288m3
		2	5.60	0.30	0.80	2.688m3
	Net brick work in super structure					60.738m3
6.	D.P.C. at plinth level Net length = 67.5 m	1	67.5	0.3	0.06	1.210m3
7.	R.C.C. lintel of 10 cm thick (assume throughout)	1	67.5	0.3	0.10	2.025m3

8.	Earth filling in plinth	1	1.4	5.2	0.35	2.548m3
		1	1.1	5.2	0.35	2.000m3
		1	6.1	5.2	0.35	11.10m3
		1	2.9	2.4	0.35	2.436m3
		1	1.4	2.4	0.35	1.176m3
					Total Earth Filling in plinth	12.260m3
9.	B.B.C.C in plinth	1	1.4	5.2	0.2	1.456m3
		1	1.1	5.2	0.2	1.144m3
		1	6.1	5.2	0.2	6.344m3
		1	2.9	2.4	0.2	1.392m3
		1	1.4	2.4	0.2	0.672m3
					Total B.B.C.C. in plinth	11.008m3
10.	5 cm thick flooring between walls	1	1.4	5.2	-	7.280 m2
		1	1.1	5.2	-	5.720 m2
		1	6.1	5.2	-	31.720 m2
		1	2.9	2.4	-	6.960 m2
		1	1.4	2.4	-	3.360 m2
	Adding sill of doors					
	D1	2	1.2	0.3	-	0.720 m2
	D2	1	0.8	0.3	-	0.240 m2
					Total flooring work	55.280m2
11.	15cm thick inside smooth plaster work	2	1.4	-	3.5	9.800 m2
		2	-	5.2	3.5	36.400 m2
		1	1.4	5.2	-	7.280 m2
		2	1.1	-	3.5	9.800 m2
		2	-	5.2	3.5	36.400 m2
		1	1.1	5.2	-	5.720 m2
		2	6.1	-	3.5	42.700 m2
		2	-	5.2	3.5	36.400 m2
		1	6.1	5.2	-	31.720 m2
		2	2.9	-	3.5	20.300 m2
		2	-	2.4	3.5	16.800 m2
		1	2.9	2.4	-	6.960 m2
		2	1.4	-	3.5	9.800 m2

		2	-	2.4	3.5	16.800 m2
		1	1.4	2.4	-	3.360 m2
					Total Plaster Work	290.240m2
	Deduction for door & windows					
	D1	(1/2) 2	1.2	-	2.5	3.000m2
	Gap	(1/2)1	1.2	-	2.5	1.500m2
	W1	(1/2)3	1.0	-	1.8	2.700m2
	W2	(1/2)1	1.5	-	1.8	1.350m2
	V	(1/2)7	0.6	-	0.8	1.680m2
	D2	(1/2)5	0.8	-	2.5	5.000m2
	Main gate	(1/2)1	2.5	-	2.5	3.125m2
					Total Deduction	15.355m2
					Net Plaster work inside	274.885m2
12.	20 cm thick Outer plaster work	2	13.40	-	6.325	169.510 m2
		2	5.9	-	6.325	74.635 m2
		2	3.6	-	6.325	45.540 m2
		2	2.0	-	6.325	25.300 m2
	Deduction for door & window					
	W1	3	1.0	-	1.0	3.000m2
	W2	1	1.5	-	1.5	2.250m2
	V	8	0.6	-	0.8	3.840m2
	D2	1	0.8	-	2.5	2.000m2
	Main gate	1	2.5	-	2.5	6.250m2
					Total Deduction	17.340m2
					Net outer plaster work	297.645m2
13.	White washing inside	As per inside plaster work				274.885m2
14.	White washing outside	As per outer plaster work				297.645m2
15.	For compound wall Excavation for foundation Length= 50.6 m	1.0	50.6	0.9	0.9	40.986m2
	P.C.C. work in foundation	1.0	50.6	0.9	0.3	13.662m2
	Brick work in foundation	1.0	50.6	0.5	0.6	15.18 m2
	Brick work above GL	1.0	50.6	0.3	1.5	22.77m2
	Plaster work 20 cm thick	2	3.3	19.7	-	130.020m2
		2	3.3	5.6	-	36.96m2

				Total plaster in compound wall		166.980m2
16.	**Estimate for sub beam (for 1 beam) Size= 300 X 350mm**					
	1. Concreting work in beam	1	6.55	0.3	0.35	0.688 m3
	2. Form work for beam					
	Bottom side	1	6.25	0.30	-	1.875 m2
	Both side	2	6.85	-	0.35	4.795 m2
	Ends	2	-	0.30	0.35	0.21 m2
	3. Quantity of steel					
	Main bars (3nos. of 20 mm dia.) Length of main bars 6.25 + 0.3 + 0.3 + (2x9x0.020) – (2x0.020) =7.17m	3	7.17	@	2.47kg	53.13 kg
	Anchor bars (2 nos. of 16 mm dia.) Length= 7.17 m	2	7.17	@	1.58kg	22.66 kg
	Stirrups (8 mm dia.@ 180 mm C/c) Length of stirrups= A+B+0.15 A= 0.468, B= 0.368 L= 0.468 + 0.368 + 0.15 = 0.986mt No. of stirrups = [6.85 – (0.02 x 2) / 0.180 + 1] = 38 Nos.	38	0.986	@	0.39kg	14.987kg
	Estimate for main beam (for beam 1) Size = (300 x 670 mm)					
17.	1. Concreting work in beam	1	5.9	0.3	0.670	1.186m3
	2. Form work for beam					
	Bottom side	1	5.3	0.30	-	1.590m2
	Both side	2	5.9	-	0.670	7.906m2
	Ends	2	-	0.30	0.670	0.402m2
					Total Form work	9.898m2
	3. Quantity of steel					
	Main bars (5nos. of 22 mm dia.) Length of main bars	5	6.256	@	2.99kg	93.527 kg

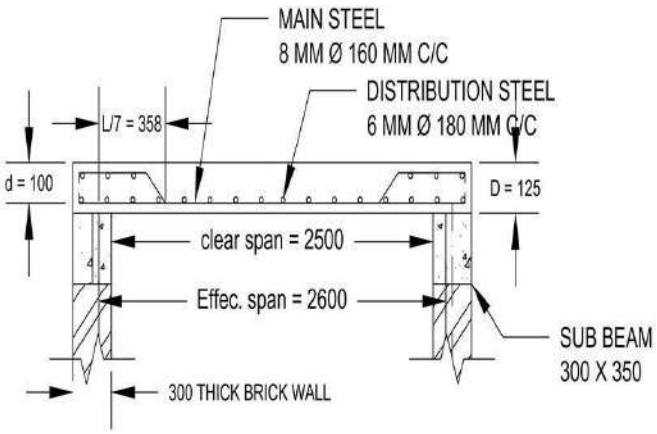
	5.3+0.3+0.3+(2x9x0.022) – (2x0.020) =6.256mt					
	Anchor bars (2 nos. of 16 mm dia.) Length= 6.256m	2	6.256	@	1.58kg	19.768kg
	Stirrups (8 mm dia.@ 180 mm C/c) Length of stirrups= 2(A+B)+0.15 A=0.606, B= 0.368 L= 2(0.606+ 0.368) + 0.15 = 2.098 No. of stirrups = [5.9 – (0.02 x 2) / 0.180] + 1 = 33 Nos.	33	2.098	@	0.39kg	27.00 kg
20.	**Estimate for slab(for 1 slab)**					
	1. Concreting work in slab	1	6.55	2.95	0.125	2.415 m3
	2. Form work for beam					
	Bottom side	1	6.55	2.95	-	19.322 m2
	Both side	2	6.55	-	0.125	1.637 m2
	Ends	2	-	2.95	0.125	0.737 m2
	3. Quantity of steel					
	Main steel (8 mm dia.@ 180mm C/C) Length of main bars L= 2.95 +(2x9x0.008)-(2x0.020) = 3.054m No. of bars = [6.55 – (0.02 x 2) / 0.180] + 1 = 38 Nos.	38	3.054	@	0.39	45.260 kg
	Distribution steel (6 mm dia.@ 180mm C/C) Length = 6.55+(2x9x0.006)-(2x0.020) =6.618m No. of bars =[2.95 – (0.02 x 2) / 0.180] + 1 =18 nos.	18	6.618	@	0.22kg	26.20 kg

Design of slab

d = 100mm

$$\therefore Over\ all\ depth = 100 + \frac{1}{2} + 20$$

D = 125mm



Main Steel

Provide 8mm dia. @ 160 mm c/c spacing

A_{st} provide = 314 mm^2

Distribution steel

Provide 6mm Φ @ 180mm c/c

Ast $_{pro}$ = 157 mm^2

Beam Design (SUB BEAM)

Size of sub beam = 300 mm x 350 mm

Steel provided in beam

Provide 3-20mm Φ

Ast $_{pro}$ = 942 mm^2

Vertical stirrups:

2 legged, 8mm Φ. Vertical stirrups at 180 mm c/c of Fe 415 steel

Size of sub beam = 300 mm x 630 mm

Provide 5-22mm Φ

Ast $_{pro}$ = 1900 mm^2

Vertical stirrups:

Ast =5 - 2mm Φ

Ast = 1900 mm^2 (SP-16, P. 229)

Provide 2 legged, 8mm Φ, vertical stirrups at 180 mm c/c of Fe 415 steel

8.1.6 Physical Design:

RAIN WATER HARVESTING SYSTEM

In present condition there is water crisis in village, and we observed that there is not water harvesting system in a village. So we have design "Rain water harvesting system" in specific building. By this system we can store the rain water and use when it requires. By this system we can reduce waste of water

- **Need for water harvesting**

  The scarcity of water is a well-known fact. In spite of higher average annual rainfall in India (1,170 mm, 46 inches) as compared to the global average (800 mm, 32 inches) it does not have sufficient water. Most of the rain falling on the surface tends

to flow away rapidly, leaving very little for the recharge of groundwater. As a result, most parts of India experience lack of water even for domestic uses.water sources fail to meet the rising demands of water supply in urban areas,

Design Considerations

Three most important components, which need to be evaluated for designing the rainwater harvesting structure, are:

1. Hydrogeology of the area including nature and extent of aquifer, soil cover, topography, depth to water levels and chemical quality of ground water.

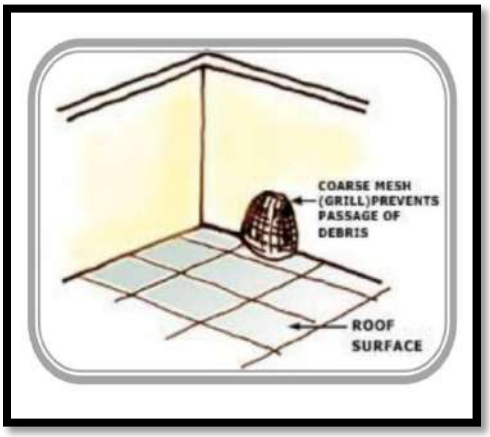
2. Area contributing for runoff i.e. how much area and land use pattern, whether industrial, residential or green belts and general built up pattern of the area

- **Components of Rain harvesting system**

  A rainwater harvesting system comprises components of various stages - transporting rainwater through pipes or drains, filtration, and storage in tanks for reuse or recharge. The common components of a rainwater harvesting system involved in these stages are illustrated here.

1. **Catchment**

   The catchment of a water harvesting system is the surface which directly receives the rainfall and provides water to the system. It can be a paved area like a terrace or courtyard of a building, or an unpaved area like a lawn or open ground.



2. **Coarse mesh**

   At the roof to prevent the passage of debris.

3. **Gutter**

   Channels all around the edge of a sloping roof to collect and transport rainwater to the storage tank. Gutters can be semi-circular or rectangular and could be made using:

   - Locally available material such as plain galvanised iron sheet (20 to 22 gauge), folded to required shapes.

- Semi-circular gutters of PVC material can be readily prepared by cutting those pipes into two equal semicircular channels.
- Bamboo or betel trunks cut vertically in half.

The size of the gutter should be according to the flow during the highest intensity rain. It is advisable to make them 10 to 15 per cent oversize

4. **Conduits**

   Conduits are pipelines or drains that carry rainwater from the catchment or rooftop area to the harvesting system. Conduits can be of any material like polyvinyl chloride (PVC) or galvanized iron (GI), materials that are commonly available.

5. **Downpipe and transmission pipes**

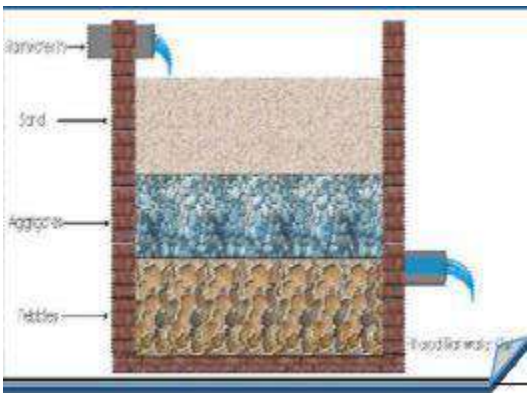
   Downpipes and transmission pipes are predominantly constructed from lengths of PVC pipe jointed using solvent welding. This is a suitable method for this purpose and the construction and maintenance of such systems is relatively straightforward. The required skills are readily available in most communities.

6. **First- flushing**

   A first flush device is a valve that ensures that runoff from the first spell of rain is flushed out and does not enter the system. This needs to be done since the first spell of rain carries a relatively larger amount of pollutants from the air and catchment surface.

7. **Filter**

   The filter is used to remove suspended pollutants from rainwater collected over roof. A filter unit is a chamber filled with filtering media such as fibre, coarse sand and gravel layers to remove debris and dirt from water before it enters the storage tank or recharge structure. Charcoal can be added for additional filtration. A simple charcoal filter can be made in a drum or an earthen pot. The filter is made of gravel, sand and charcoal, all of which are easily available



   Sand filters

   Sand filters have commonly available sand as filter media. Sand filters are easy and inexpensive to construct. These filters can be employed for treatment of water to effectively remove turbidity (suspended particles like silt and clay), colour and microorganisms.

8. Tanks (For collection of the water)

It is suggested that, where possible, storage is provided above ground. Underground tanks require pumps to lift the water which requires skilled and regular maintenance. Additionally, it is difficult to detect leaks in underground storage tanks and there is a risk of groundwater ingress and associated contamination of the water source. Where possible, tanks should make use of gravitational potential energy and be situated in an elevated position below gutters.

Design of Rain Water Harvesting:

MEASURMENT SHEET

ITEM	DESCRIPTION	NO	L	B	H/D	QUANTITY	SAY QUA.	UNIT
1.	Providing and fixing to wall ceiling floor 10.0 Kg. F/Cm2 working pressure polythene pipes for rain water, soil waste and ventilating pipes of the following outside dia. Low density, complete with necessary fittings, wall clamps etc. including making good the well celling and floor. (F) 75 mm	**3**	**0.4**	**-**	**-**	**1.2**		
		1	10.3	-	-	10.3		
		1	2.0	-	-	2.0		
		1	1.5	-	-	1.5		
		1	2.5	-	-	2.5		
		1	3.0	-	-	3.0		
	Alba	6	-	-	-	-		Nos.
	Tea	3	-	-	-	-		Nos.
	Valve	2	-	-	-	-		Nos.
	Plug	1	-	-	-	-		Nos.
					Total	20.5	21.0	Rmt.
2.	Providing and fixing to wall ceiling floor 6.0 Kg. F/Cm2 working pressure		0.5	-	-	0.5	0.5	Rmt.

	polythene pipes for rain water, soil waste and ventilating pipes of the following outside dia. Low density, complete with necessary fittings, wall clamps etc. including making good the well celling and floor. (A) 20 mm							
	Tap	1	-	-	-	-		Nos.
					Total	0.5	0.5	Rmt.
3.	Plastic Tank (2000 lit)	1	-	-	-	-		L.S
4.	Plastic Tank Bottom Brick ottah Extra over item for superstructure above plinth level up to floor two level	1	2.0	2.0	1.0	4.0	4.0	Qum.

ABSTRACT SHEET					
Sr. no	**Description**	**Quantity**	**Rate**	**Per**	**Amount**
1.	Providing and fixing to wall ceiling floor 10.0 Kg. F/Cm2 working pressure polythene pipes for rain water, soil waste and ventilating pipes of the following outside dia. low density, complete with necessary fittings ,wall clamps etc including making good celling and floor.(F) 75 mm {S.O.R. Page No. 155(I. 23004F)}	21.0	251.00	Rmt.	
			2.51	Rmt.	
		Total	253.51	Rmt.	5323.71
2.	Providing and fixing to wall ceiling floor 6.0 Kg. F/Cm2 working pressure polythene pipes for rain water, soil waste and ventilating pipes of the following outside dia. low density, complete with necessary fittings ,wall clamps etc including making good celling and floor.(A) 20 mm {S.O.R. Page No. 154(I. 23004A)}	0.5	49.60	Rmt.	

			0.496	Rmt	
		Total	50.1	Rmt	25.05
3.	Plastic Tank (2000 lit)	2000 lit	4000.00	L.S.	4000.00
4.	Plastic Tank Bottom Brick Ottah Extra over item for superstructure above plinth level up to floor two level {S.O.R. Page No. 73(I. 7002)}	4.0	214.00	Cum.	856.00
				Total Amount Rupees	10204.76
				Add 5 % Electrifacation Charge Rs.	510.24
				Add 7 % Plumbing Charge Rs. :	714.33
				Total Amount Rupees	11429.33
				Add 3 % Contingency Charge Rs. :	342.90
				Total Amount Rupees	**11780**

(Table 25 Abstract Sheet of Rain water harvesting)

- **Proposed Solid Waste Management system**

  STEP – 1: Community Education and Provision of Dustbins: At least two weeks before the actual collection of waste from the door steps of households, ward-wise community education took place on types of wastes; and how community cooperation in waste-segregation at the household level can ease waste management at the GP level. The GP campaigned with the community to cooperate with the arrangement in their personal interests, and in the interest of community well-being. Each household was provided with two dustbins – Green for dry waste; and Red for Wet Waste.

  STEP – 2: Collection Thaliya engages vehicles (Magic four wheel with calling bell) under swach bharat abhiyan cycles for daily collection of waste from households and market area. The vehicles make two trips daily – one in the morning from 7.00 to 10.30 am; and again in the evening from To 6.00 pm. The vehicle has two compartments – one for collection of 'wet wastes' and the other for 'dry wastes'. Each vehicle has a driver and a genitor who empties the dustbins into the vehicle handed by residents at their door steps. The idea of collecting two times a day is part of their planning. It feels easy to touch 'the wet waste', when it is still fresh / or when it has not started decaying. It is a well-thought out plan. The unit attempts handling any type of waste of any quantity generated within the Panchayat.

  STEP- 3: Segregation – Primary – Secondary - Tertiary: The households are supposed to segregate wet waste from dry waste at the household level, before handing them over to genitors. This is primary segregation. Bring them to the SWM unit and do secondary segregation. Secondary segregation is reported to be necessary because - all said and done – many a household do only a rough

segregation into two different bins. The genitors do a secondary segregation and shift the wet waste fit for vermi-composting, and others go for tertiary segregation. Practically, tertiary segregation involves sorting dry wastes of different types – such as plastics, bottles, pet bottles, iron pieces, papers, card boards, cloth pieces, carry bags, tetra packs etc.

STEP – 4: Treatment: Wet wastes that are easily digestible / decomposable go into making vermicompost; and wet waste of assorted nature go into plain composting covered with a plastic sheet. The non-biodegradable wastes are classified and kept separately for different recycling use. There are buyers for each type of waste – be it papers, card boards, bottles, pet bottles, bottle caps etc. Each type of bio-degradable waste has some utility. Some of the items like orange Peels, lemon peels, eggshells etc. are processed by the SWM Unit itself and are converted into bio-products.

STEP – 5: Store Keeping: Each type of dry waste is kept in one compartment each after segregation. There is a long tin-shed compartmentalized for this purpose. These items (bottles, pet bottles, papers, card boards, worn out cloths/footwear etc.) cannot be sold on a daily basis. So, they let them accumulate over a period of one or two months so that it becomes economical for recyclers who deal in such waste materials to buy and transport to their places. They are sold to recycling agents who visit this SWM Unit periodically.

STEP – 6: Sale as recyclables: These items (bottles, pet bottles, papers, card boards, worn out cloths/footwear etc.) are sold to traders who deal in recyclable waste materials. They go for reprocessing, and they may arrive in the market in several different forms.

STEP – 7: Sale after recycled products: Some of the wastes such as orange peels, lemon peels, and egg shells are processed by the SLWM Unit. They become salable commodities. For instance, orange peels / lemon peels are dried up and powdered to be added in making scouring powders used for vessel cleaning. Similarly, egg shells are powdered and sold for use as organic fertilizers in rose gardens. They are presented as ‘resource recovery from wastes’ below. This hierarchy can only be achieved by way of DECENTRALISATION of Waste management. This model is a culmination of awareness to systemized and scientific management.

Pre-production Actions

Reducing Production (consumption): Producing and consuming only as much as needed. Redesigning Production processes: Producing using cleaner processes and packaging using less material. Production of safe and recyclable materials: Avoiding the use of toxic and no recyclable materials, so that maximum resource can be recovered with least harm to the environment.

Post-production Actions

Reuse: What is produced should be reused as many times as possible. E.g. Bottles, containers, bags, etc.

Recycle:

Recycling those materials that cannot be reused. E.g. Organic waste into compost, PET bottles into polyester fibers, glass bottles into glass panes, cotton rags into paper, etc.

Waste Generation		Collection & transportation	Disposal	
Sr. no	**Particular**	**Quantity**	**Unit price**	**Total cost**
	Solid waste management			
1.	No. of dustbins install Common dustbins of 100 kg capacity (including school, anganwadi and Panchayat building)	10	500	50000
Total estimated Solid Waste Generated: 1.5 – 2 tons per day (based on an estimate of 250g per person per day) Types of Solid Waste**: Biodegradable: Animal waste, vegetable waste** Non-Biodegradable: **Plastic bags, papers, glass Solid Waste Sources: HH, Weekly markets, Schools, Shops, etc.**		Currently there is no scientific system to daily collect and/or transport the solid waste generated Once in 2 to 3 months, waste is collected from the roads/drains and transported to an open area outside the village This process is contracted out by the GP	Current Disposal methods Vegetables & Food Waste: Given to livestock, reused in field Plastics: Thrown outside in the open area, fields, drains or burnt	
2.	Dustbins for households green colour (10 litres)	604	135	81540
3.	Dustbins for households red colour (15 litres) System for collection, segregation and disposal of household garbage	604	175	105700
4.	Workers Uniforms, safety		3000	3000

	equipment; hand gloves, canvas shoes, first aid kits etc.			
5.	Tools required (Shovels, Brooms etc.)	1set	15000	15000
6.	Waste Collection Vehicles (Battery operated vehicles)**	2	200000	400000
7.	Other SWM Activities, Landscaping and Beautification			30000
				Total Cost : 658240 RS /Y

(Table 26 waste collection system)

8.1.7 Design of Solar Street Light

- **Introduction:**

The energy crisis all over the world is known. Many ways to solve problems with environmental future care. The growing requirement of energy and the less resource of traditional energy sources has become a challenge for developing countries as well as developed country. So for this reason, every country tries to energy efficiency and sustainable project to be installed. Solar street lighting systems are an effective way to reduce power consumption and CO_2 impact on the environment with the maintenance of the safety standards of the road. Electric street lighting consumes 114 TW h annually, so 69 million tones CO_2 emission. By Photovoltaic effect the solar radiation can be directly converted into electrical energy. This energy is stored in a battery and supplied to the luminary when it is required to glow in night or when it's required. . The system is also having controller facility. There are three types of control. First is an optical control method, by using a light sensor the street lights can automatically in the evening after it's ON automatically in the morning its OFF automatically. Second is the time control method, in which the light will glow as per our time adjustments. And the third is time-optical control, which the lights will glow automatically from time to time with automatically controlled intensity. So the unnecessary power wastage is reduced and save the energy.

So we have to use renewable energy which helps to reduce global warming and also reduce pollution in the environment. Street light is the most common object which is an indication of how much a village or country is developed. So we can use solar street light to save energy and get more efficient energy.

LED is a solid state semiconductor device which can convert electrical energy into visible light. It is characterized by low power consumption, long life, and reduced environmental pollution.

Given structure here the list of requirement equipment needed to design a solar street light system.

Composition of a Solar LEDs lighting system

1-Tilted solar modules placed on a mounting structure facing the sun path

2- LED lighting unit suspended on a pole short arm

3- Vented steel enclosure, (contains the battery/ies and the solar charge controller)

4- Structural anticorrosion parts consists of the pole, the affixing base, the short arm and the modules mounting structure

(Fig. 63 Solar Street Light)

- **Working:**

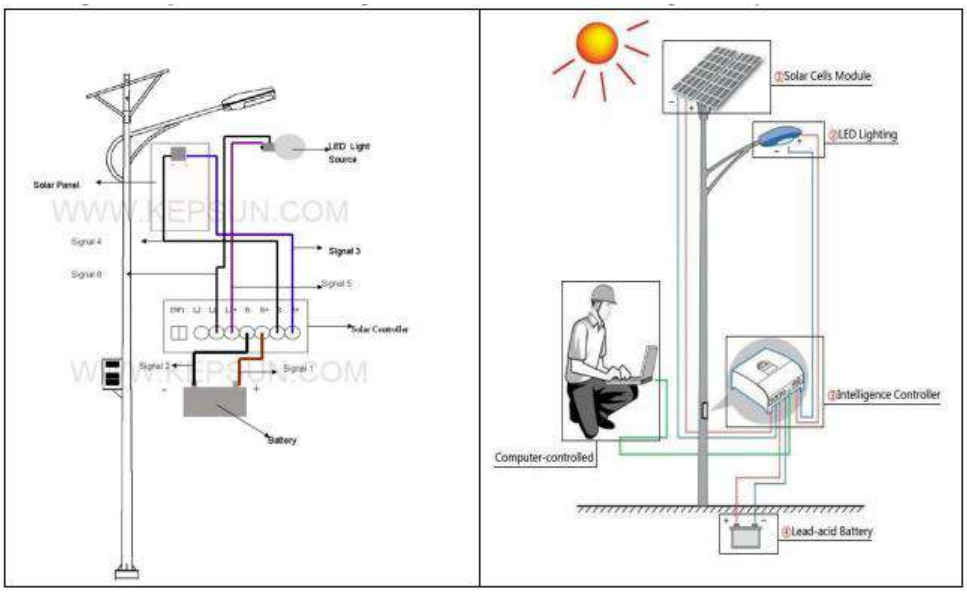
During day time, solar radiation consume energy and charges the battery which is connected with the solar panel. And after energy to LED light equipment at night.

- **Requirement of design:**

In the street light system, we no need to set up a transmission line or cable and no special controls are required.

Basic components like,

Solar panel, LED lamp (9/12/15/18/24 Watt), Pole, Battery, Controller



LEDs have good average life, life span, cost is very low, operate watts low. That's why there is more use of LEDs compared to others.

(Fig. 64 Connection of Solar Street Light)

- **LED Lamp:**

(Fig. 65 LED Lamp)

- **Selection of solar panel:**

Polycrystalline silicon solar cells are more appropriate in sunny areas. Because the price of polycrystalline silicon solar cells is lower than monocrystalline silicon solar cells.

- **Installation of solar panel:**

We have to set up a solar panel appropriately. Because the impact of shadow on solar panels decreases generation capacity 10% – 20%.

- **Selection of battery:**

Here we select a battery which has minimum maintenance and long life. So we use valve regulated lead acid batteries as a better choice. Because of less maintenance compared to lead acid batteries.

- **Controller:**

LED lights automatically turn off or turn on as per weather and we can also use time control functions which operate LEDs with a certain time.

(Fig. 66 Controller of Solar Street Light)

- **Protection:**

We also give protection to the load terminal as short circuit protection during design of the controller.

- **Advantages:**

Long life, Low maintenance cost, High efficiency

- **Disadvantages:**

High cost for installation (Mean while investment of money will be high.)
Temperature dependent.
And this is also depending upon the light radiation.

- **Approximately costing:**

We assume, in village we take 90 Street light for calculations,

55 LED lights of 15W
25 LED lights of 18W
10 LED lights of 24W

15W LED light price = Rs. 17,000/-
18W LED light price = Rs. 18,000/-
24W LED light price = Rs. 21,000/-
Total cost = (17,000 × 55) + (18,000 × 25) + (21,000 × 10)
= 1610000 + 770000
= 15,95,000
So,
Approximate costing: 16 Lakh

- **Payback period:**

Almost 3 to 4 years to recover all cost.

- **Defining of Packages:**

SSLS Type	Lamp Size (Watt)	Minimum Solar PV Module Size (Wp)	Minimum Battery Size for Lead Acid(AH)	Minimum Battery Size for Lithium Ion (AH)	Minimum Charge Controller Size (A)	Height of pole in meter	Recommended for road having Right of Way (ROW)
Type 1	10	50	40	30	5	7	Less than 4 M
Type 2	20	100	60	45	10	7	4-6 M
Type 3	30	150	80	60	12	7	>6-10 M
Type 4	40	200	100	75	15	8 or 9	>10 -14 M
Type 5	60	300	150	115	20	8 or 9	>14 -20 M
Type 6	80	400	200	150	30	10	>20 – 30 M
Type 7	100	500	250	180	40	10	>30 M

(Table 27 Types of Solar Street Light System)

- **Conclusion:**

Currently, initial investment in solar street light is major problem. Installation cost is high but the efficiency is high and long life. So it's a long term investment. And it's very important for the development of the village. And villages in developed countries will also develop. After all, "**VISHWAKARMA YOJNA"** aim's to develop and we get a modern village called **"URBANIZATION"**.

8.1.8 To Design Underground Cable System

Underground Cable

What is UG Cable?

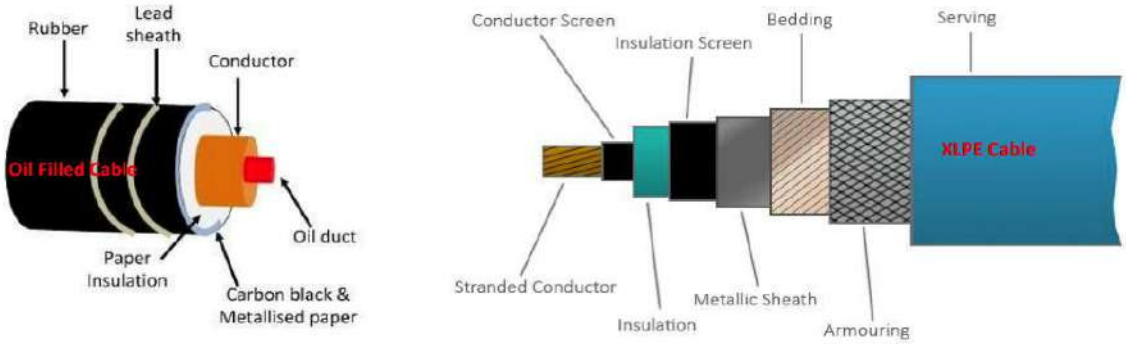
A cable which buried below the ground and distribute electrical as well as telecommunications signal.

Construction Principle of UG Cables:

An underground cable essentially consists of one or more conductors covered with suitable insulation and surrounded by some protective layer.

1. Cable Sheath
2. Wire Screen
3. Insulating Layer
4. Electric Conductor

(Fig. 67 Layers of underground cable)



(Fig. 68 XLPE underground cable)

XLPE Insulation Cable:

- ✓ Cross-linked polyethylene (XLPE) through the cross-link reaction of organic peroxides
- ✓ Continuously developing for application to higher voltages
- ✓ Higher voltages 500kV XLPE cables have already been commercialized.
- ✓ This cable was established in the USA around mid of 20th century.

Comparison between UG Cable and OH Cable:

Comparison Factor	UG Cable	OH Cable
Construction	Complicated, High cost and Heavy insulation required	Easy, Low cost, No need of insulation
Installation	Easy	Difficult
Heat Dissipation	Limited	Natural Cooling
Size of Conductors	Large	Small
Voltage Carrying Capacity	Average	Good
Fault Detection and Repair	Complicated	Easy
Safety	More safe	Less
Effect of Lightning Discharges	Not affected	Sometimes affected
Interference	No	Yes
Voltage Drop	Less due to larger diameter	More due to small diameter
Environmental Impact	More environmental and Health benefits	Causes human, Animal intervention
Land Use	Less	More
Life	Shorter	Longer

(Table 28 Comparison between underground cable and overhead cable)

Advantages and Disadvantages of UG Line over OH Line:

Advantages:

- ✓ Main advantage to use this cable is power theft should be near to zero percentage, Less space required, No visual intrusion, Not affected by wind or lightning, Higher surge impedance.

Disadvantages:

- ✓ Fault location is difficult and time consuming, Expensive, More monitoring, Testing is difficult and time consuming, Jointing require person with high skill, Joints become weak points.

To Install Underground Cable in the Village (Design):

Map of the Village (Roads and Street):

(Fig.69 Street view of village)

- Above map is Mota Khutavada Village map. In this map we clearly show the roads and streets of the village.
- Now we want to install underground cables in this village. So first of all we need to calculate how many main streets (roads) are present and how many sub streets are present.
- After calculation of streets we need to calculate how much load consumed by each house.
- In this village around 2000 houses are present.
- We consider 1 kW for each house so total demand is 2 MW for the village.
- Now we want to add one transformer for one street. This street consist around 50 houses and total load of the street is 50 kW.
- We assume that load factor is 0.8 and total load is 50 kW so we need to calculate transformer rating in kVA.
- kVA Rating of transformer = Total Load/Load Factor
- kVA Rating of Transformer = 50/0.8
- kVA = 62.5
- But for future loading we need to install 66 kVA rating transformer.
- So we need to install 66 kVA rating transformer for one street and it consist 50 houses and each house consist 1 kW load. So total load is 50kW

Underground Cable View of the Village (Design):

(Fig.70 Underground cable view of village's street)

- **Red Lines** – Small Streets of the village (Sub Street)
- **Blue Lines** – Main Street of the village (Main Road)

- Above image show the underground cable view of village.
- The village consist total 42 streets.
- 35 streets are sub streets and 7 streets are main streets (roads).
- In the above village the red lines shows the sub streets and the blue lines shows the main streets (roads).
- We assume that every sub street consist around 50 houses and each houses load is around 1 kW. So one Sub Street's load is nearly equal to 50 kW.
- And every sub street we need to install one 66 kVA transformer.

Different Types of Underground Cables:

By Voltage:

(i) Low-tension (LT) cables - upto 1000 V
(ii) High-tension (HT) cables - upto 11,000 V
(iii) Super-tension (ST) cables - from 22 kV to 33 kV
(iv) Extra high-tension (EHT) cables - from 33 kV to 66 kV
(v) Extra super voltage cables - beyond 132 kV

By Construction:

1. Belted cables - up to 11 kV
2. Screened cables - from 22 kV to 66 kV
3. Pressure cables - beyond 66 kV.

- **In this village XLPE HV Belted cables are used.**

Current Rating of HV Belted Cables:

Cable Type	**XLPE**	
Size of cable in Sq. mm	**Rated Current in Amp**	**Derated Current in Amp**
3 × 150	240	182
3 × 240	315	240
3 × 300	360	274
3 × 400	402	301
3 × 1000	685	550

(Table 29 Current rating underground cable)

- Load of the one sub street is around 50 kW and theoretically 1 kW consists nearly equal to 4 ampere current. So overall one Sub Street's current is 200 ampere but this is full load current. But never rated current exceed their limit because of full load is never connected to the transformer.
- So we need to install 150 Sq. mm XLPE HV Belted cable for all the sub streets.
- Here 66 kVA transformer's full load current is around 165 amperes. But for good efficiency we need to runs transformer below the full load current.
- The length of the UG cable for the sub street is around 5 km long.

- In the main street of village consists bank, shops etc. So we need to install at least 1 transformer for one street 66kVA rating in main streets (roads). And length is around 4 km long.

Conclusion:

- In this village we need to install 150 Sq. mm 11 kV XLPE UG Belted cables which can carry current up to 240 ampere.
- For the sub street we need at least 5 km long cable and for the main street we need at least 4 km long UG cable.
- At the end of every sub street we need to install 66 kVA rating transformer which contains average load of 50 kW.
- And in Main Street we also need to install 66 kVA rating transformer but the number of houses is less and load is as it is because of some shops and bank need much more load.

Costing:

Polycab H.T **XLPE** Aluminium Armoured Cable **11KV** 3 Core **150 mm**, Nominal Voltage: 1100, Rs 589 /meter

Is It Armoured: Armoured
Brand: Polycab
Conductor Stranding: Aluminium
Number of Core: 3
Now we need approximately 9 km long underground cable which means 9000 meter long cable.
Around cost of the underground cable is Rs. 53 lakh

Different Types of UG Cables (Three Cores):

According to IS: 692
11 kV, PILC, Belted Cable

Component	Material	Function
Conductor	Cu / Al	Power Transmission
Core insulation	Impregnated paper	To prevent short circuit
Filler	Impregnated jute fibers	As a separator and to fill air voids
Belt insulation	Impregnated paper	As a binder (Bending)
Sheath	Lead alloy	Moisture barrier and primary earth path
Inner serving	Bituminized paper	Protect sheath from chemicals corrosion and bedding

	Armor	Steel wire	Mechanical protection and secondary earth path
	Outer serving	Bituminized jute tape	Chemical protection of armor

11 kV, XLPE, Belted Cable (We are using this cable)

Component	Material	Function
Conductor	Al	Power Transmission
Core screen	Silicon	To limit electrical stress and smooth equipotential conductive surface for insulation
Core insulation	XLPE	To prevent short circuit
Insulation screen	Silicon	Void free equipotential shield over insulation
Copper tape screen	Copper tape	Provide metallic screen over insulation
Filler	PVC string	As a separator and to fill air voids
Belt insulation	PVC tape	As a binder (Bending)
Armor	Steel strip	For mechanical protection and earth path
PVC jacket	HDPE	For mechanical and chemical protection of cable

8.1.9 Design of battery backup off grid solar system

- **Introduction:**

There are three main types of solar system,

(1) Grid Connected Solar System
(2) Grid Connected with Battery Backup Solar System
(3) Battery Backup off Grid Solar System.

In Grid Connected Solar System these systems directly connected to power grid. The prime advantage of this type of system is the ability to balance the system production and home power requirements. Grid Connected Solar Systems are the lowest cost type of residential solar electric system, due to having fewer required components.
In Grid Connected with Battery Backup System these systems directly connected to power grid and as well as adds batter backup to the system. The addition of a battery backup enables the system to balance production and demand and protects against power outages. Solar electric system production depends on the available sunlight. When sunlight is absent, production can exceed demand. When production exceeds demand, the excess power can charge the batteries, which store the electricity. But these systems has also disadvantage like, charging and discharging batteries reduce the overall efficiency of the system. So these systems are complicated as compare as others. As well as installation also expensive.
In Battery Backup off Grid Solar System these systems completely disconnected from the power grid. So, without grid, batteries make the system balance. These types of systems are more popular because it's fully independent from the grid. Most home appliances like Fans, TV, and Bulb etc. can work through this system.

- **Major Components Used:**
  PV Module - Converts sunlight into DC electricity.
  Solar Charge Controller - Regulates the voltage and current coming from the PV panels going to battery and prevents battery overcharging and prolongs the battery life.
  Inverter - Converts DC output of PV panels or wind turbine into a clean AC current for AC appliances or fed back into grid line.
  Battery - Stores energy for supplying to electrical appliances when there is a demand.
  Load - is electrical appliances that connected to solar PV system such as lights, radio, TV, computer, refrigerator, etc.

- **Sizing of This System:**
  1. Determine the total power consumption in one day.
  2. Determine the size of PV module, Energy needed to PV panels. (Generally multiply 1.3 with total power consumption demand), For INDIA Solar Panel generation factor is between 4 to 5. (So, divided total energy needed with 4.5)
  3. Determine Inverter size. (Generally 25-30% bigger than total watts of appliances)
  4. Calculate Battery size.
  Battery Capacity (Ah) = $\frac{\text{Total Watt-hours per day used by appliances}}{(0.85 \times 0.6 \times \text{nominal battery voltage})}$ x Days of autonomy

Now, we take one Example,

A house has the following electrical appliance usage:

Two 9 Watt led lamp used 4 hours per day.

One 60 Watt fan used for 2 hours per day.

One 150 Watt TV used for 2 hours per day.

The system will be powered by 12 V_{dc}, 150 W PV modules.

(I) Determine power consumption demands

Total appliance use = (18 W x 4 hours) + (60 W x 2 hours) + (150 W x 2)

= 492 Wh/day

Total PV panels energy needed = 492 x 1.3

= 639.6 Wh/day

(II) Size the PV panel

Total W of PV panel capacity needed

= 639.6 / 4.5

= 142.13 W

Number of PV panels needed

= 143.13 / 150

= 0.95 modules

Actual requirement = 1 module

So this system should be powered by 1 module of 150 W PV module.

(III) Inverter sizing

Total Watt of all appliances = (2 x 9) + 60 + 150 = 228 W

For safety, the inverter should be considered 25-30% bigger size.

The inverter size should be about 285 W or greater.

(IV) Battery sizing

Total appliances use = (9 W x 4 hours x 2) + (60 W x 2 hours) + (150 W x 2 hours)

Nominal battery voltage = 12 V

Days of autonomy = 1 days

$$\text{Battery capacity} = \frac{[(9\text{ W} \times 4\text{ hours} \times 2) + (60\text{ W} \times 2\text{ hours}) + (150\text{ W} \times 2\text{ hours})] \times 3}{(0.85 \times 0.6 \times 12)}$$

Total Ampere-hours required 241.17 Ah

So the battery should be rated 12 V 250 Ah for 1 day autonomy.

- **Pricing of Off Grid Solar System:**

How much does a 1 kW to 10 kW System Price?	
Off grid solar system	**Price (all inclusive)**
320 watt	₹ 39,500
1 kW	₹ 95,000
2 kW	₹ 1,90,000
3 kW	₹ 2,85,000
5 kW	₹ 4,25,000
10 kW	₹ 9,50,000

(Table 30 Pricing of Off Grid System)

Loom Solar 1 kW off grid solar system for Home with battery backup:

Main Products
Solar Inverter – Microtek 2335 VA (1 nos.)
Solar Battery (C10) – 150 Ah (2 nos.)
Solar Panels–1125 Watt (375 watt mono PERC * 3 nos.)
Mounting Structure – 3 Panels Stand
DC Wire – 15 meters Pair
Connectors – 3 in 1 and 1 in a
Running Load

(Fig. 71 Luminous Solar System)

Up to 1200 watts of power with combination of – 5 ceiling Fans, 20LED lights, 2 Television, 1 Refrigerator, 1 mixer and Laptop/ Mobile Charging

- **Backup Time :**

Load	**500 W**	**400 W**	**300 W**	**200 W**	**100 W**
Duration	4 hours 20 minutes	6 hours	9 hours	15 hours	36 hours

(Table 31 Backup time of off grid system)

- **Technical Details:**

Inverter Model	**Msun 2335**
Inverter Capacity	2 KVA
Efficiency	Inverter – 97%, Module > 16%
Module Type	Mono-PERC
Battery Included	Yes
Standard Installation Included	Yes
Installation Cost Included	₹ 10,000

(Table 32 Technical Details of off grid system)

- **Steps To Install Solar Panels:**
  Here are the simple steps to install solar panels,
  Step-1: Solar panel installation made easy
  Step-2: Assembly of solar panels
  Step-3: Electrical Wiring
  Step-4: Connection between solar panel and solar inverter
  Step-5: Connection between solar inverter and solar battery

<table>
<tr><td>1.
  </td><td>Assemble Solar Panels:
  </td></tr>
<tr><td>Electrical Wiring :
  </td><td>Connections between solar panels and inverter :
  </td></tr>
<tr><td>Connections between Inverter and Battery
  </td><td>Connection between Inverter and Grid:
  </td></tr>
<tr><td>Solar Inverter:
  </td><td></td></tr>
</table>

- **Advantages:**
  Long Life, Low Maintenance Cost, High Efficiency, Keep Environmental Clean and Green, Easier Installation, Easy Alternative for Rural areas, Completely Independent from Grid
- **Disadvantages:**
  These types of systems are costly.
  Batteries are required to deliver electricity consistently throughout the day and night.
  It could require a lifestyle change to reduce energy consumption.

- **Conclusion:**
  We can use more solar based energy resources in home and public utility building. It reduces environmental pollution. And also reduce electricity cost in the long run.
  Awareness about energy efficiency by the use of solar is an important thing in conservation of energy. Solar power is the future of electricity. There is one time capital investment and proper maintenance.
  Thus, use of renewable energy, energy efficient equipment and proper use of energy can push Mota Khutavada village towards "**URBANIZATION**".

8.2 Reason for recommending this design

- Detailed design stage is building style. Total designs are usually remarked as 'developed design' or 'definition' it is the method of seizing and developing the approved idea formed design. Detailed style of design ought to be offer sufficient data applications for statutory approval to be created.
- Designing instructions are to be followed as per recommendations in the way of a better practice in design. They're supposed to give clear commands to designers to developers so that they can learn to adopt exact principles like efficiency & consistency. Instead of demonstrating principles and designing of guidelines to aid helpful advice on how to create a designing method that could be platform-specific or cross-platform.

8.3 Suggestions / Benefit of the villagers advantages of village life

- Everybody in the village depends on agriculture and so they cultivate by their own. They're very friendly and they have unity became they live together and they share their work with each other's. Because the environment is generally pollution free and noise free, we can enjoy the real beauty of nature in the village. Normally, villagers don't heist to help others.

CHAPTER: 9

Proposing Design for Future Development of the village for the Part II design

In our village the basic facilities like bus stand, Public Toilet, Dispensary, community hall we proposed. In future we design and proposed for the some advanced design which make village in to smart or ideal village.
The future development of village is having facilities like,

- Elevated water tank
- Redesign of CHC
- Digital library
- Recreation garden
- Solar street light
- Bio-gas plant
- Solar irrigation techniques
- Rain water harvesting system
- Improved landscaping of village
- All basic facilities available in the village
- Better like style of villager
- E-Seva Kendra
- Agro Storage
- Improve transportation facility and improve use of government facilities

Sr. No.	Design Name	Period	Benefit
1.	Dispensary	1 to 2 Year	Animal sickness
2.	Bus Stop	1 Year	Waiting place for villagers for vehicle
3.	Public Library	Up to 1 year	For reading of villagers
4.	Agro Storage	1 year	For good fertilizer
5.	E – Seva Kendra	Up to 1 year	For banking, mobile recharge, aadhar service
6.	Rain water Harvesting	3 to 5 month	Storing of drinking waste in rainy season.
7.	Public Toilet	6 to 9 month	Used by villagers or outer people tor toilet
8.	Post Office	2 to 3 Year	Post office work
9.	Recreation Garden	1 to 2 Year	For play and refreshment and happiness
10.	Bio-gas plant	Up to 1 year	Financial as well as environment welfare
11.	Open Air Theater	2 to 3 Year	Enjoyment for everyone

CHAPTER: 10

Conclusion of the entire Village activities of the project

The motive of Vishwakarma Yojana phase - VII is to uplift the lifestyle of the rural areas to its certain extent up to the level of an ideal village situated at the nearby location of that particular jurisdiction. It is an effective government scheme to develop the rural areas under economical cost with good workability and efficiency during its usage. The project tends to improve the physical, social as well as socio-cultural aspects of the village by implementing and improvising various infrastructures with regards to lesser or least hindrance to its rural authenticity. 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. Indeed, employment expansion is at least as important as growth in productivity. In a sense, both represent the utilization of labor as a resource. Why, then, does thinking about efficiency focus on one and neglect the other It is important to reflect on this question. The answer, which calls for change in both economics and politics, could make a real difference. With Gap Analysis, we conclude that some of different Smart Village facilities are required as basic or primary level which still lack in village. So, according to Gap Analysis of Mota Khutavada village, we observed condition of existing infrastructure facilities in village such as- Primary school, Aganwadi etc. Smart 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 as;

- Bus Station, Overhead water tank, Public toilet, Rainwater harvesting, Bio-gas plant, Design of solar street light, Renewable energy source planning, Design of battery backup off grid solar system

CHAPTER: 11

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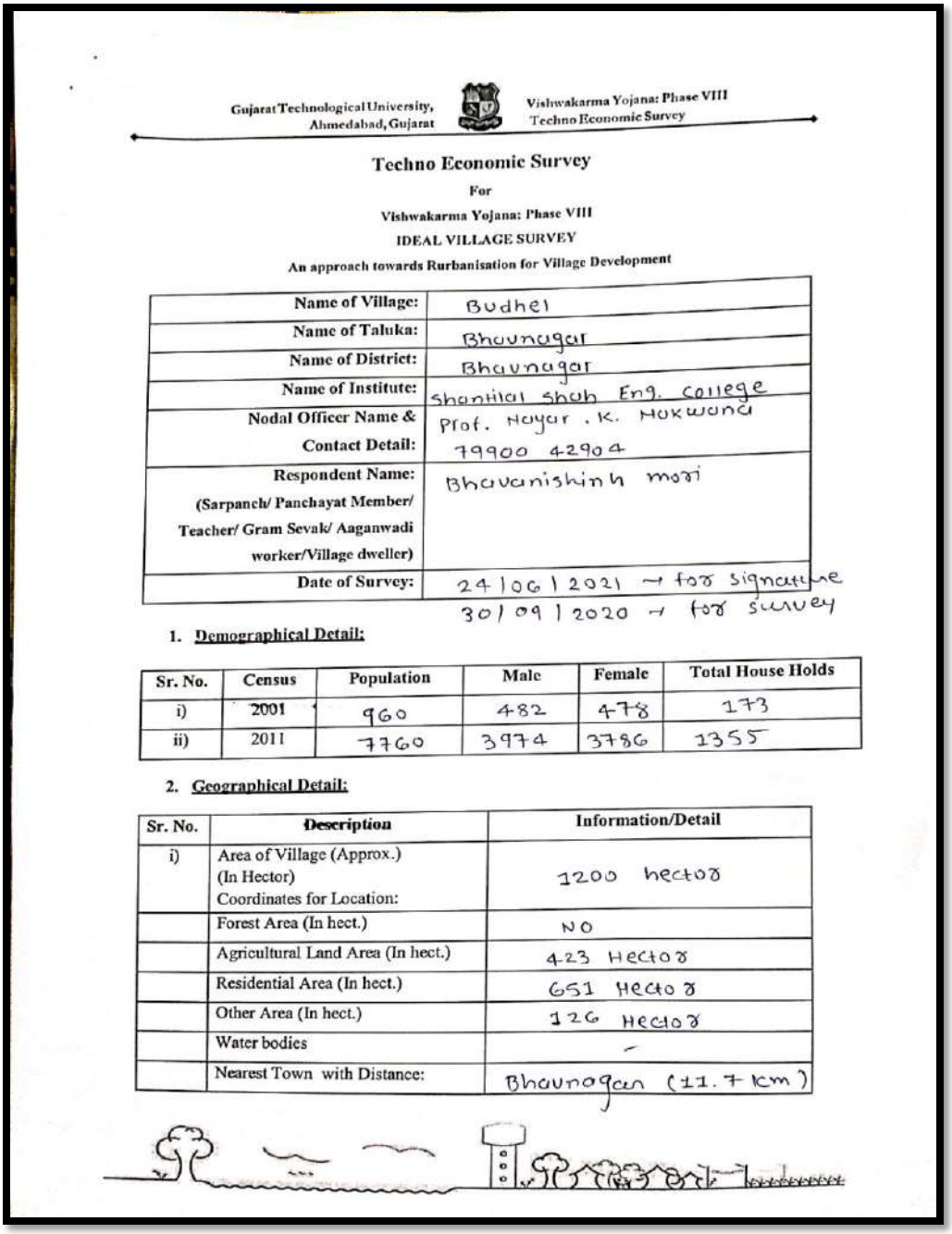
CHAPTER: 12

Annexure attachment

12.1 Survey form of Ideal Village



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Techno Economic Survey

Techno Economic Survey

For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

Name of Village:	Budhel
Name of Taluka:	Bhavnagar
Name of District:	Bhavnagar
Name of Institute:	Shantilal shah Eng. College
Nodal Officer Name & Contact Detail:	Prof. Nayar .K. Nakwana 79900 42904
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Bhavanishinh mori
Date of Survey:	24/06/2021 → for signature 30/09/2020 → for survey

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	960	482	478	173
ii)	2011	7760	3974	3786	1355

2. **Geographical Detail:**

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	1200 hector
	Forest Area (In hect.)	NO
	Agricultural Land Area (In hect.)	423 Hector
	Residential Area (In hect.)	651 Hector
	Other Area (In hect.)	126 Hector
	Water bodies	-
	Nearest Town with Distance:	Bhavnagar (11.7 km)

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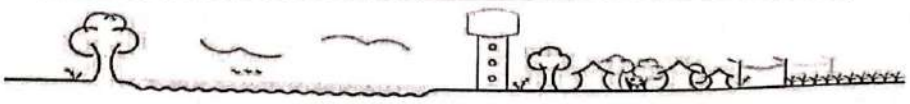
3. Occupational Details:

Name of Three Major Occupation groups in Village	1. Agriculture 2. Diamonds 3. Shops

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	All houses Tap connection 75 % Bore wells 1 - Pond	✓ ✓ ✓		Good drinking water facility
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: 2 nos. 14,000 L			capacity
	Underground Sump	Capacity: 4 nos. 25 Lakh L			Capacity
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	Yes	✓		In 75 % of village
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open	closed			
	If Open than Pucca / Kutchcha	–			
	Whether drain water is discharged directly in to Water bodies/ Sewer plants	outside of the village			
Suggestions if any:					



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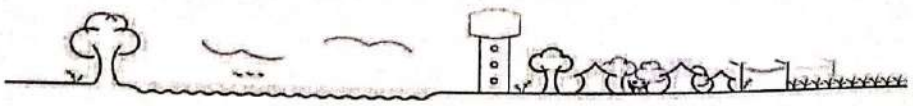
E.	Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM				
	Village approach road	cement	concrete		
	Main road	cement	concrete		
	Internal streets	50% blocks, 30% kachha roads, 20% RCC			
	Nearest NH/SH/MDR/ODR Dist. in kms.	state highway			
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	no			Bhavnagar (11.7 km)
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	yes	✓		
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	All	✓		
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Y			govt. more than 6 hr.
	Power supply for Domestic Use	Y	✓		
	Power supply for Agricultural Use	Y	✓		
	Power supply for Commercial Use	Y	✓		
	Road/ Street Lights	Y	✓		



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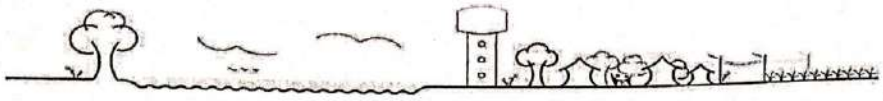
	Electrification in Government Buildings/ Schools/ Hospitals	Y	✓		
	Renewable Energy Source Facilities (Y/ N)	NO		✓	Required
	LED Facilities	NO		✓	Required
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	2 NOS.			
	Location Condition	Poor condition			
	Community Toilet (With bath/ without bath facilities)	Y	✓		
	Solid & liquid waste Disposal system available	Y	liquid waste is available Solid waste is not available		
	Any facility for Waste collection from road	Y	workers are there for collect the waste clean Road		
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	well	✓		
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	80% Pucca 20% kutchha			

5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks



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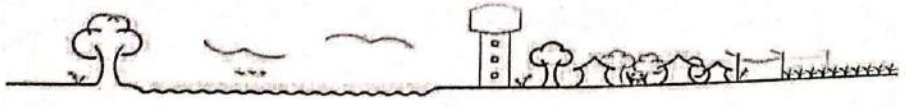
K.	Health Facilities:				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	1 PHC 1 Govt. Hospital 1 private clinic 8-10 private hospital		✓	
	Private Clinic/Private Hospital/ Nursing Home	↑		✓	
	If any of the above Facility is not available in village than approx. distance from village: ..10...kms. Bhavnagar				
Suggestions if any: —					

L.	Education Facilities:				
	Aaganwadi/ Play group	8	✓		
	Primary School	1 Girls 1 Boys	✓		
	Secondary school	1	✓		
	Higher sec. School	1	✓		
	ITI college/ vocational Training Center	NO		✓	
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	NO		✓	
	If any of the above Facility is not available in village than approx. distance from village: 10.....kms. Bhavnagar				
Suggestions if any:					

M.	Socio- Culture Facilities				
	Community Hall (With or without TV) Location:	Not available		✓	Required



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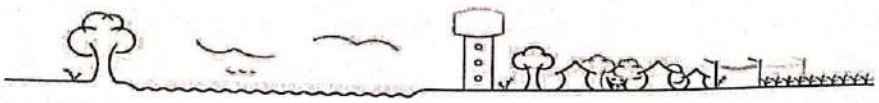
	Condition:				
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	Not available		✓	
	Public Garden Location: Condition:	Not available		✓	
	Village Pond Location: Condition:	Yes Good condition	✓		
	Recreation Center Location: Condition:	1 Joggers Park	✓		
	Cinema/ Video Hall Location: Condition:	NO			
	Assembly Polling Station Location: Condition:	Yes			
	Birth & Death Registration Office Location: Condition:	Yes At Panchayat office	✓		

If any of the above Facility is not available in village than approx. distance from village: .....10.....kms. Bhavnagar

Suggestions if any:

N.	Other Facilities				
	Post-office	Yes	✓		
	Telecommunication Network/ STD booth	yes	✓		



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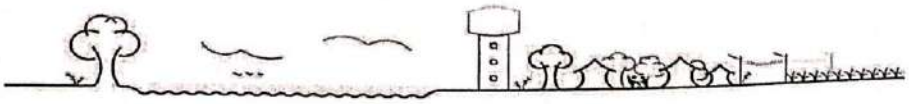
	General Market	Good	✓		
	Shops (Public Distribution System)	Good	✓		
	Panchayat Building	Good			
	Pharmacy/Medical Shop	Good			
	Bank & ATM Facility	1 ATM, 1 BANK	✓		
	Agriculture Co-operative Society	Yes	✓		
	Milk Co-operative Soc.	Yes	✓		
	Small Scale Industries	Yes	✓		
	Internet Cafes/ Common Service Center/Wi Fi	Yes	✓		
	Other Facility	Youth club, Mahila Mandal			
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		✓	Required
P.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	NO		✓	Required
Q.	Any Other	NO		✓	Required

7. **Data Collection From Village**

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



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Recent Projects going on for Development of Village	Yes Market
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)	All Infrastructures are new	
2.	Additional Information/ Requirement	Required 1 ITI College.	

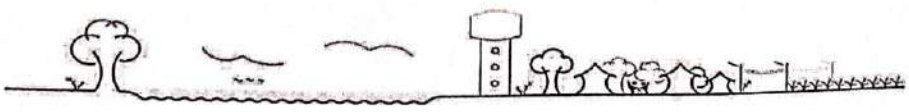
9. **Smart Village Proposal Design**

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	—	—	—

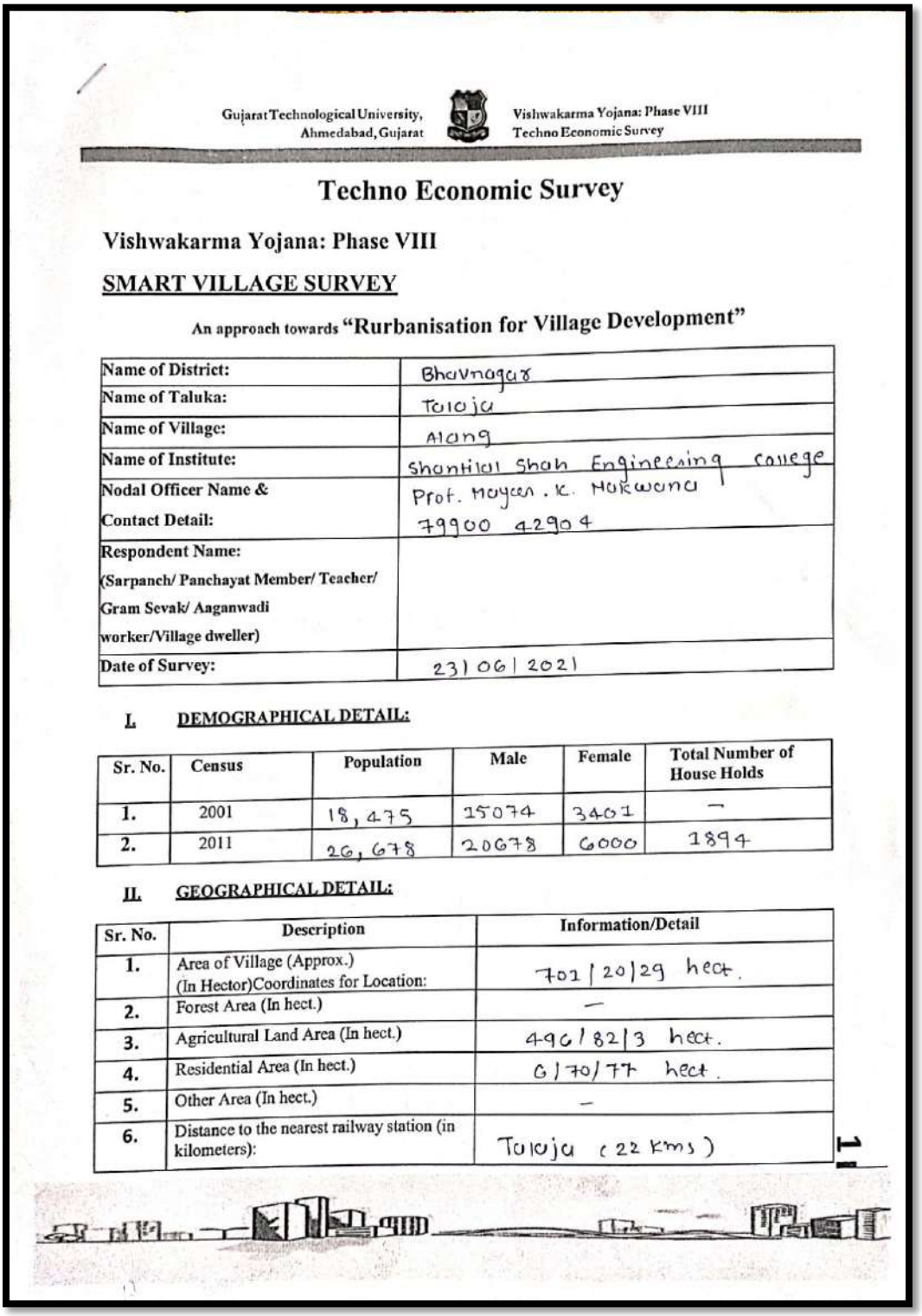
Note: Photographs/ Video/ Drawings of all existing Infrastructure facilities & conditions should be taken by students of respective villages for their record and information.

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

24/06/24
સરપંચશ્રી
બુધેલ ગ્રામ પંચાયત
તા.જી. ભાવનગર



12.2 Survey form of Smart Village



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SMART VILLAGE SURVEY

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

Name of District:	Bhavnagar
Name of Taluka:	Talaja
Name of Village:	Along
Name of Institute:	Shantilal Shah Engineering college
Nodal Officer Name & Contact Detail:	Prof. Mayuri. K. Makwana 79900 42904
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	
Date of Survey:	23/06/2021

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	18,475	15074	3401	–
2.	2011	26,678	20678	6000	1894

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	702/20/29 hect.
2.	Forest Area (In hect.)	–
3.	Agricultural Land Area (In hect.)	496/82/3 hect.
4.	Residential Area (In hect.)	6/70/77 hect.
5.	Other Area (In hect.)	–
6.	Distance to the nearest railway station (in kilometers):	Talaja (22 Kms)

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7.	Name of Nearest Town with Distance:	Talaja (22 km)
8.	Distance to the nearest bus station (in kilometers):	In village (0 km)
9.	Whether village is connected to all road for the any facility or town or City?	Yes

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1. work in ship bra 2. Farming 3. Job
Major crops grown in the village:	1. Cotton 2. Peanuts 3. onions

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	Public Tap Tube well	6 Nos.		Well - 29 Bore well - 1000 (APPX.)
2.	**DUG WELL** Protected Well Un Protected Well	Protected well	✓		Hand pump (5-6)
3.	**WATER FROM SPRING** Protected Spring Unprotected Spring	Protected 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**	Dam canal Pond	✓		

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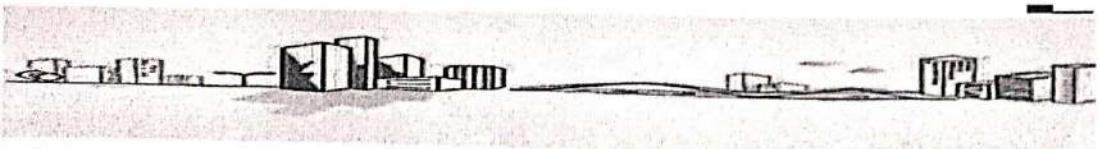
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	Yes		
	Underground Sump	Capacity:	Yes		
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1 2 B. OPEN WITH OUTLET C. OPEN WITHOUT OUTLET	—	—		
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	WBM			good
	Main road	R.C.C			good
	Internal streets	R.C.C			good
	Nearest NH/SH/MDR/ODR Dist. in kms.	NH → 45 km SH → 35 km			
Suggestions if any:		MDR → 10 km			
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	23 km Talaja	—		good
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	In village (Daily)	—		Good
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Available	Auto Bus Jeep Chhakda		Good
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	24 hrs.			66 KV 2-Plant



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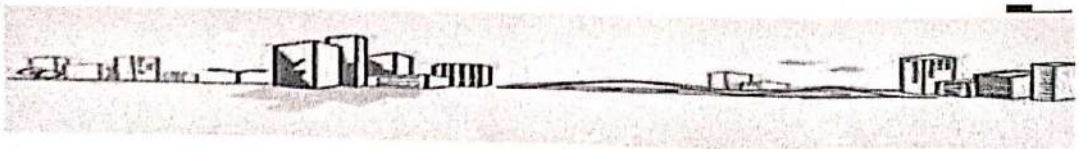
	Power supply for Domestic Use	✓			
	Power supply for Agricultural Use	✓			
	Power supply for Commercial Use	✓			
	Road/ Street Lights	LED lights, Solar lights.			Good
	Electrification in Government Buildings/ Schools/ Hospitals	✓			
	Renewable Energy Source Facilities (Y/ N)	✓			
	LED Facilities	✓	✓		
Suggestions if any:		-			
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	9 Toilets			Good condition
	Location Condition	In some	Distance		
	Community Toilet (With bath/ without bath facilities)	with & without	✓		
	Solid & liquid waste Disposal system available	✓	✓		
	Any facility for Waste collection from road	Yes	✓		
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL OTHER (SPECIFY)	2 29	✓ ✓		
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Pucca			More than 90 %

4



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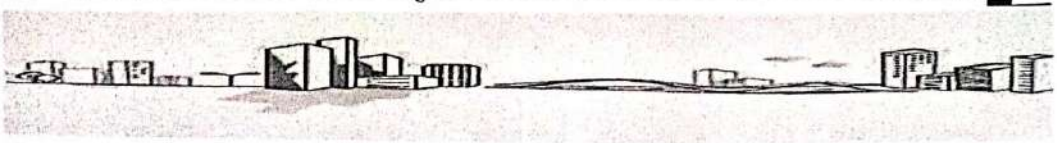
V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	15 - Anganwadi			
	Sub-Centre	1 - PHC			
	PHC	15 - Private Clinic			
	BLOCK PHC				
	CHC/RH	1 - Ayush Health Centre			
	District/ Govt. Hospital				
	Govt. Dispensary	1 - 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: ...22.....kms. Talaja				
	Suggestions if any:				
K.	**Education Facilities:**				
	Aaganwadi/ Play group	15 NOS.	✓		
	Primary School	3 NOS	✓		
	Secondary school	2 NOS	✓		
	Higher sec. School	2 NOS	✓		
	ITI college/ vocational Training Center	NO		✓	Required
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	NO		✓	Required
	If any of the above Facility is not available in village than approx. distance from village: 22.....kms. Talaja				

5



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Suggestions if any:

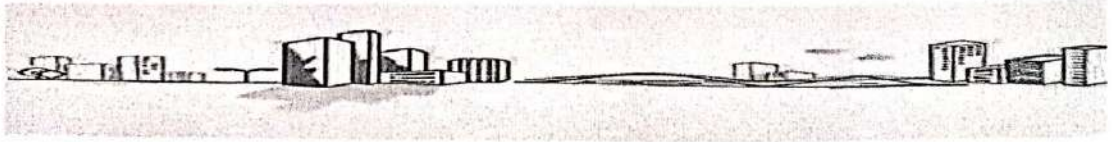
L.	Socio- Culture Facilities	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	Good		✓	
	Public Library (With daily newspaper supply: Y/N)	Good (Y)		✓	
	Public Garden		Garden Road	✓	
	Village Pond			✓	
	Recreation Center				✓
	Cinema/ Video Hall	Good		✓	
	Assembly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

If any of the above Facility is not available in village than approx. distance from village: 22 kms. Talaja

Suggestions if any:

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

19



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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?			1.	✓
	2. Are there any beneficiaries in the village from the following programme?			2.	✓
	3. Janani Suraksha Yojana			3. ✓	
	4. Kishori Shakti Yojana			4. ✓	
	5. Balika Samriddhi Yojana			5. ✓	
	6. Mid-day Meal Programme			6. ✓	
	7. Intergrated Child Development Scheme (ICDS)			7. ✓	
	8. Mahila Mandal Protsahan Yojana (MMPY)			8. ✓	
	9. National Food for work Programme (NFFWP)			9. ✓	
	10. National Social Assistance Programme			10.	✓
	11. Sanitation Programme (SP)			11. ✓	
	12. Rajiv Gandhi National Drinking Water Mission			12. ,	✓
	13. Swarnjayanti Gram Swarozgar Yojana			13.	✓
	14. Minimum Needs Programme (MNP)			14.	✓
	15. National Rural Employment Programme			15.	✓
	16. Employee Guarantee Scheme (EGS)			16. ✓	
	17. Prime Minister Rojgar Yojana (PMRY)			17. ✓	
	18. Jawahar Rozgar Yojana (JRY)			18.	✓
	19. Indira Awas Yaojna (IAY)			19.	✓
	20. Samagra Awas Yojana (SAY)			20. ✓	
	21. Sanjay Gandhi Niradhar Yojana (SGNY)			21.	
	22. Jawahar Gram Samridhi Yojana (JGSY)			22. ✓	✓
	23. Other (SPECIFY)				

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

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

VII. DATA COLLECTION FROM VILLAGE

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Village Base Map Available: Hard Copy/Soft Copy	Soft copy ✓			
2.	Recent Projects going on for Development of Village	No	-	✓	
3.	Any NGO working for village development	Yes	-		(5-8)
4.	Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS CYCLONE DROUGHT LANDSLIDES AVALANCHE OTHER (SPECIFY)	-	-	-	-

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks

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

IX. Smart Village / Heritage Details

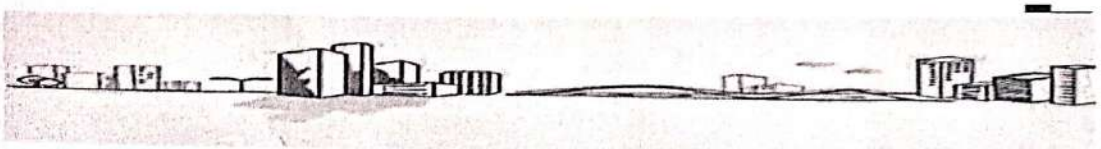
Sr. No.	Descriptions	Information/ Detail	Remarks
1.	IS THEIR ANY THING FOR THE VILLAGE ENHANCEMENT POSSIBLE ?	Ship Brecking development more	

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

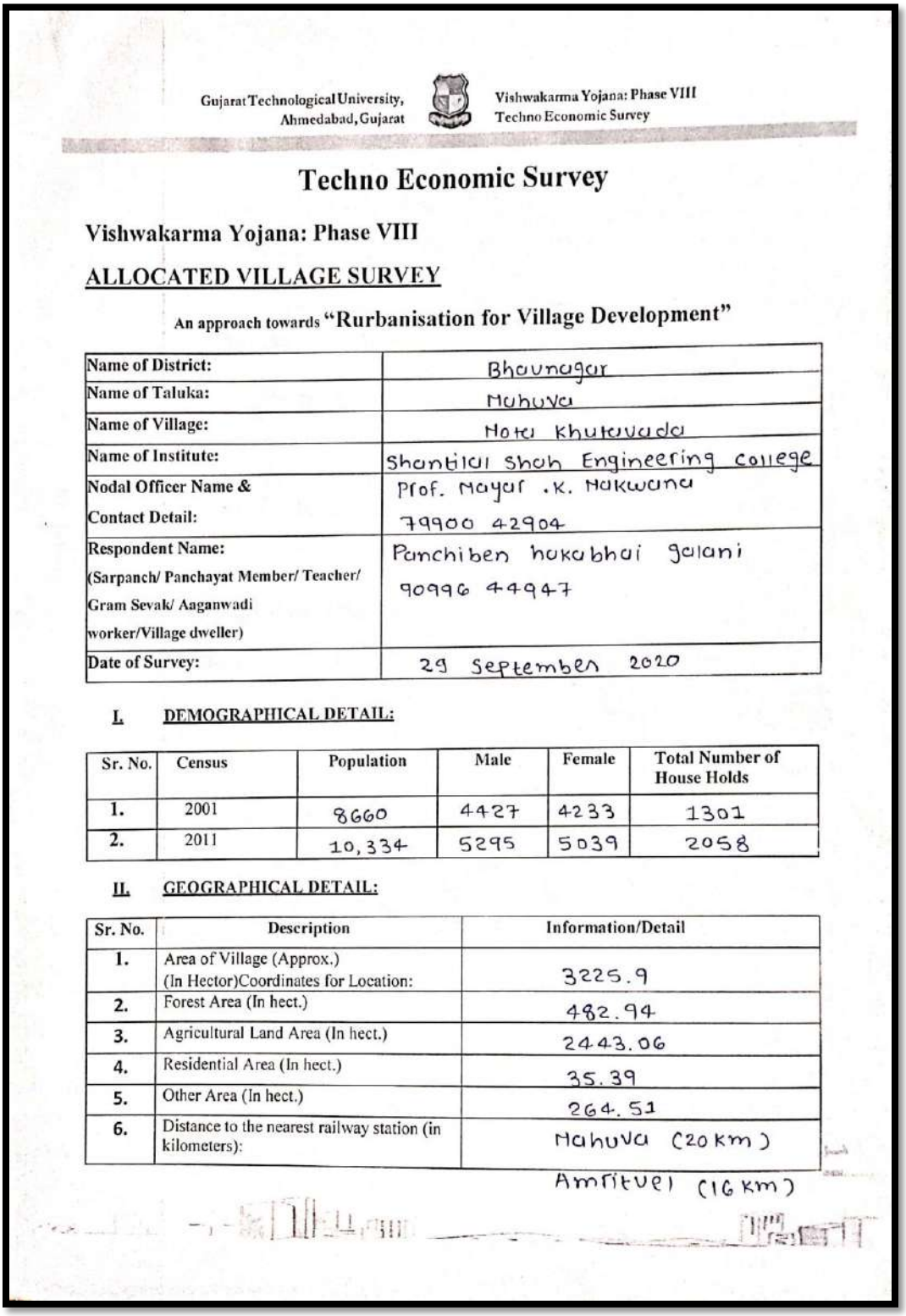
For Any Administration queries/ Difficulties:
GTU VY Section
Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

L.N. Chauhan.
સદસ્ય
જિ.પં. ભાવનગર (અલંગ-સીટ)

9



12.3 Survey form of Allocated Village



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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:	Bhavnagar
Name of Taluka:	Mahuva
Name of Village:	Mota Khutavada
Name of Institute:	Shantilal Shah Engineering College
Nodal Officer Name & Contact Detail:	Prof. Mayur .K. Makwana 79900 42904
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Panchiben hukabhai jalani 90996 44947
Date of Survey:	29 September 2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	8660	4427	4233	1301
2.	2011	10,334	5295	5039	2058

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	3225.9
2.	Forest Area (In hect.)	482.94
3.	Agricultural Land Area (In hect.)	2443.06
4.	Residential Area (In hect.)	35.39
5.	Other Area (In hect.)	264.51
6.	Distance to the nearest railway station (in kilometers):	Mahuva (20 km) Amritvel (16 km)

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

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1.	Farming
	2.	Labour work
	3.	Diamond workers

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

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	Tube well		✓	• Required water tank • Filter plan
2.	**DUG WELL** Protected Well ✓ Un Protected Well		✓		
3.	**WATER FROM SPRING** Protected Spring Unprotected Spring				
	Rainwater ✓ Tanker Truck ✓ Cart With Small Tank		✓		
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/** Irrigation Channel Bottled Water Hand Pump ✓ Other(Specify)Lake/ Pond		✓		• Hand pump is not in working condition.

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Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:		✓	Required
	Underground Sump	Capacity:		✓	Required
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			✓	
	Main road			✓	
	Internal streets		✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.				YES: SH21
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	NO			MAHUVA (20KM)
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	YES			NEW BUS STATION REQUIRED (old is not working condition
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	YES			
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	YES			GOVT. (More than 6Hrs)

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	Power supply for Domestic Use	YES			
	Power supply for Agricultural Use	YES			8 Hours
	Power supply for Commercial Use	YES			
	Road/ Street Lights	YES		✓	Not in working condition
	Electrification in Government Buildings/ Schools/ Hospitals	YES			Maintenance is required
	Renewable Energy Source Facilities (Y/ N)	NO		✓	Required
	LED Facilities	NO		✓	Required
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	NO		✓	Required
	Location Condition				
	Community Toilet (With bath/ without bath facilities)	NO		✓	
	Solid & liquid waste Disposal system available	NO			
	Any facility for Waste collection from road	NO			
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL OTHER (SPECIFY)	YES YES YES YES			
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	70% 30%	Pucca Kutchha		Appsox. ratio = 2.33

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	9			2 Need maintenance
	Sub-Centre	2			
	PHC	NO			
	BLOCK PHC	NO			
	CHC/RH	✓	✓		
	District/ Govt. Hospital	YES	✓		
	Govt. Dispensary				
	Private Clinic	2	✓		
	Private Hospital/	2	✓		
	Nursing Home				
	AYUSH Health Facility	YES	✓		
	sonography /ultrasound facility				
	If any of the above Facility is not available in village than approx. distance from village: ...-.....kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group	YES (9)			
	Primary School	YES	✓		Maintenance req.
	Secondary school	YES	✓		
	Higher sec. School	YES	✓		Maintenance req.
	ITI college/ vocational Training Center	NO	✓		Needed
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	NO	-	-	-
	If any of the above Facility is not available in village than approx. distance from village: ..20...kms.				

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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)				✓
	Public Garden				✓
	Village Pond			✓	
	Recreation Center				✓
	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. we provide communication Hall.

Suggestions if any:

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

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

Suggestions if any:

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

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	NO	✓		Required
2.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	NO NO NO	✓ ✓ ✓		Required Required Required
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	✓		Soft Copy
2.	Recent Projects going on for Development of Village	NO			
3.	Any NGO working for village development	Yes			
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	 Required Required Not Available	
2.	Additional Information/ Requirement	Bus-station	
3.	During the last six months how many times CLEANING .....daily..... 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 ?	yes	Bus-stop water tank public Toilet communication Hall

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

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

2/1/5

(શ્રીમતિ પાર્વતીબેન હકાભાઈ ગલાણી)
સરપંચ
શ્રી મોટા ખૂંટવડા ગ્રામ પંચાયત

12.4 Gap Analysis of the Allocated Village

VILLAGE GAP Analysis					
Village Facilities	**Planning Commission/UDPFI Norms**	**Village Name:**	**Mota Khutavada**		
		Population:			**10,334**
		Existing	**Required as per Norms**	**Smart Vilage / Cities / Heritage Future Projection Design**	**Gap**
Social Infrastructure Facilities					
Education					
Anganwadi	Each or Per 2500 population	9	1	8	0
Primary School	Each Per 2500 population	1	1	4	0
Secondary School	Per 7,500 population	1	2	1	1
Higher Secondary School	Per 15,000 Population	1	1	1	0
College	Per 125,000 Population	0	0	0	0
Tech. Training Institute	Per 100000 Population	0	0	0	0
Agriculture Research Centre	Per 100000 Population	0	0	0	0
Skill Development Center	Per 100000 Population	0	0	0	0
Health Facility					0
Govt/Panchyat Dispensary or Sub PHC or Health Centre	Each Village	1	1	1	0
Primary Health & Child Health Center	Per 20,000 population	1	1	1	0
Child Welfare and Maternity Home	Per 10,000 population	0	1	0	1
Multispeciality Hospital	Per 100000 Population	0	0	1	0
Public Latrines	1 for 50 families (if toilet is not there in home, specially for slum pockets & kutcha house)	0	5	2	5
Physical Infrastructure Facilities					
Transportation		**Adequate / Inadequate**	Adequate		
Pucca Village Approach Road	Each village	1	1	1	0
Bus/Auto Stand provision	All Villages connected by PT (ST Bus or Auto)	0	1	1	1
Drinking Water (Minimum 70 lpcd)		**Adequate / Inadequate**	Inadequate	Adequate	
Over Head Tank	1/3 of Total Demand	Inadequate	1	1	1
U/G Sump	2/3 of Total Demand	Inadequate	1	1	1
Drainage Network - Open		**Adequate / Inadequate**	Inadequate	1	
Drainage Network - Cover		0	1	1	1
Waste Management System		**Adequate / Inadequate**	Inadequate	Adequate	
Socio- Cultural Infrastructure Facilities					
Community Hall	Per 10000 Population	0	1	1	1
community hall and Public Library	Per 15000 Population	0	1	1	1
Cremation Ground	Per 20,000 population	0	0	1	0
Post Office	Per 10,000 population	1	1	1	0
Gram Panchayat Building	Each individual/group panchayat	1	1	1	0
APMC	Per 100000 Population	0	0	1	0
Fire Station	Per 100000 Population	0	0	0	0
Public Garden	Per village	1	0	1	1

Police post	Per 40,000Population	1	1	1	0
Shopping Mall	Inadequate				
Electrical Design					
Electricity Network		**Adequate / Inadequate**	Adequate		
Any Smart Village Facility					
Technology					
Mobile Van		0	1	1	1
		ESR cap	0	1	1
		Sump cap	0	1	1
		Lat	0	1	1

(Table 33 Gap Analysis)

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

Sr. No.	Village Name	Discipline	Part-I	Part – 2
1	THALIYA (Bhavnagar)	CIVIL	Public Toilet	Step Auditorium
			Proposed Solid waste Management System	R.C.C Road
			Elevated Water Tank	Public Garden
		ELECTRICAL	Electrical plan of Bus stand	Electrical Plan of Gram Panchayat Building
			Design of Electrical plan of Bank	Electrical Plan of Public Toilet
			Design of Street Lights for Roads	Design of Electrical plan of Angadwadi
			Design of Solar Roof Top for village	
2	BAGDANA (Bhavnagar)	CIVIL	Design of RCC Permeable Pavement Road	Garden
			Anganwadi	Wi-Fi integrated CCTV camera and smart solar light
			Communication Hall	Bus Stand
		ELECTRICAL	Design of Electrical Plan of Bus Stand	Electrical plan Post Office
			Design of Electrical plan of Community Hall	Electrical plan Of school Building
			Design Of Electrical Plan of Public Toilet	Electrical Plan of PHC Building
			Design of Solar street light for village	Design Of Solar irrigation

3	GHOGHA (Bhavnagar)	CIVIL	Solid and Liquid Waste Management	Communication Hall
			Drainage System	Public Toilet
			Environmental Factory	Design of Anganwadi
		ELECTRICAL	Design of Electrical plan of Community Hall	Electrical plan Public Garden
			Design of Electrical plan of Public library	Electrical plan Of anganwadi
			Design of Electrical Plan of Post office	Electrical Plan of Public Toilet
4	AMBLA (Bhavnagar)	CIVIL	Public Toilet	Post Office
			Water Harvesting System	Communication Hall
			Panchayat Building	Causeway
		ELECTRICAL	**No Electrical Students**	

(Table 34 Summary of Village design)

12.6 Drawings (If required A1,A2,A3 designs is not visible than only)

12.7 Summary of good Photographs (Village Visit, ideal Village, Smart Village)


PUNSARI GRAM PANCHAYAT
LIQUID WASTE
USE ME
PUNSARI VILLAGE, GUJARAT


શેઠશ્રી જગલદાસ દામોદર મોદી કેળવણીભવન


શ્રીમતિ જયાબેન દેવરાજભાઈ ઠુંડાણિયા-ઉકરડા રાખવા


GETCO
66 KV MOTA KHUTAVADA SUB STATION


ભાવનગર ડિસ્ટ્રિક્ટ કો-ઓપરેટિવ બેંક લિ.

12.8 Village Interaction with Sarpanch Report with the photograph

A report

On

Interactive Presentation (Vishwakarma Phase 8)

At

Mota Khutavada, Bhavnagar District

As per the circular of GTU guideline, GTU had informed all the team members of Vishwakarma Yojana to present their work in the allocated village for the successful and effective implementation of Vishwakarma Yojana Phase -8.

Under their guideline the members of the team of Mota Khutavada village presented the plan for the development of the village at Mota Khutavada gram panchayat office.

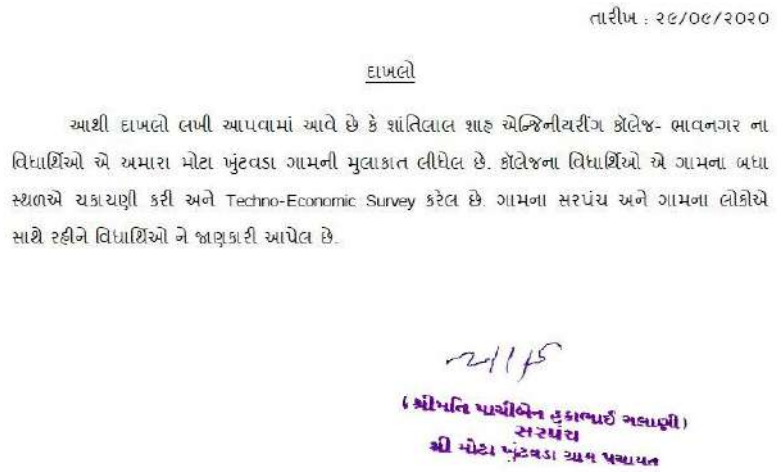
Sarpanch, village dwellers were present to know how the development of the villagr can be done.

Some of them also gave their own ideas and the facilities which are requied in the village. We presented our work under the guideline of VY Phase – 8. We also made them understand about the main objective of the project, its benefits for the development of village and other issues and concerns prevailing in the village.

We explained them about the various designs we are going to proposed in the village for its development. The designs which we are going to proposed were designated as Physical infrastructure, social infrastructure, social and cultural facilities, repair and Maintenance of existing structure and the most important facility of sustainable/ renewable energy source of planning.

(Fig.72 conferencing with Talatimanrti and Sarpanch about development of village)

12.9 Sarpanch Letter giving information about the village development



તારીખ : ૨૯/૦૯/૨૦૨૦

દાખલો

આથી દાખલો લખી આપવામાં આવે છે કે શાંતિલાલ શાહ એન્જિનીયરીંગ કૉલેજ- ભાવનગર ના વિદ્યાર્થિઓ એ અમારા મોટા ખુંટવડા ગામની મુલાકાત લીધેલ છે. કૉલેજના વિદ્યાર્થિઓ એ ગામના બધા સ્થળએ ચકાચણી કરી અને Techno-Economic Survey કરેલ છે. ગામના સરપંચ અને ગામના લોકોએ સાથે રહીને વિદ્યાર્થિઓ ને જાણકારી આપેલ છે.

(શ્રીમતિ પાર્વતીબેન હુકાભાઈ ચકાણી)
સરપંચ
શ્રી મોટા ખુંટવડા ગ્રામ પંચાયત

12.10 Comprehensive report preparation as per format

Vishwakarma Yojana is a Gujarat government project allotted to GTU in which we the students of GTU who were involved in this project were allocated with a village in our district for Rurbanisation. We visited & completed surveys Mota Khutavada, Budhel & Pavthi and did the SWOT analysis, which helped us to know our strengths, weaknesses, opportunities & threats. From this we analyzed problems and requirement of our allocated village and started finding the solution. We prepared as good as possible designs for the development of the Mota Khutavada village. Also, we saw their poor condition of village and its infrastructures, etc.

We eagerly hope through that our project may be a good help in development of Mota Khutavada Village. Here the Mota Khutavada village has 24hrs electricity but it lags at educational level, where we had provided school designs to fulfill this requirement.
Due to Covid-19 we had some problems; however we managed our prospective works. We know that there are always ups and downs in life; it doesn't mean to stop there. Instead of this we worked and for full filling the proper financial problem we designed the Bus stand, post office, Public Library, Agro Storage, Open Air Theater etc.

With the help of Gap Analysis of Mota Khutavada Village we can conclude that the village needs better infrastructures such as Higher Secondary Schools, ITI Buildings, Colleges, Banks, PHC, Bus Stand, Recreational Park, Community Hall, Clean Water Drinking & Storage Facility, Cinema Theater (Luxury), and Cemetery, Petrol Pumps, Toilets, Biogas Plant, Gram panchayat office and other public conveniences.

Use of renewable energy and create design of sustainable development. Also we try to give security design to safe village. And overall good experience among the people. Also we make a documentary film on Mota Khutavada village and try to make modern India and make in Indian.

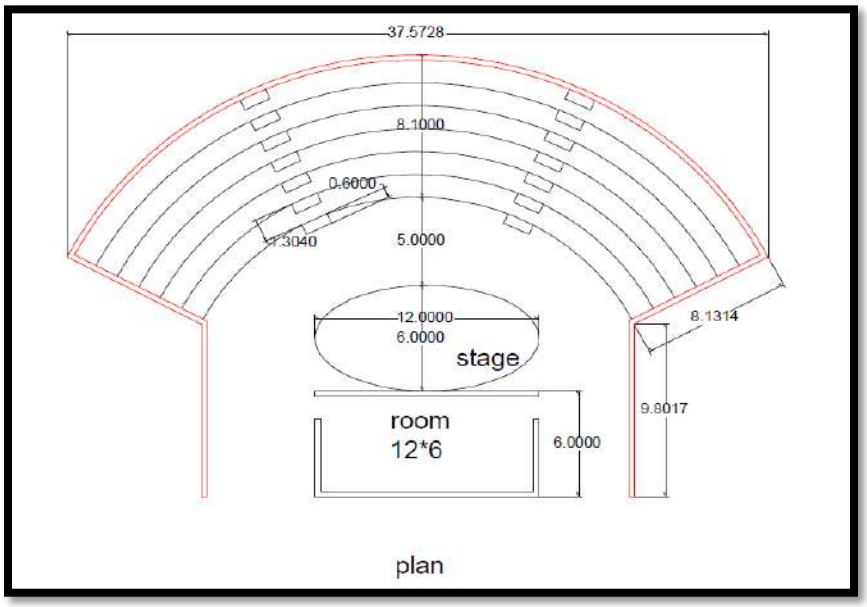
CHAPTER: 13

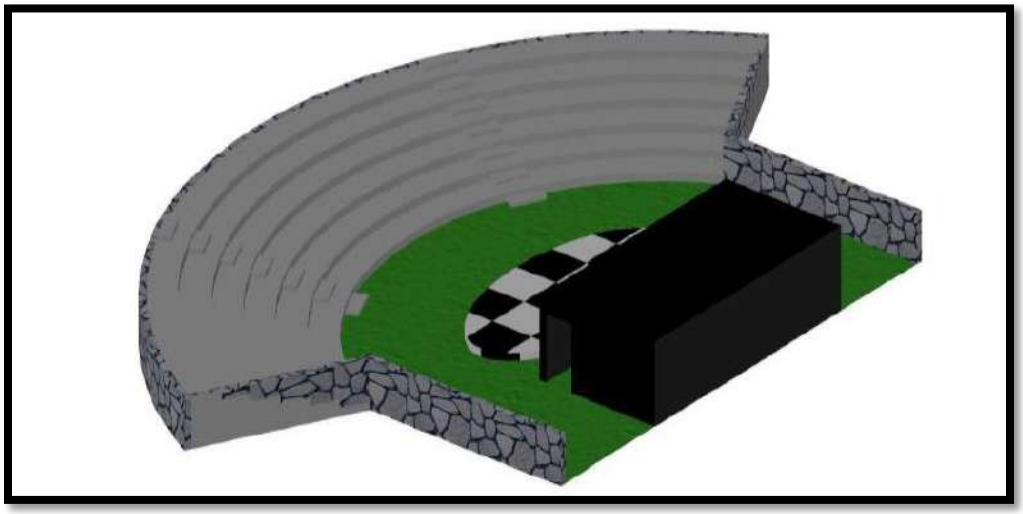
Future Design of the Aspects (From Chapter 9)

13.1 Design Proposals

13.1.1 Civil Design 1

Open Air Theater





(Fig.73 2D & 3D View of Open Air Theater)

Measurement Sheet						
Sr.	**Item Description**	**No.**	**L(m)**	**B(m)**	**H(m)**	**Quantity**
1.	Earth Filling	1				**253.54 m^3**
2.	Uncoursed rubble masonry with Hard and cm 1:6					**44.41 m^3**
3.	PCC (for stage)	1	56.54		0.2	**11.308 m^3**
4.	Providing and laying polished Kota stone slab flooring over (20mm thick base of cement mortar 1:6)					
	Setting Arrangement	1	368.46			**368.46 m^3**
	Stage	1	56.54			**56.54 m^3**
						Total Quantity = 425 m^3
5.	Brick Masonry for Room (36 – 0.5 x 0.3 x 4)	1	35.94	0.3	3	**32.346 m^3**
	Deduction for Door	1	1.2	0.3	2.1	**0.756 m^3**
						Total Quantity = 32.346 – 0.756 = 31.59 m^3
6.	Wood Work for door	2	1.2	0.3	2.1	**1.512 m^3**
7.	RCC Work for Slab	1	12	6	0.15	**10.8 m^3**
8.	Excavation for Foundation	1	1.2	0.6	1	**21.564 m^3**
9.	Filling in foundation brick Bats Chhara in layers of 20cm thickness	1	35.94	0.6	1	**21.564 m^3**
10.	Flooring Work	1	11.4	6.4	-	**72.96 m^3**

(Table 35 Measurement Sheet of Open Air Theater)

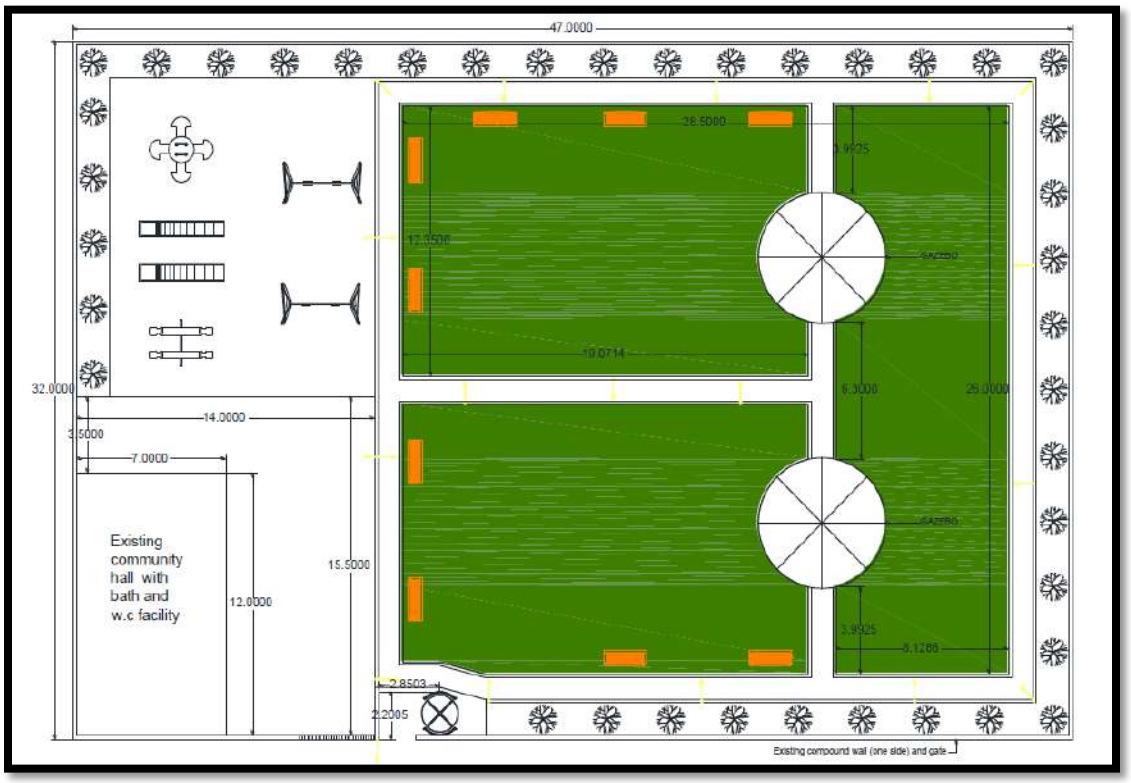
ABSTRACT SHEET					
Item No.	**Item Description**	**Quantity**	**Rate (Rs.)**	**Per**	**Amount (RS.)**
1.	Earth Filling	253.54	300	m^3	**76062**
2.	Uncoursed rubble masonry with hard and cm 1:6	44.41	1742	m^3	**77362.22**
3.	PCC	11.308	3100	m^3	**35054.8**
4.	Providing and laying polished Kota stone slab flooring over (20cm thick base of cement	425	611	m^2	**259675**

	mortar 1:6)				
5.	Brick masonry for room	31.59	3500	m^3	**110565**
6.	Wood Work for door	1.51	7800	m^3	**11778**
7.	RCC Work for slab	10.8	8800	m^3	**95040**
8.	Excavation for foundation	21.564	85	m^3	**1832.94**
9.	Filling in foundation brick bats chhara in layer of 20cm thickness	21.56	452	m^3	**9745.12**
10.	Flooring work	72.96	500	m^2	**36480**
				Total Amount	713595.08
				Contractor's Profit 10%	65021
				Contingencies 5%	32510.5
					81126.58

(Table 36 Abstract Sheet of Open Air Theater)

13.1.2 Civil Design 2

Recreation Garden



(Fig.74 2D View of Recreation Garden)

Measurement Sheet						
Sr.	**Item Description**	**No.**	**L(m)**	**B(m)**	**H(m)**	**Quantity**
	COMPOUND WALL					
1.	**Excavation** (32 x 2 + 46.4)	1	115.85	0.7	0.7	**56.7665 m^3**
2.	**CC in foundation (1:3)**	1	115.85	0.7	0.2	**16.219 m^3**
3.	**Brick Masonry**					
	400 mm thick wall	1	115.85	0.4	0.2	9.268 m^3
	300 mm thick wall	1	115.85	0.3	0.9	31.2795 m^3
	200 mm thick wall	1	115.85	0.2	1.5	34.755 m^3
					Total Quantity	**75.3025 m^3**
4.	**Filling in Excavation**					
	Total Excavation					54.194 m^3
	CC in Foundation					15.484 m^3
	Brick Masonry in foundation					18.802 m^3
					Total Quantity	**19.908 m^3**
	KERB WALL					
1.	**Excavation**	1	291.54	0.3	0.25	**21.8655 m^3**
2.	**CC in Foundation(1:3)**					
		1	291.54	0.15	0.25	8.232 m^3
		1	291.54	0.15	0.1	3.293 m^3
					Total Quantity	**11.5258 m^3**
3.	**No. of block required**	219.54	0.5	-	-	**109.77 nos.**
	GAZEBO					
1.	**Excavation**	2	113.1	0.3	-	**67.86 m^3**
2.	**CC in foundation**	2	113.1	0.3	-	**67.86 m^3**
3.	**Brick work**					
	First Step	2	91.61	-	0.3	54.966 m^3
	Second Step	2	72.38	-	0.3	43.428 m^3
					Total Quantity	**98.394 m^3**
	PAVER BLOCK					
1.		1	15.5	7	-	**108.5 m^2**
		1	3.5	7	-	**24.5 m^2**
		1	91.87	1	-	**91.87 m^2**
					Total Quantity	**224.87 m^2**

(Table 37 Measurement Sheet of Recreation garden)

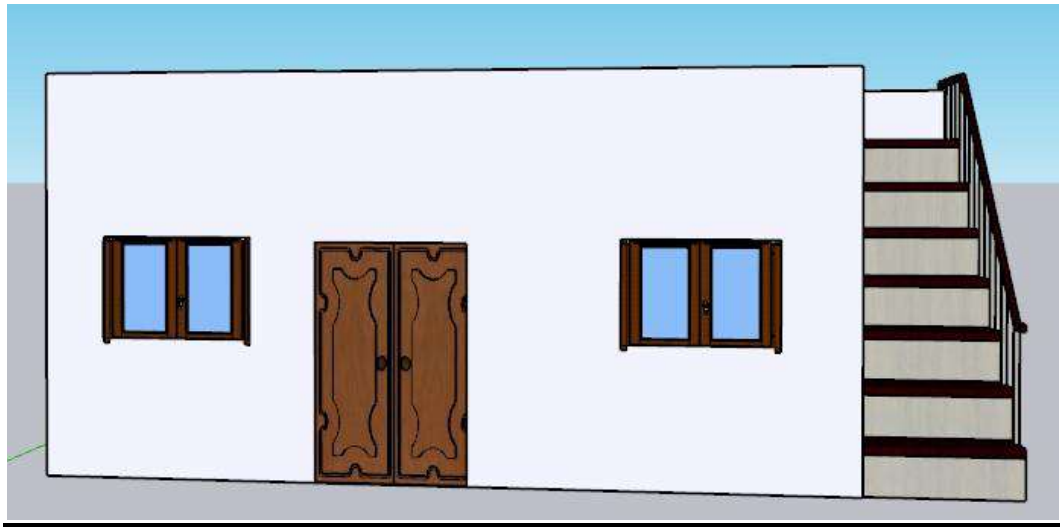
ABSTRACT SHEET					
Item No.	**Item Description**	**Quantity**	**Rate (Rs.)**	**Per**	**Amount (RS.)**
	COMPOUND WALL:				
1.	Excavation	56.77	85	m^3	**4825.45**
2.	CC in foundation (1:3)	16.22	3100	m^3	**50282**
3.	Brick Masonry	75.30	3200	m^3	**240360**
4.	Filling in Excavation	19.91	50	m^3	**995.5**
	KERB WALL:				
1.	Excavation	21.87	85	m^3	**1858.95**
2.	CC in foundation (1:3)	11.53	3100	m^3	**35743**
3.	No. of block required	110	100	Nos.	**11000**
	GAZEBO:				
1.	Excavation	67.86	85	m^3	**5768.1**
2.	CC in foundation	67.86	3100	m^3	**210366**
3.	Brick Work	98.40	3200	m^3	**314880**
	PAVER BLOCK:				
		224.87	610	m^3	**137170.7**
				Total Amount	**1013849.7**
				Contractor's Profit 10%	**101384**
				Contingencies 5%	**50692**
					116592.7

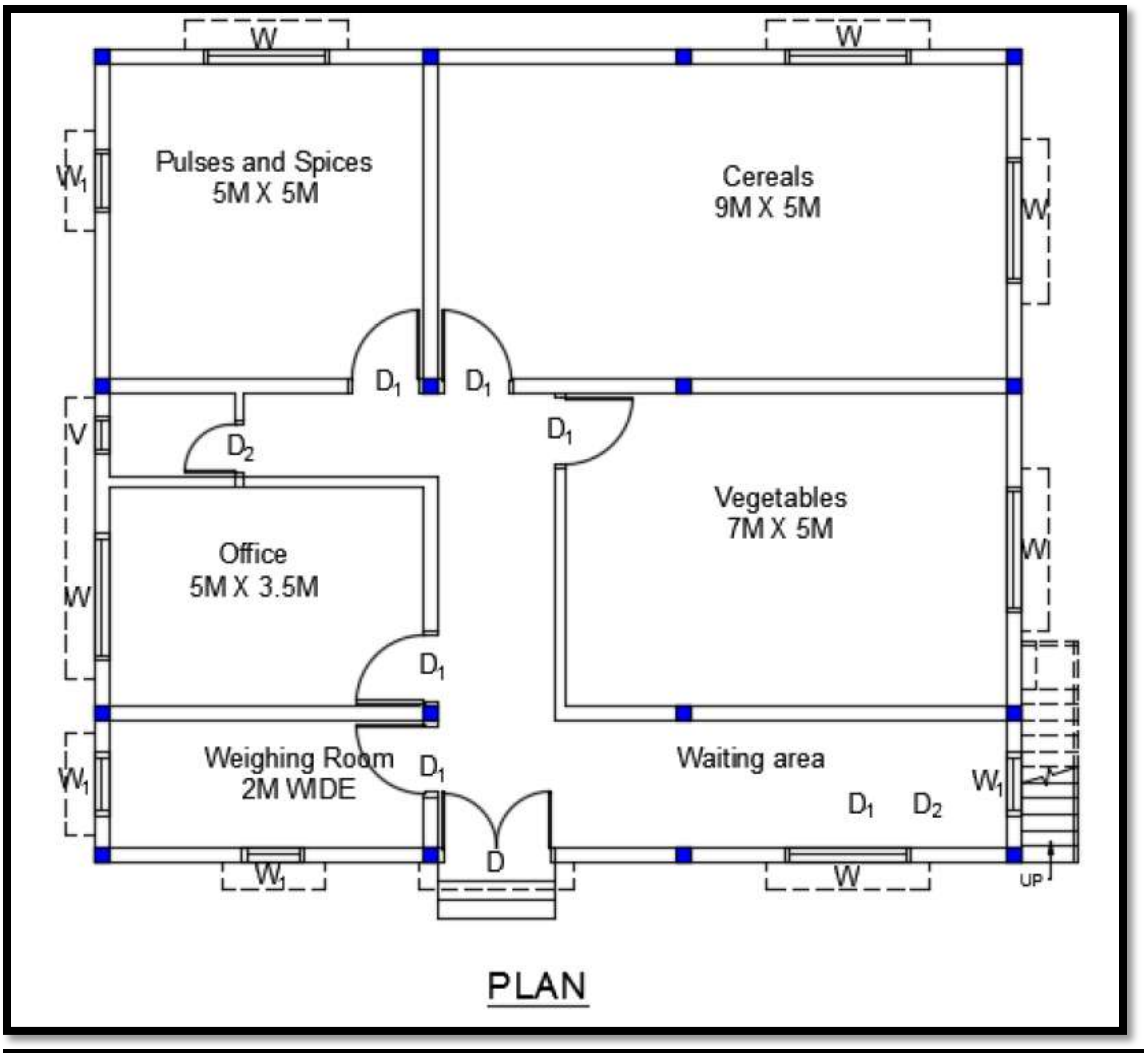
(Table 38 Abstract Sheet of Recreation garden)

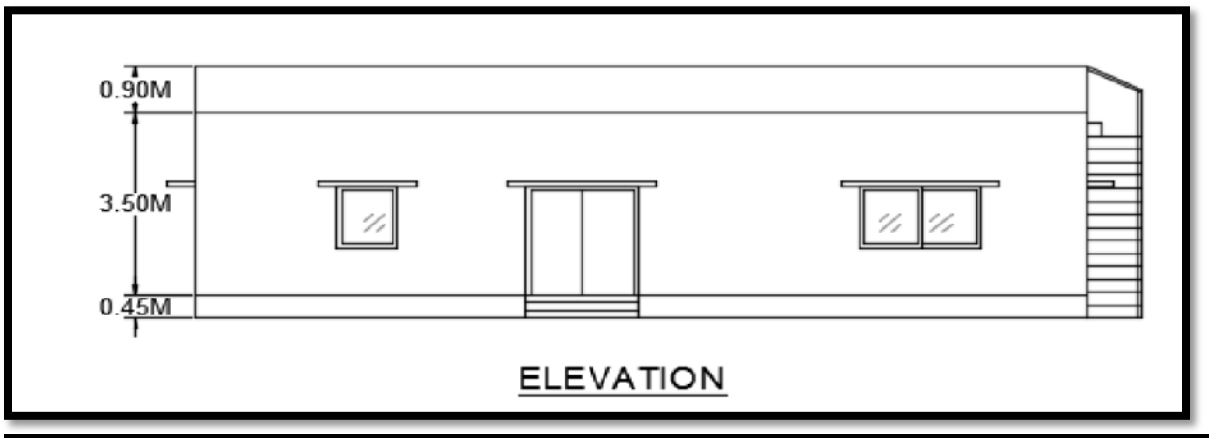
13.1.3 Civil Design 3

Agro Storage

As village Area is an area with lot of agricultural land the shortage for storage of agro goods is always a major issue. The farmers used to store the agro products at the open land on field or some storage area provided in the house. Hence we have designed a RCC framed structure for the storage of Agro products which will have a facility to register the goods during entry to the storage unit and during dispatch, so that the proper records of the goods can be maintained.




W
W
Pulses and Spices
5M X 5M
Cereals
9M X 5M
W1
W1
D1
D1
D1
D2
Vegetables
7M X 5M
Office
5M X 3.5M
W
W
D1
Weighing Room
2M WIDE
D1
Waiting area
W1
W1
D1
D2
D
W1
W
UP
PLAN



(Fig.75 2D & 3D View of Agro Storage)

Measurement Sheet						
Sr.	**Item Description**	**No.**	**L(m)**	**B(m)**	**H(m)**	**Quantity**
1.	**Excavation for Foundation**	16	4	4	1.5	384 m^3
	Excavation for steps	1	2.4	0.7	0.2	0.336 m^3
					Total Quantity	**384.33 m^3**
2.	**PCC for foundation**	16	4	4	0.1	25.6 m^3
	PCC for steps	1	2	0.7	0.1	0.14 m^3
					Total Quantity	**25.74 m^3**
3.	**RCC for foundation**					
	Volume=(A1+A2 +$\sqrt{A1} \times A2$)	16	0.19			3.04 m^3
	RCC for beam					
	Step 1	16	5.23	0.23	0.3	19.24 m^3
	Step 2	4	4	0.23	0.3	1.1 m^3
	Step 3	4	2.23	0.23	0.3	0.61 m^3
					Quantity	20.95 m^3
					Total Quantity = 3.04 +20.96	**24 m^3**
4.	**Brick masonry in super structure**					
	Long Wall 1	3	12	0.23	3.5	28.98 m^3
	Long Wall 2	1	5	0.23	3.5	4.02 m^3
	Short Wall 1	4	14	0.23	3.5	45.08 m^3
	Short Wall 2	1	5	0.23	3.5	4.025 m^3

	Brick masonry for steps					
	Step 1	1	2	0.7	0.3	0.42 m^3
	Step 2	1	2	0.35	0.3	0.21 m^3
					Quantity	82.73 m^3
	Deduction					
	Door					
	D	1	1.85	0.23	2.1	0.89 m^3
	D1	4	1.2	0.23	2.1	2.31 m^3
	D2	1	0.9	0.23	2.1	0.43 m^3
	Window					
	W	6	2	0.23	1.2	3.31 m^3
	W1	3	1	0.23	1.2	0.828 m^3
	Ventilation					
	V	1	0.6	0.23	0.6	0.0828 m^3
					Quantity	7.84 m^3
					Total Quantity = 82.73 – 7.84	**74.88 m^3**
	Flooring					
	Kota Stone					
	Room 1	1	5	5	-	25.00 m^3
	Room 2	1	9	5	-	45.00 m^3
	Room 2	1	7	5	-	35.00 m^3
					Quantity	105 m^3
	Marble					
	Office	1	5	3	-	15.00 m^3
	Verandah	1	14	2	-	28.00 m^3
	Open Area 1	1	2	5	-	10.00 m^3
	Open Area 2	1	5	1.5	-	7.5 m^3
					Quantity	60.5 m^3
	R.C.C for Slab (1:1.5:3)	1	13	15	0.15	**29.25 m^3**
	Outside Plaster (1:4)					
	L = 2 (13 + 15)	1	56	-	3.5	196 m^3
	Deduction					
	D	1	1.85	-	2.1	3.88 m^2

	W	6	2	-	1.2	14.4 m^2
	W1	3	1	-	1.2	3.6 m^2
					Quantity	**174.12 m^2**
	Inside Plaster(1:4)					
	Long Wall 1	4	12	-	3.5	168.00 m^3
	Long Wall 2	1	5	-	3.5	17.5 m^3
	Short Wall 1	6	14	-	3.5	294 m^3
	Short Wall 2	1	5	-	3.5	17.5 m^3
						497 m^3
	Deduction					
	D	1	1.85	-	2.1	3.88 m^3
	D1	10	1.2	-	2.1	25.2 m^3
	D2	2	0.9	-	2.1	3.78 m^3
	W	5	2	-	1.2	12.00 m^3
	W1	3	1	-	1.2	3.6 m^3
					Quantity	48.46 m^3
					Total Quantity	**448.54m^3**
	Color outside					
	L = 2 (13 + 15)	1	56	-	3.5	196 m^3
	Deduction					
	D	1	1.85	-	2.1	3.88 m^3
	W	6	2	-	1.2	14.4 m^3
	W1	3	1	-	1.2	3.6 m^3
					Total Quantity = 196 – 21.88	**174.12 m^3**
	Color inside					
	Long Wall 1	4	12	-	3.5	**168.00 m^2**
	Long Wall 2	1	5	-	3.5	17.5 m^2
	Short Wall 1	6	14	-	3.5	194 m^2
	Short Wall 2	1	5	-	3.5	17.5 m^2
						497 m^2
	Deduction					
	D	1	1.85	-	2.1	3.88 m^2
	D1	10	1.2	-	2.1	25.2 m^2

	D2	2	0.9	-	2.1	3.78 m^2
	W	5	2	-	1.2	12 m^2
	W1	3	1	-	1.2	3.6 m^2
						48.46 m^2
						448.54 m^2
	Wood Work(Door 40mm THK)					
	D	1	1.85	-	2.1	3.88 m^2
	D1	5	1.2	-	2.1	12.6 m^2
	D2	1	0.9	-	2.1	1.08 m^2
						17.56 m^2
	Window					
	W	6	2	-	1.2	14.4 m^2
	W1	3	1	-	1.2	3.6 m^2
						18.00 m^2
						35.56 m^2
	R.C.C for chajja					
	W	5	2.4	0.65	0.1	0.78 m^2
	W1	3	1.6	0.65	0.1	0.31 m^2
	W2	1	5	0.65	0.1	0.32 m^2
						1.41 m^2
	R.C.C for column	16	0.23	0.23	5	**4.23 m^3**

(Table 39 Measurement Sheet of Agro Storage)

ABSTRACT SHEET					
Item No.	**Item Description**	**Quantity**	**Rate (Rs.)**	**Per**	**Amount (RS.)**
1.	Excavation for foundation	384.33	87	m^3	**33,436.71**
2.	P.C.C for foundation	25.74	3150	m^3	**81,081**
3.	R.C.C for foundation and beam	24	9218	m^3	**221,232**
4.	Brick masonry in super structure	74.25	3321	m^3	**246,584.25**
5.	Flooring	60.5	742	m^2	**44,891.00**
6.	R.C.C for slab (1:1.5:3)	29.25	4937	m^3	**144,407.25**
7.	Outer Plaster (1:4)	174.12	132	m^2	**22,983.84**
8.	Inside Plaster (1:4)	448.54	100	m^2	**44,854.00**

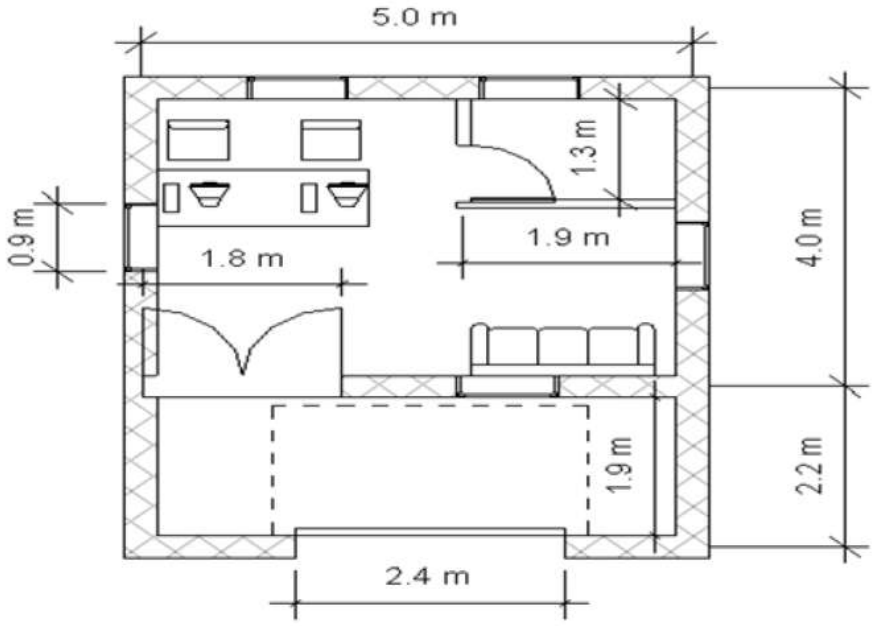
9.	Color outside	174.12	130	m^2	**22,635.60**
10.	Color Inside	448.54	90	m^2	**40,368.60**
11.	Woodwork for wood and windows	35.56	245	m^2	**8,712.20**
12.	R.C.C for Chajja	1.41	4235	m^3	**5,971.35**
13.	R.C.C for Column	4.23	4792	m^3	**20,270.16**
				Total Amount	**937428**
				Contractor's Profit 10%	**93742**
				Contingencies 5%	**46871**
					1,078,041

(Table 40 Abstract Sheet of Agro Storage)

13.1.4 Civil Design 4

Design of E-Seva Kendra

- **Aadhaar Enabled Payment system**
  Start accepting payments from leading Banks using customers Aadhaar No. , The customer need not remember Bank Account/User ID/ Password/PIN, Required is Aadhaar No. and biometric authentication
- **Mobile & DTH Recharge**
  Any prepaid mobile phone of any operator any circle, Any DTH operator of any location, Instant recharge and SPAS confirmation by the operator
- **Bill Payment**
  Electricity, Landline bill payments, No limitation on the amount of bill payment, Instant payment & confirmation on SMS
- **Bus Booking**
  Tie up with more than 900 bus operators, Enabling search and instant confirmation booking of tickets online, commission plus convenience fee available as an incentive for booking HOTEL
- **Insurance Service**
  All type insurance premium collections, Protect with covers for daily hospital cash, ambulance charges & medical expenses, In case of claim 100% of depreciation amount



(Fig.76 2D View of E - Seva Kendra)

Measurement Sheet						
Sr.	**Item Description**	**No.**	**L(m)**	**B(m)**	**H(m)**	**Quantity**
1.	**Excavation for foundation**	1	27.4	0.9	1.1	**27.12 m^3**
2.	**P.C.C (1:4:8)**	1	26.5	0.9	0.3	**7.155 m^3**
3.	**Brick masonry up to plinth level**					
	Step 1	1	26.8	0.6	0.3	4.824 m^3
	Step 2	1	26.9	0.5	0.3	4.035 m^3
	Step 3	1	27	0.4	0.7	7.57 m^3
					Total Quantity	**16.429 m^3**
4.	**P.C.C on plinth Level**	1	29.14	-	0.15	4.371 m^3
5.	**Brick masonry above plinth wall**	1	19.2	0.3	3	17.28 m^3
		1	9.4	0.3	1.2	3.384 m^3
		1	3.2	0.2	3	1.92 m^3
	Deduction Door and window					
	D	1	2.4	0.3	1.2	0.864 m^3
	D1	1	1.8	0.3	2.1	1.134 m^3
	D2	1	0.9	0.3	2.1	0.567 m^3
	W	5	0.9	0.3	1.2	1.62 m^3
	Lintel	1	30.3	0.3	0.15	1.363 m^3
					Total Quantity	**17.036 m^3**

6.	**RCC Work**					
	Slab(1:1.5:3)	1	5.3	4.3	0.15	3.418 m^3
	Lintel (1:2:4)	1	30.3	0.3	0.15	1.3635 m^3
	Steel for RCC (1%)					365kg
					Total Quantity	4.781 m^2
7.	**Flooring (Cyramic tile)**	1	4.7	3.7	-	17.39 m^2
	Deduction of wall	1	3.2	0.2	-	0.64 m^2
	Addition of door area					
	D2	1	0.9	0.3	-	0.27 m^2
					Total Quanity	**17.02 m^2**
	Slab smooth ips flooring	1	4.7	3.7	-	17.39 m^2
8.	Skirting	1	14.3	-	0.05	**0.715 m^2**
9.	**Inside smooth 15mm plaster**					
		2	3.7	-	3	22.2 m^2
		3	4.7	-	3	42.3 m^2
		2	1.9	-	3	11.4 m^2
		2	1.3	-	3	7.8 m^2
		2	1.9	-	1.2	4.56 m^2
		1	4.7	-	1.2	5.64 m^2
	Celling 6mm plaster	1	4.7	3.7	-	17.39 m^2
	Deduction					
	D	1	2.4	-	1.2	2.88 m^2
	D1	1	1.8	-	2.1	3.78 m^2
	D2	1	0.9	-	2.1	1.89 m^2
	W	5	0.9	-	1.2	5.4 m^2
					Total Quantity	**79.95 m^2**
10.	Outside plaster (20mm sand plaster)					
	Long Wall	2	5.3	-	3.55	37.62 m^2
	Short wall	2	4.3	-	3.55	30.53 m^2
	Parapet Wall	2	2.2	-	1.2	5.28 m^2
		1	5.3	-	1.2	6.36 m^2
					Total Quantity	52.79 m^2
	Deduction					

	D	1	2.4	-	1.2	2.88 m^2
	W	4	0.9	-	1.2	4.32 m^2
					Total Quantity	**45.59 m^2**
11.	Earth filling on foundation					
	Outside	1	-	-	-	5.35 m^3
	Inside	1	-	-	-	5.35 m^3
					Total Quantity	**10.70 m^3**
12	Painting					
	Inside- Acrylic emulsion (Interior grade)					**97.34 m^3**
	outside- Acrylic emulsion (Exterior grade)					**45.59 m^3**

(Table 41 Measurement Sheet of E – Seva Kendra)

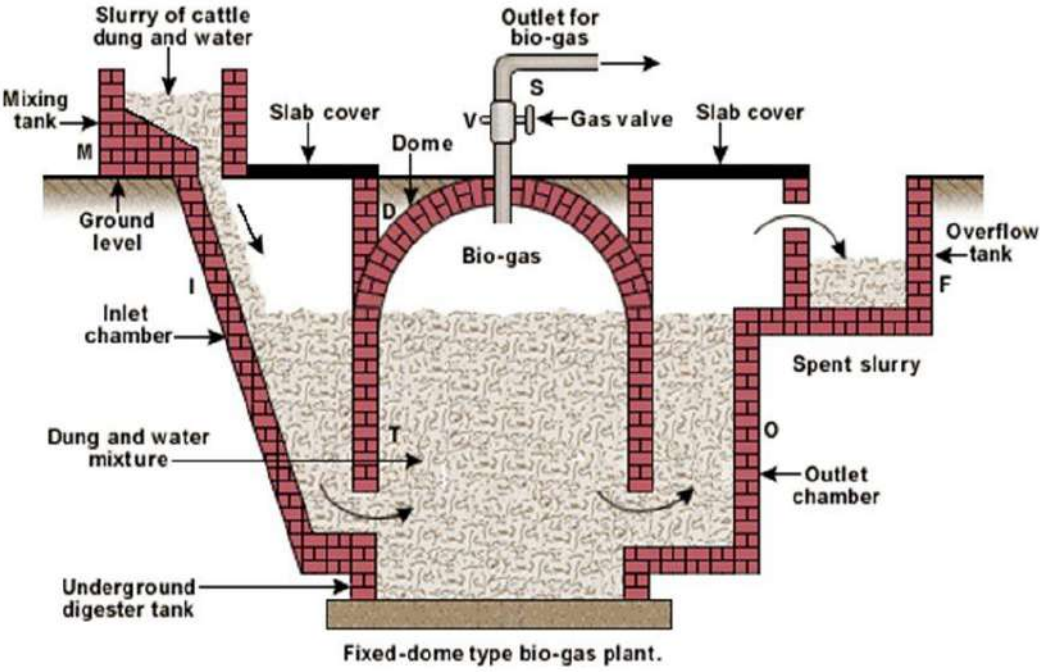
ABSTRACT SHEET					
Item No.	**Item Description**	**Quantity**	**Rate (Rs.)**	**Per**	**Amount (RS.)**
1.	**Excavation for foundation**	27.12	310	m^3	**8407.2**
2.	**Filling of foundation trench**	10.70	448	m^3	**4793.6**
	P.C.C				
	Material				
	Cement	51	280	Bag	14280
	Sand	5.04	800	m^3	4032
	Brick bat	10.08	1000	m^3	10080
				Total Material Cost	**28392**
3.	**Labour**				
	Male Coolie	5	200	Person	1000
	Female Coolie	9	180	Person	1620
	Coolie	3	200	Person	600
	Bhistie				100
	Sundries				100
				Total Labour Cost	**3420**
4.	Brick work up to plinth	1.38	3300	m^3	**4455**
5.	Brick work above plinth	17.036	3500	m^3	**59626**
6.	R:C:C 1:1.5:3	14.721		m^3	**182429**
7.	C.M. (1:4) 25mm thick cement	1.64	1200	m^3	**51926**
8.	Inside Plaster 12mm 1:4	274.06		m^3	**31654**
9.	Outside Plaster 12mm 1:4	149.78		m^3	**19042**
10.	Painting	274.06	700	Liter	**13160**
				total	**5,32,780**

(Table 42 Abstract Sheet of E – Seva Kendra)

13.1.5 Civil Design 5

Design of Bio – Gas Plant

We have proposed **fixed dome type biogas plant**



(Fig.77 2D View of Bio-gas Plant)

Calculation of produced night soil

One person has produce avg. 400 grams of night soil + 1000 ml of waste water

Avg. produces night soil per day by entire society (with waste water)

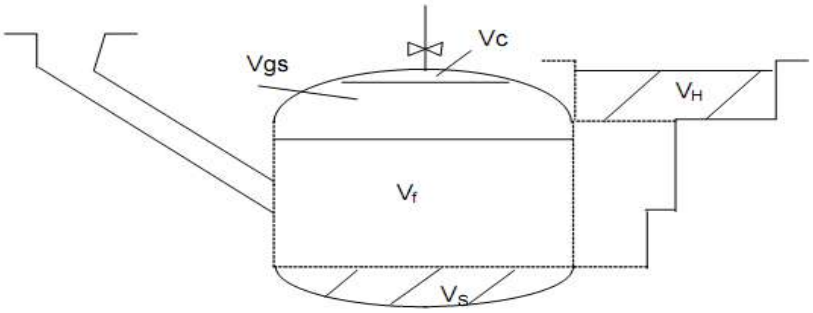
= 1400(night soil + waste water) x 2000 (person)

= 2800 litres / day

Volume calculation of digester chamber

- Total night soil produce per day = 2800 litres / day
- Temperature = 30° C (average)
- Retention time = 45 days
- Total discharge = 2800 litres / days

- ***Cross section of biogas plant***



a) Volume of gas collecting chamber = Vc
b) Volume of gas storage chamber = Vgs
c) Volume of fermentation chamber = V_f
d) Volume of hydraulic chamber = V_H
e) Volume of sludge layer = Vs

Total volume of digester **V** $=Vc+Vgs+V_f+Vs$

= 2800(liters) x 45(days)

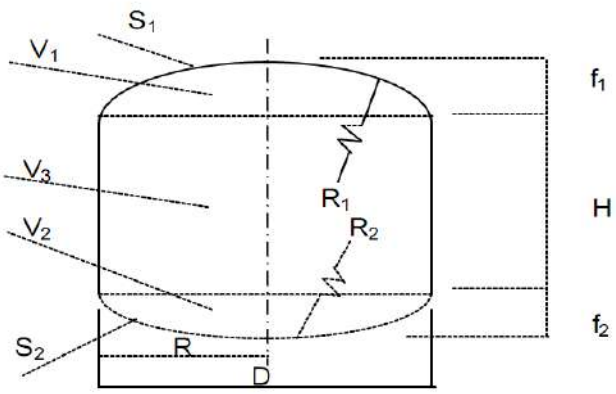
=126000 liters (1000 liters = 1 m^3) = 126 m^3

We are design biogas plant from geometrical dimensions method which is given in code of practice (IS - 9478 : 1989)

For volume	For geometrical dimensions
$Vc \leq 5\%\ V$ $Vs \leq 15\%\ V$ $Vgs + V_f = 80\%\ V$ $Vgs = V_H$ $Vgs = 0.5\ (Vgs + V_f + Vs)\ K$ Where K = Gas production rate per m^3 digester volume per day. For india K = 0.4	$D=1.3078 \times V^{1/3}$ $V_1=0.0827\ D^2$ $V_2 = 0.05011\ D^2$ $V_3 = 0.3142\ D^2$ $R_1= 0.725\ D$ $R_2= 1.0625\ D$ $f_1 = D/5$ $f_2 = D/8$ $S_1 = 0.911\ D^2$ $S_2 = 0.8345\ D^2$

From geometrical dimensions method

- **Calculation of volume of biogas plant**



$V_f + Vs = 0.80\ V$

$126 = 0.80\ V$

$V = 157.5\ m^3 \sim 160\ m^3$

- **Calculation of diameter of biogas plant**

$D = 1.3078\ V^{1/3}$

$= 1.3078\ (160)^{1/3}$

$D = 7.10$ m.

- **Calculation of height of biogas plant**

$H = (4 \times 0.3142 \times D^3)/ (\pi \times D^2)$

$= (4 \times 0.3142 \times 16^3) / (3.14 \times 16^2)$

$= 6.404$ m.

= Provide 6.5 m. height

- **Calculation of volume of bottom dome of biogas plant**

$V1 = 0.827\ D^2$

$= 0.827\ (16)^2$

$= 21.17\ m^3$

- **Calculation of volume of bottom dome of biogas plant**

$V2 = 0.05011\ D^2$

$= 0.05011\ (16)^2$

$= 12.82\ m^3$

- **Calculation of volume of middle portion of biogas plant**

$V3 = 0.3142\ D^2$

$= 0.3142\ (16)^2$

$= 80.43\ m^3$

- **Calculation of Height of top dome**

$F1 = D / 5$

$= 16 / 5$

$= 3.2$ m

- **Calculation of height of bottom dome**

$F2 = D / 8$

$= 16 / 8$

$= 2$ m

- **Capacity of gas collection tank of biogas plant**

  Feed material: Night soil, amount (Dd):900 kg/day

  Mixing ratio: night soil: water = 1:1

  Fermentation slurry amount (Sd):900 kg/day x 2 =1800 l/day

  Retention time (RT): 45 days

  Digester volume (VD):1800 l/day x 45 days = 81000 l

  Digester temperature (t): 30 - 35 °C

  Specific -gas production (Gd) : 40 l/kg

  Daily gas production (G):40 l/kg x 900 kg/day = 36000 l/day

  Gasholder capacity (C): 60 %

  Gasholder volume (VG):36000 l x 0.60= 21600 l = 21.6 m^3

- ***Calculation of Total Solid (TS) content and total biogas generation***
- One tonne of TS can produce 200 cm^3 of biogas, so 1 kg of TS will produce 0.2 m^3 of biogas.
- One kg of **night soil (human waste)** contains about 20% TS

  Now,1kg of **night soil (human waste)** which contains 20% TS will produce, 0.2 x 0.2 = 0.04 m^3 of biogas

  1 kg of **night soil (human waste)** will produce 0.04 m^3 of biogas

  Hence, 1/0.04 = 25 kg is required to produce 1 m^3 of biogas.

  Density = mass / volume

  Density of biogas is 1.15 kg / m^3

  Mass (required here 1 kg)

  Volume required to make 1kg biogas = mass (1 kg) / density (1.15 kg/m^3)

  = 0.86 m^3

  Therefore to produce 1kg of biogas we need = 0.86 x 25

  = 21.7 kg

  = Approx. 22 kg of night soil

  Above calculation has been conducted without the addition of water Generally 1 : 1 ratio of feedstock is to water is taken.

Total biogas generated in our plant (design)

= total 900 kg of solid waste generate per day

= 900 x 45(RT)

= 40500 kg

22 kg of night soil (human waste) are required for produce 1 kg of biogas.

= 40500 / 22

= 1840 kg / 45 days (RT)

= 40.90

= 41 kg / day

COST OF CONSTRUCTION OF BIOGAS PLANT AS PER DESIGN

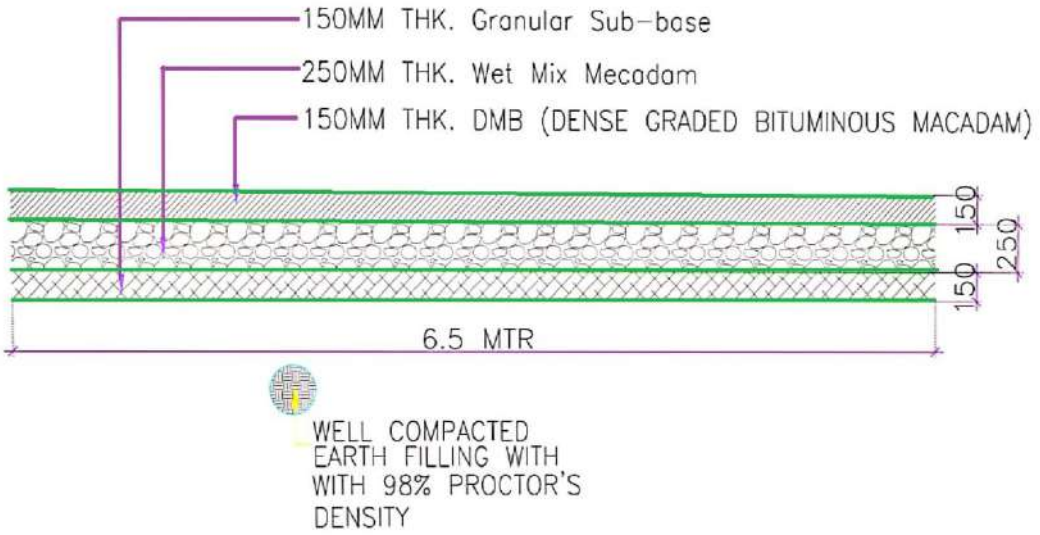
Item	Unit	No. of unit/m^3	No. of unit/160m^3	Cost / unit	Cost (Rs.)
Construction material					
Bricks	piece	140	22400	4	89600
Cement	bag	4	640	270	172800
Gravel	M^3	0.20	32	700	22400
Sand	M^3	0.25	40	800	32000
Steel (10mm)	kg	4	640	45	28800
Paint	liter	0.20	32	200	6400
				Cost of construction materials	**352000**
Appliances					
Inlet PVC pipe 10 cm	piece		4	20	80
Iron bar 6 dia.	kg		30	7	210
Binding wire	kg		2	50	100
Outlet pipe	piece		1	70	70
G.I. nipple	piece		10	4	40
Main gas valve	piece		1	100	100
PVC 90º elbow	piece		20	5	100
Glue for PVC connection	bottle		3	100	300
Water drain	piece		1	100	100
PVC pipe 0.5 dia.	meter		20	30	600
Gas hose pipe 0.5 dia.	meter		5	50	250
Male / Female socket	piece		10	20	200
Pumping house system	No.		1	50000	50000
Pressure regulating system	No.		1	12500	12500
Gas tape	piece		5	60	300
Teflon tape	piece		10	10	100
Tee 0.5 dia.	piece		10	10	100

				Total cost of Appliances	**65150**
Labours					
labour	Person		150(5/days)	350	52500
mason	person		100(5/days)	400	40000
Bhisti	person		20 (1 / day)	350	7000
				Total cost of labour	**99500**
Cost of excavation	M^3		160	120	19200
				Total Cost of excavation	**19200**
TOTAL COST OF CONSTRUCTION OF BIO-GAS PLANT					**535850**

(Table 43 Abstract Sheet of Bio-gas Plant)

13.1.6 Civil Design 6

R.C.C Road Work



(Fig. 78 RCC Road Work)

Measurement Sheet						
Sr.	**Item Description**	**No.**	**L(m)**	**B(m)**	**D(m)**	**Quantity**
1.	Excavation in foundation	1	3400	6.5	0.4	8840
2.	Conveyance				22100	22100
3.	Granular Sub-base with Coarse Graded Material	1	3400	6.5	0.15	3315

(Table Measurement Sheet of RCC Road Work)

ABSTRACT SHEET					
Item No.	**Item Description**	**Quantity**	**Rate (Rs.)**	**Per**	**Amount (RS.)**
1.	Earth work in cutting in all sorts of soil & Murom including, conveying, breaking clods spreading the stuff as & where dire. Within a lead of 50 m from end of cutting.	6165	47	M^3	289755
2.	Conveyance charge of earth, lime, Murom, building rubbish, manure, garbage, sludge, excavated rock, fly ash, aggregates of any kind Including spreading &leveling etc. complete.	22100	175	M^3	3867500
3.	Granular Sub-Base with Coarse Graded Material (Table:- 400- 2) (Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with motivator at OMC, and compacting with vibratory roller to achieve the desired density, complete for Grade - V Material. (as per As per MoRTH 5th Revision table 400.1) (Govt. R & B NH Division SOR 2012/13 Ch-4 Item No. 4.1.b.(i) Page No.19 + Carting as per Statement No. 05 Sr.No. 3.2.1B(2))for grading- I Material	3738	1200	M^3	4485600
4.	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.	5525	1575	M^3	8701875
5.	Providing and applying primer coat with cationic bitumen emulsion SS1 grade conforming to IS: 8887 on prepared surface of wet mix macadam including clearing of Wet mix macadam surface with air compressor to remove all loose material other foreign material. The primer shall be sprayed uniformly at the rate of 0.70-1.0 kg/sq.mt. The tack coat shall be applied by a self propelled or towed bitumen pressure sprayer, equipped for spraying the material uniformly at a specified rate. No dilution or heating at site of RS1 Bitumen emulsion shall be permitted. RA based on Govt R & B NH Division SOR 2012/13 Ch-5 ItemNo.5.10 Pg No.27 & Current market rate of SS1 Emulsion	3315	64	M^3	212160
6.	Dense Graded Bituminous Macadam (Providing and laying dense bituminous macadam with 100-120 TPH batch type HMP producing an average output of 75 tones per hour using crushed aggregates of specified grading, premixed with bituminous binder @ min 4.5% by weight of total mix, transporting the hot mix to work site, laying		3807	M^3	0

	with a self-propelled paving machine equipped with an electronic sensing device to the required grade, level and alignment, rolling with 810 tone static weight or vibratory roller or with a pneumatic tier roller of 12 to 15 tone weight to achieve the desired compaction as per approved design mix . for Grading-II (26.5 mm nominal size) 3407.00 As per AMC Circular dated on 26-02-2014				
	(A)Production	4707	3667	M.T	17260569
	(B)Cartiing	4707	90	M.T	423630
	(C)Laying	4707	50	M.T	235350
7.	Providing and applying tack coat with Cationic Bitumen Emulsion 7 139.0 0 M.T. 1039.50 RS1 complying with IS: 8887. The tack coat shall be applied by a self-propelled or towed bitumen pressure sprayer, equipped for spraying the material uniformly at a specified rate. No dilution or heating at site of RS1 bitumen emulsion shall be permitted.	31560	13	M^2	409578
8.	Manufacturing testing supplying loading transporting to work site unloading lowering in trench laying and jointing R C C NP3 class pipe in C M 1:1 including all jointing material such as cement ,sand hump bitumen as directed. Testing the pipe line to a head of 1.5 m and hydraulic test as directed etc. complete	15753	690	RMT	10869570
9.	Constructing B.P. type Catch pit of size 0.60 x 0.60 depth up to 0.75 mt including excavation, P.C.C. (1:4:8), 23 cm thick brick masonry wall in CM (1:6) with 40 2788.00 Nos. 4mm thick IPS flooring in the prop M15 at bottom and 15 mm thick cement plaster inside the catch pit in the proportion of CM (1:3) without jali etc. comp. as directed.	3400	2788	NOS.	9479200
10.	Grating (Jali): 740 x 740 x 90 mm square jali, 10:00 MT load design, 90 x 2 mm MS flat all round, Frame: 10 15.00 600 x 600 mm clear opening, outer size- 900 x 900 x 165 mm. On the upper periphery of frame 25 x 3 mm wide MS flat should be well embedded in concrete to protect the edges of frame.	3400	820	NOS.	2788000
11.	Raising & Repairing damaged M.H. up to Finished Road Level incl. removing damaged brick and repairing by masonry in C.M. 1:5 and plaster in C.M. 1:3 and fixing C.I. steps and M.H. and carting the same as directed	4500	820	NOS.	3690000
12.	Total amount of Provision for Price variation in Bitumen For DBM	225	5000	M.T	1125000
				Total Amount	**63837787**
				2% sup. & conti. RS	**1276756**
				Grand Amount	**65114543**

(Table Abstract Sheet of RCC Road Work)

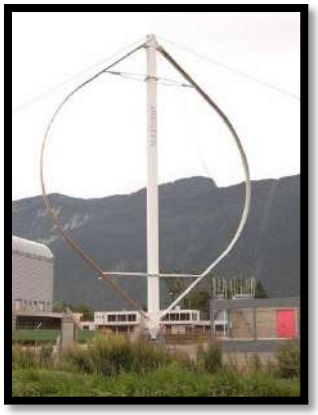
13.1.7 Electrical Design 1

Windmill

Two basic types on their axis of rotation:

(1) Vertical Axis
(2) Horizontal Axis

In Vertical Axis,



(Fig.79 Vertical axis Windmill)

In Horizontal Axis,
Types of Windmills:

Post mill

(Fig.80 Post mill type windmill)

Simple drain mill

(Fig.81 Simple drain mail type windmill)

Tower mill

(Fig. 82 Smock mill type windmill)

American wind mill

(Fig.83 Tower mill type windmill)

Smock mill.

(Fig. 84 American mill type windmill)

Components of Windmill:

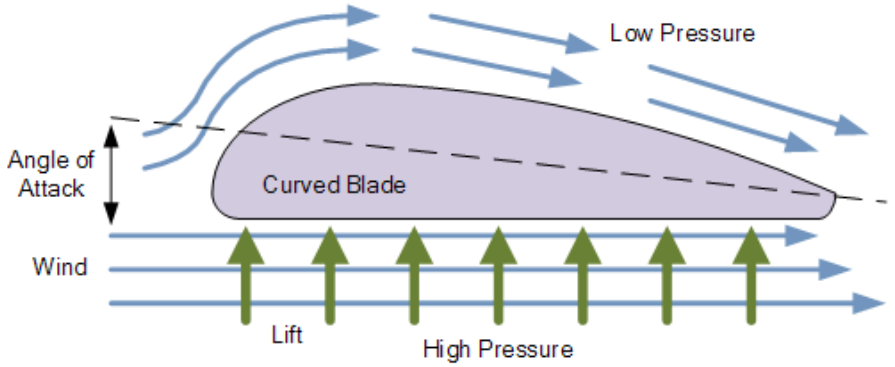
Following are the components of windmill:

- **Blades:** These are the essential component of the windmill, and they control the functioning of rotor speed.
- **Rotor:** Rotor is also known as a propeller.
- **Anemometer:** This component is used for measuring the wind speed.
- **Tower:** This is the support system holding the blades and propeller together.

Types of blades:

Horizontal-axis turbines have blades like airplane propellers, and they commonly have three blades. The largest horizontal-axis turbines are as tall as 20-story buildings and have blades more than 100 feet long. Taller turbines with longer blades generate more electricity.

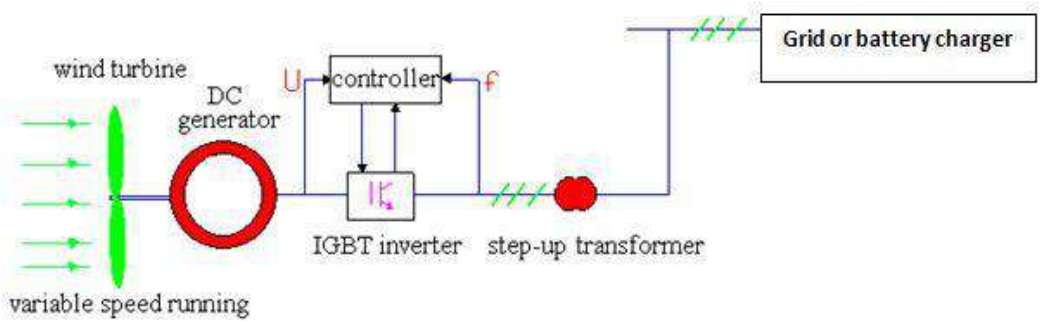
Glass and carbon fibres
Nano-engineered polymers and composites
Hybrid reinforcements



(Fig. 85 Blade of windmill)

Rotor (Generator):

- **Types of rotor,**
  - Direct Current (DC) Generators.
  - AC Asynchronous Generators, and.
  - Switched Reluctance Generators.
  - But in recent decades PM generators have been gradually used in wind turbine applications due to their high power density and low mass.
  - Often these machines are referred to as the **permanent magnet synchronous generators** (PMSGs) and are considered as the machine of choice in small wind turbine generators.



(Fig.86 Block diagram of windmill)

Uses of Windmill:

The main purpose of windmill is to convert wind energy into electrical energy, and when electrical energy is obtained, the following are the ways it is used:

- For pumping of groundwater.
- Extraction of oil from the seeds.
- Milling of the grains.

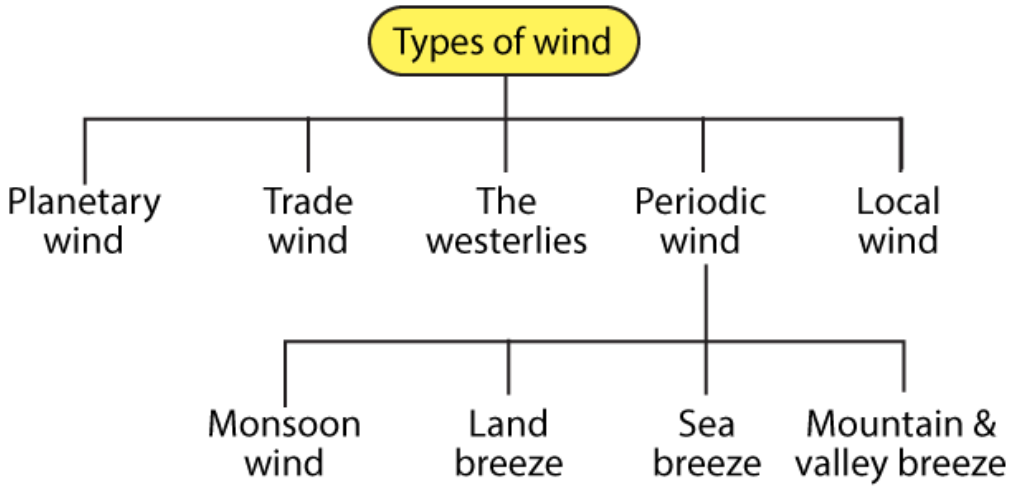
Wind in simple terms is nothing but moving air. We all enjoy wind rustling through the leaves in our garden. It has also expanded the range of transport and has provided a power source in terms of mechanical energy for the generation of electricity in windmills and recreation purposes in hot air balloons. Wind power was also used in voyages by sailors to direct their ships. When the winds are strong, they lead to the destruction of life and property in the form of cyclones and storms, causing forest fires, landslides etc. In this article, we will learn about the causes of wind and the destruction caused by winds.

Types of Wind:

Wind blowing above the earth surface may be classified into five major types:

- Planetary winds
- Trade winds
- The westerlies
- Periodic winds
  - Monsoon winds
  - Land breeze
  - Sea breeze
  - Mountain and valley breeze

  Local winds



(Fig.87 Wind types)

Turbulence:

Wind Power Density (WPD) is a quantitative measure of wind energy available at any location. It is the mean annual power available per square meter of swept area of a turbine, and is calculated for different heights above ground. Calculation of wind power density includes the effect of wind velocity and air density.

Wind turbines are classified by the wind speed they are designed for, from class I to class III, with A to C referring to the turbulence intensity of the wind.

Class	Average Wind Speed (m/s)	Turbulence
IA	10	16%
IB	10	14%
IC	10	12%
IIA	8.5	16%
IIB	8.5	14%
IIC	8.5	12%
IIIA	7.5	16%
IIIB	7.5	14%
IIIC	7.5	12%

(Table 44 Turbulence in windmill)

Efficiency:

Conservation of mass requires that the amount of air entering and exiting a turbine must be equal. Accordingly, Betz's law gives the maximal achievable extraction of wind power by a wind turbine as 16/27 (59.3%) of the rate at which the kinetic energy of the air arrives at the turbine.

The maximum theoretical power output of a wind machine is thus 16/27 times the rate at which kinetic energy of the air arrives at the effective disk area of the machine. If the effective area of the disk is A, and the wind velocity v, the maximum theoretical power output P is:

$$P = \frac{16}{27}\frac{1}{2}\rho v^3 A$$

$$P = \frac{8}{27}\rho v^3 A$$

Here, ρ is the air density.

Power Need for the Village and Installation of Turbine (Enercon E - 53):

- The output of a wind turbine depends on the turbine's size and the wind's speed through the rotor. Wind turbines manufactured today have power ratings ranging from 250 watts to 7 MW.
- An onshore wind turbine with a capacity of 2.5 – 3.0 MW can produce up to 6 million kWh in a year – enough to supply 1,500 average EU households with electricity. This household needs more power but in village the people doesn't need that much power.

- In our village approximately 2000 houses are present.
- And we assume that almost all houses consume 1 kW so total demand is approximately 2 MW.
- But we all know that one or two windmill can't generate 2 MW power.
- So we want to install more than 2 windmills to generate 2 MW power.
- We can install **Enercon E-53** turbine.
- Specification of **Enercon E-53** turbine,

Rated power	**800 kW**
Rotor diameter	52,9 m
Hub height in meter	50 / 60 / 73
Wind zone (DIBt)	WZ II exp. / WZ 3 GK I / WZ 4 GK II
Wind class (IEC)	IEC SA
WEC concept	Gearless, variable speed, single blade adjustment

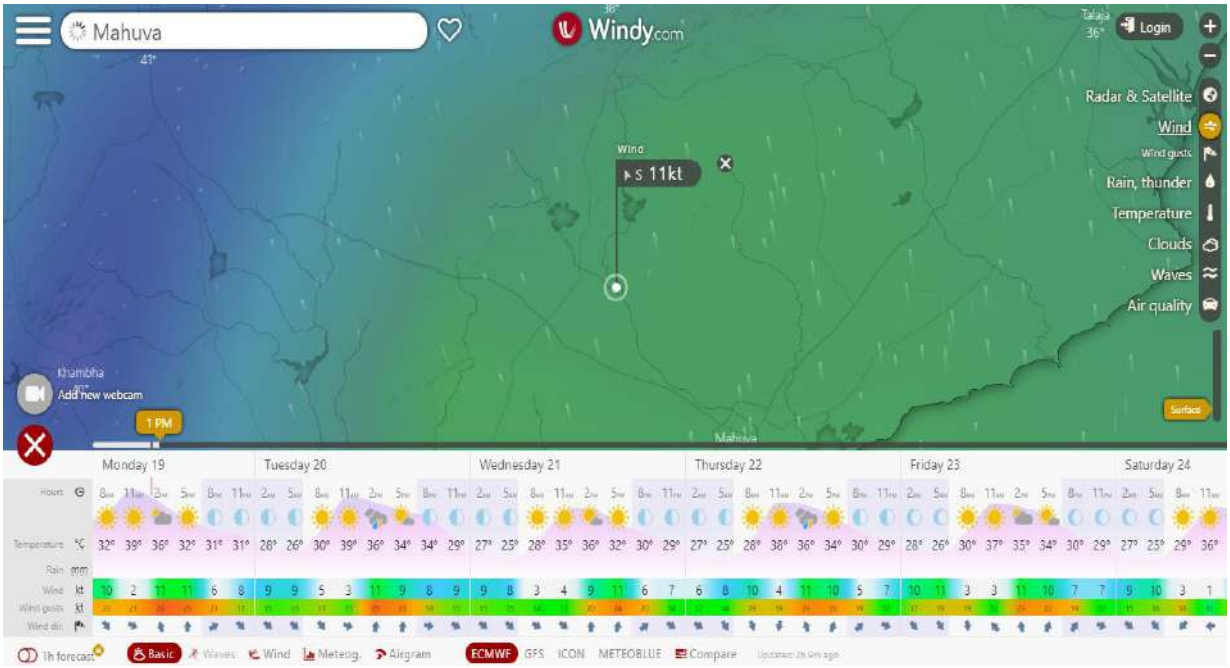
(Table 45 Enerrcon E – 53 Turbine Specification)

Enercon E - 53 800 kW Wind Turbine Specification:

Turbine:	
Configuration	Three blade, horizontal axis, upwind
Rated Power	800kW at 12m/s
Rotor Speed	11 to 30 rpm
IEC 61400-1 Turbine Class	IIIA
Site Average Wind Speed	7.5 m/s
Survival Wind Speed	57 m/s
Rotor:	
Rotor Diameter	52.9 m
Swept Area	2,198 m²
Blade Material	GRP (Epoxy)
Power regulation	Pitch controlled variable speed
Generator:	
Generator Type	ENERCON direct drive synchronous ring generator
Configuration	3-Phase, 400V, 50Hz – 60Hz
Brake & Safety System:	
Main Brake System	3 independent pitch control systems with emergency power supply
Secondary System	Rotor brake and Rotor lock (maintenance purposes)
Automatic Shutdown triggered by	High wind speed, grid failure, over-speed, all other fault conditions
Controls:	
Control Systems User Interface	ENERCON SCADA
Towers:	
Available Hub Heights	50 m, 60 m, 75 m
Tower Type	Tubular steel tower
Warranty:	
Period and type	Up to 15 year standard service package

(Table 46 Enercon E – 53 Turbine Details)

We want to install **3 Enercon E – 53 turbines** which give us maximum 2.4 MW power.
Wind speed of the Village:



(Fig.88 Wind velocity map of the location)

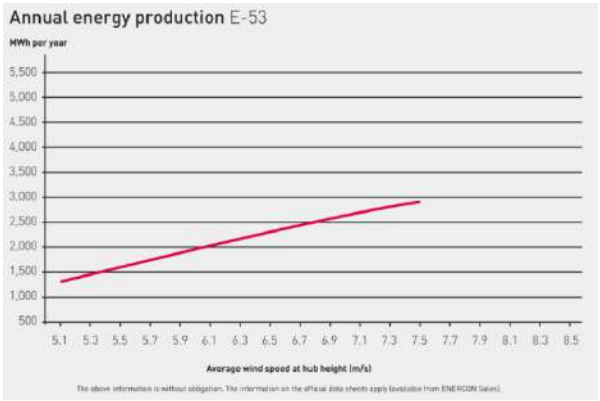
In normal Condition at ground level the speed of the wind is 6 m/s.

Costing:

The cost of 2 MW windmill is around 15 crore Indian Rupees to fully install but it depends upon blades, rotor and tower.

This cost is very high so what can we do? We install small 1 kW windmill on the top of the house.

Energy Production:



(Fig.89 Annual Energy Production of Enercon E – 53 Turbine)

HAWT Wind Turbines:

A “HAWT” is a Horizontal Access Wind Turbine. These are the types of wind turbines that are most widely used, and are usually the first to come to mind when we think of wind energy. These turbines can have two, but more often three, blades on top of a tower reaching up to 120m tall. The blades can be upwards of 60m long and can produce up to 20 MW of energy.

VAWT Wind Turbines:

A “VAWT” is a Vertical Access Wind Turbine. These types of wind turbines harness power from the wind in the opposite direction than the HAWT. VAWT are used less frequently because their vertical design is not as effective or as efficient as the horizontal design.

(Fig.90 Vertical Windmill Farm)

1 kW Horizontal axis wind turbines:

(Fig.91 1 kW Horizontal Axis Windmill)

This 1 kW windmill generally use in home application. Generally this windmill mount top of the house.

And cost is around 70,000 to 1 lakh rupees.

1 kW Vertical axis wind turbines:

(Fig.92 1 kW Vertical Axis Windmill)

The cost of this 1 kW vertical axis windmill is around 1 lakh rupees.

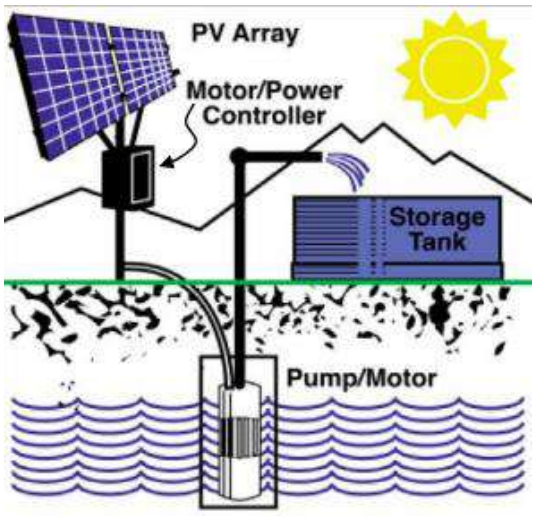
13.1.8 Electrical Design 2

Solar Powered Water Pump

1. Introduction:

Photovoltaic (PV) panels are often used for agricultural operations, especially in remote areas or where the use of an alternative energy source is desired. In particular, they have been demonstrated time and time again to reliably produce sufficient electricity directly from solar radiation (sunlight) to power livestock and irrigation watering systems.

A benefit of using solar energy to power agricultural water pump systems is that increased water requirements for livestock and irrigation tend to coincide with the seasonal increase of incoming solar energy. When properly designed, these PV systems can also result in significant long-term cost savings and a smaller environmental footprint compared to conventional power systems.



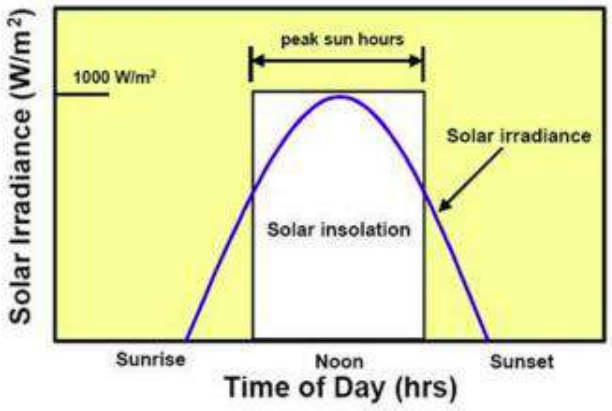
(Fig. 93 Solar Water Pump)

The principle components in a solar-powered water pump system (shown in Figure 1, right) include:
The PV array and its support structure

- An electrical controller, and
- An electric-powered pump.

2. Solar Radiation:

Solar radiation is the energy from the sun that reaches the earth. It is commonly expressed in units of kilowatts per square meter (kW/m^2). The earth receives a nearly constant 1.36 kW/m^2 of solar radiation at its outer atmosphere. However, by the time this energy reaches the earth's surface, the total amount of solar radiation is reduced to approximately 1 kW/m^2.



(*Fig.94 Solar radiation and peak sun hours)*

3. Solar Panels:

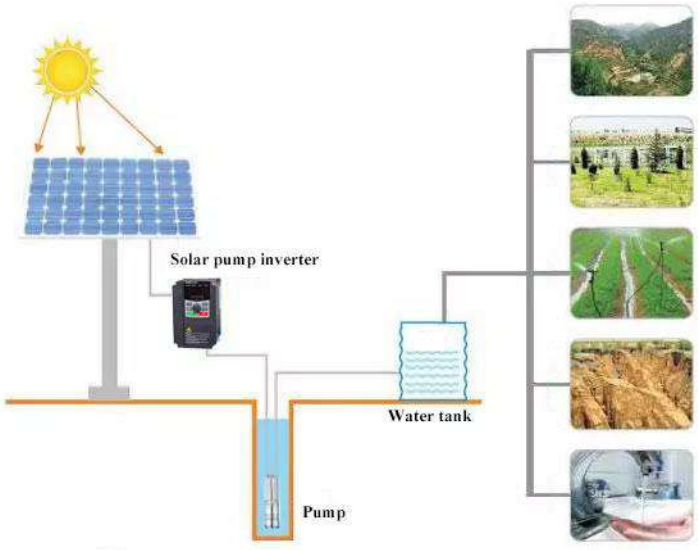
We know that 1 HP ≅ 746 Watt

But, in Solar Powered Water pump System we consider 1 HP = 1 KW.

In the Solar Powered Water Pump There are numbers of variety like 3 HP, 5 HP and 7.5 HP etc.

The solar cell module is a solar power generating device that directly converts solar energy into direct current electrical energy. The solar cell array is constituted by several solar panels in series-parallel connection. It absorbs the solar radiation, and transforms it into the electricity energy, so as to provide the power source for the entire water pumping system.

For 3 HP systems we consider 3 KW and hence we use 335 Watt panels so we need 9 Solar Panels with rating 335 Watt.



(Fig. 95 Solar Water Pump & Uses)

4. Solar Pump Inverter:

The direct output of solar cell is generally 12V DC, 24V DC, 48V DC. In order to provide AC energy to the devices or appliances, it is necessary to convert the direct current energy generated by the solar power system into AC electric energy, so DC-AC power inverter is required. The DC-DC inverter is also needed in some cases when a load with multiple voltages is required, such as converting power from 24V DC to 5V DC (note that it is not a simple buck). The solar pump inverters play such role.

For safety, the inverter should be considered 25-30% bigger size.

The solar pump inverter is the most important equipment in the photovoltaic water pumping system and the soul of the system. The inverter controls and regulates the operation of the PV pumping system, converts the DC power generated by the solar cell array into AC power, drives the water pump, and adjusts the output frequency in real time according to the change of the intensity of the sunlight, realizes the maximum power point tracking, and maximizes the utilization of the solar energy.

- **To Design Solar Water Pump**

1. Model selection procedure

- Confirm the head and flow of water pump the head is the vertical distance from the pump water inlet to the outlet, and the flow is the daily water consumption.
- Confirm the power of the water pump it depends on the head, flow and outlet diameter and so on.
- Confirm the inverter the power of the inverter is 1.1-1.3 times of the water pump motor power.
- Confirm solar panel capacity the power of solar panels is 1.3-1.5 times of the inverter power.
- Selection of the cable specification It depends on the connection distance between the inverter and water pump

2. Obtain user demand - Daily water demand, head and diameter of the well

Before configuring the solar water pump system, it is required to know the customer information in detail to give an effective solution.

For instance, the information of a customer is that we should understand before as follows:

- The well depth is about 55m, the head is about 48m, and the well diameter is about 200mm.
- Need to irrigate 5 hectare. The entire irrigation period requires about 27000 m^3 water and irrigates for a continuous six months.
- The local average sunshine is about 5 hours per day.
- About the head of water pump, the following is a bride introduction about it.
- The head refers to the height at which the pump can lift water, usually expressed in H, and the unit is m.
- Pump head = static head + horizontal delivery distance + loss head
- The static head refers to the altitude difference between the suction point of the pump and the high control point. For example, pumping water from a deep well and sending it to a high water tank, the static head refers to the altitude difference between the water suction point in the well and the water tank at the high point. As shown in the figure, the static

head is H1+H3, and the horizontal delivery distance is shown in figure H2. When the head is generally calculated, the head is counted as 1m for every 10m in the horizontal direction. The loss head is usually 6% to 9% of the net head, such as water pipe elbow, water head and so on, which is generally 1~2 m.

- Now see the specific selection of the solar water pump system configuration

1. Solar water pump

- According to the known head and flow, a suitable water pump can be referred in a reversed manner: for example, 1000 m^3 water is pumped in 300 days, the local sunshine is 4.5 hours, and the system efficiency is 0.9

2. Size:

- Head: 110m
  Flow: 1000 / (300*0.9*4.5） = 1.215 m^3/h
  Pump selection: pump motor power 3kW, flow 1.2m^3/H, head 115m.

(Fig.96 335 watts solar PV Module)

3. Solar pump inverter

- Generally, it is better to select the inverter that is larger than the water pump one size in specification. The 3KW water pump is equipped with 4.2KW solar pump inverter at least.

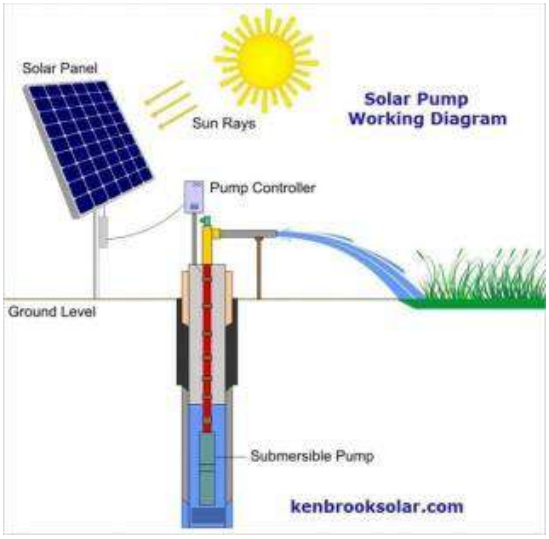
4. Solar panels

- Generally, the solar panel power to be chosen is 1.3-1.5 times of the water pump power. Here is 3 × 1.4 = 4.2KW. The working voltage of the solar pump inverter is 200V-360V. It can select the 335W solar panel, 9 pieces connected in series, a total power of 4.2kW.

Sr. No.	Items	Specification	Quantity	Price
1	Solar Panels	335 Watt	9	Rs. 1,17,000/-
2	Holder			Rs. 2000/-
3	Solar Pump Inverter	4.2 kW	1	Rs. 20,000/-
4	Submersible Pump	3 kW, 1.2m3/H flow, 115m Head	1	Rs. 10,000/-
5	Pump Motor	3 HP Single Phase	1	Rs. 2500/-
6	Safety Instrument and Earthing device	Nil	1	Rs. 10,000/-
7	Distribution System	Nil	1	-
8	Pipes and Cables	Nil	1	Rs. 10,000/-

(Table 47 Technical Details of Solar Water Pump with Cost)

So, the Overall Cost of 3HP Solar Water Pump System is Rs. 1,70,000/-
So, the payback period is almost 9 years.



(Fig.97 Solar Pump Working Diagram)

- **Subsidy Structure of Solar Scheme**

Under the scheme, the farmer will get subsidy on new and improved solar-powered pumps. The farmers will have to spend only 10% of the total expenditure to acquire an install a solar pump and 60% cost will be handled by government and the remaining 30% will be taken care of by the bank as credit.
This Subsidy Scheme also known as "**PM KUSUM YOJANA".**

Subsidy Structure:
How much farmer get subsidy from central government?

Central Government	60% of the total cost as Subsidy

(Table 48 Subsidy Structure for Solar Water Pump)

How much farmer get loan from banks?

Banks	30% of the total cost as loan to farmers.

(Table 49 Loan Structure for Solar Water Pump)

How much money farmer can invest?

Farmer Investment	10% of the total cost

(Table 50 Investment for Solar Water Pump)

- **Conclusion:**

We can use more solar based energy resources in home and public utility building. It reduces environmental pollution. And also reduce electricity cost in the long run.

Awareness about energy efficiency by the use of solar is an important thing in conservation of energy. Solar power is the future of electricity. There is one time capital investment and proper maintenance.

Thus, use of renewable energy, energy efficient equipment and proper use of energy can push Mota Khutavada village towards "**URBANIZATION**".

13.1.9 Electrical Design 3

The Design of Electrical House Wiring and Lighting:

Generally we use 1, 1.5 and 2.5, 4.0 and 6.0 sq. mm wire in electrical wiring in our home.
In our home we use single phase (Single Core) wire for electrical wiring.
In our electrical wiring there are two main types of wire.

(i) Single Strand and

(ii) Multi Stranded

We prefer Multi Stranded wire because this wire can carry maximum current and heat dissipation is better.

Finally we prefer Single Core, Multi Stranded and Copper conductor for electrical wiring in our home.

(Fig.98 Types of electrical wiring wire)

Some specification of electrical wiring wire,

Nominal Cross Sectional Area of Conductor	Number /Nominal Diameter of Conductor Strands	Nominal Thickness Of Insulation	Approx. Overall Diameter	Current Carrying Capacity 2 Cable Single Phase		Max. Conductor Resistance per Meter at 20° C
				Conduit	**Unenclosed Clipped**	
1.0 sq. mm	14/0.3 mm	0.7 mm	2.7 mm	15 A	16 A	0.018.10 Ω
1.5 sq. mm	22/0.3 mm	0.7 mm	3.0 mm	18 A	22 A	0.012.10 Ω
2.5 sq. mm	36/0.3 mm	0.8 mm	3.6 mm	25 A	28 A	0.007.41 Ω
4.0 sq. mm	56/0.3 mm	0.8 mm	4.1 mm	35 A	42 A	0.00495 Ω
6.0 sq. mm	84/0.3 mm	0.8 mm	4.6 mm	46 A	52 A	0.00330 Ω

(Table 51 Specification of different sq. mm electrical wiring wire)

So, this is the some specification of electrical wire we use in the house.

Now some figure of how much load can take current,

Domestic Portable Appliance	Amps Used	Watts Used
Fridge	1.5	130
TV	0.5	120
Tube light	0.25	40
LED Lamp	0.05	9
Incandescent Lamp	0.55	100
Iron	10	1500
AC	10	1800
Ceiling Fan	0.5	120
Table Fan	0.33	60

(Table 52 Home appliance load)

How much lumens required,

- Bathroom: 880 to 1600 lumens
- Kitchen: 1600 to 2500 lumens
- Living room: 1,000 to 2,000 lumens
- Bedroom: 1,000 to 2,000 lumens
- Hallway: 500 to 1,000 lumens

BULB | BRIGHTNESS	450 LUMENS	800 LUMENS	1100 LUMENS	1600 LUMENS	2600 LUMENS	5800 LUMENS
 LED	6W	9 - 10W	13W	16 - 18W	24W SPECIAL HIGH VOLTAGE LAMPS	45W
 CFL	8 - 9W	13 - 14W	18 - 19W	23W	40W	85W
 Regular INCANDESCENT	40W	60W	75W	100W	150W	300W
 Halogen	29W	43W	53W	72W	150W	300W

(Table 53 Lumens in different lamps)

Lumens Calculation in House:

- In the house we generally use fridge, TV, tube light, led lamp and ceiling fan.
- So total our wattage is around 1000 watt it means we consume nearly equal to 1 kW.
- And the current of our home circuit is nearly equal to 4 ampere.

- In bedroom we need to install at least 2 led bulb of 9 watt for better lighting it gives 1500 lumens. And the average area of the room is 120 sq. feet.
- In living room we need to install 2 led bulb of 13 watt for better lighting it gives 2200 lumens. And average area of room is 180 sq. feet.
- In kitchen area we need to install 2 led bulbs of 10 watt and it gives 1600 lumens. And average area of kitchen is 90 sq. feet.
- In toilet/bathroom required heavy lighting so we need to install 1 bulb with 10 watt rating and it gives 800 lumens. And average area of bathroom/toilet is 25 sq. feet.

Components use in electrical wiring,
(i) Electrical Wire (1.0, 1.5, 2.5, 4.0, 6.0 sq.mm)
(ii) Energy Meter
(iii) ELCB and MCB
(iv) Switch Board
(v) Home Appliances (Fan, TV, Bulb, Fridge etc.)

Types of Electrical Wire:

Wire Size (sq. mm)	Purpose
1.0 sq. mm	Earthing Purpose
1.5 sq. mm	Distribution purpose, from switchboard to lighting/fan points
2.5 sq. mm	Distribution Board (DB) to mainboards in a room
4.0 sq. mm	Geyser/Heaters, Electrical Induction stove, other electrical appliances which require 15 Amperes
6.0 sq. mm	For Air conditioners (up to 1.5 Tons capacity)

(Table 54 Different sq. mm electrical wiring wire specification)

Electrical Wiring Installation:
Earthing Wire (1.0 sq. mm):

- First of all we need to calculate earthing wire in house. Earthing wire should be 1.0 sq. mm. that is enough. And the length of the earthing wire for 2BHK house should be 90 meter.
- The price of the 1 sq. mm earthing wire is ₹ 840

Phase and Neutral Wire (1.5 sq. mm):

- For distribution purpose from switchboard to fan, bulb etc. 1.5 sq. mm wire is enough and generally length of this wire for 2BHK house should be 90 meter.
- But we want to consider second wire which is neutral wire so this wire length also 90 meter.
- And the cost of combine 180 meter 1.5 sq. mm wire is ₹ 3200

Phase and Neutral Wire (2.5 sq. mm):

- For distribution board to main board in house we want to use 2.5 sq. mm wire.
- For 2 BHK house this wire length nearly equal to 50 meter.
- But we want to consider neutral wire also so total length is nearly equal to 100 meter.
- And the cost of this wire is ₹ 1800

Phase and Neutral Wire (4.0 sq. mm):

- For higher load taking appliances in home we want to use 4.0 sq. mm wire for more safety.
- In 2 BHK house this wire length should be nearly equal to 30 meter.
- But we want to use neutral wire also so total length of 4.0 sq. mm wire is 60 meter.
- Overall cost of 4.0 sq. mm wire is ₹ 2000

Phase and Neutral Wire (6.0 sq. mm):

- If we want to use air conditioning in our home in future so we want to use 6.0 sq. mm wire.
- Length of the 6.0 sq. mm wire should be nearly equal to 20 meter for 2 BHK house.
- Total length (including neutral wire) of wire is nearly equal to 40 meter.
- Overall cost is ₹ 1500

Location	No. of Socket + Switch (6 Amps)	No. of Socket + Switch (16 Amps)	No. of Switches (6 Amps)
Living Room	5 (sockets) + 5 (Switches) (TV, DTH, Charging, Ironing & Spare)	2 (sockets) + 2 (Switches) (Air conditioner, Spare)	5 Switches (2 Lights, 2 Fans, Entrance Light)
Bedroom-1	3 (sockets) + 3 (Switches) (Charging purpose, Night Lamp, Study)	1 (socket) + 1 (Switch) (Air conditioner)	3 Switches (Light, Fan & Night Lamp)
Bedroom-2	3 (sockets) + 3 (Switches) (Charging purpose, Night Lamp, Study)	1 (socket) + 1 (Switch) (Air conditioner)	3 Switches (Light, Fan & Night Lamp)

Kitchen	3 (sockets) + 3 (Switches) (Refrigerator, mixer & Chimney)	2 (sockets) + 2 (Switches) (Microwave, Purifier)	3 Switches (Light, Fan & Exhaust)
Bathroom	2 (sockets) + 2 (Switches) (Shaving razor Charging purpose)	2 (sockets) + 2 (Switches) (Geyser)	4 Switches (2 Lights & 2 Exhaust)
Total Minimum Requirements	16 (sockets) + 16 (Switches) (6 Amps Points)	8 (sockets) + 8 (Switches) (16 Amps Points)	18 Switches (6 Amp Points)

(Table 55 Switches and sockets use in house)

Cost of the Switches and Sockets:

- For 16 (sockets) + 16 (Switches) of 6 Amps points cost is around ₹ 500
- For 8 (sockets) + 8 (Switches) of 16 Amps points cost is around ₹ 1100
- For 18 (Switches) of 6 Amps points cost is around ₹ 300

ELCB and MCB:

- For standard anchor MCB 8 Way SPN Distribution Board price is ₹ 1200.
- This board including 5+1 MCB and the rating of MCB is 10000 Amp.
- Standard L&T India Earth Leakage Circuit Breakers, 25A 30mA, 2 Pole price is ₹ 2200

Smart Energy Meter:

- Energy meter gives reading about consumed energy, volts, current etc.
- But smart energy meter gives the entire thing which normal energy meter gives but smart energy meter monitoring our system.
- Smart energy meter can connect through our mobile phone and we can also monitoring our system.
- The cost of smart energy meter is starting from ₹ 3000

13.2 Recommending of the design

- Detailed design stage is building style. Total designs are usually remarked as ‘developed design’ or ‘definition’ it is the method of seizing and developing the approved idea formed design. Detailed style of design ought to be offer sufficient data applications for statutory approval to be created.
- Designing instructions are to be followed as per recommendations in the way of a better practice in design. They’re supposed to give clear commands to designers to developers so that they can learn to adopt exact principles like efficiency & consistency. Instead of demonstrating principles and designing of guidelines to aid helpful advice on how to create a designing method that could be platform-specific or cross-platform.

13.3 Suggestions / Benefit of the villagers advantages of village life

- Everybody in the village depends on agriculture and so they cultivate by their own. They’re very friendly and they have unity became they live together and they share their work with each others. Because the environment is generally pollution free and noise free, we can enjoy the real beauty of nature in the village. Normally, villagers don’t heist to help others.

CHAPTER: 14

Technical Options with Case Studies

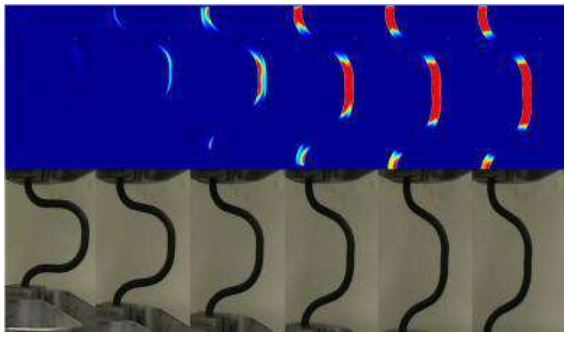
14.1 Civil Engineering

14.1.1 Advanced Earthquake Resistant

METHODS FOR EARTHQUAKE RESISTANT BUILDINGS:

A. Shape-memory alloys:

This demonstrates exceptional characteristics desirable in a seismic risk resistant building. They have a capability to disintegrate considerable energy without permanent deformation or considerable destruction. Generally common shape memory alloys are makeup of metal blends comprising, nickel titanium, copper-aluminum-nickel and Copper-zinc-aluminum-nickel, this is more suitable for extensive applications.



(Fig.99 Shape-memory alloys)

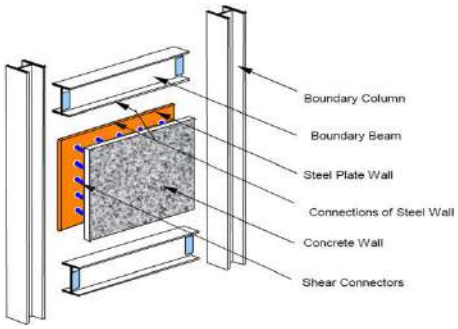
B. Seismic Dampers

In Seismic Dampers are the diagonal braces in a moment resisting frame which is used for efficient lateral load resisting scheme. In modern area the structural seismic retort to control have taken the lead to the alternative of these bracings with seismic dampers. These dampers behave similar to the hydraulic shock absorbers in cars considerably in case the sudden jerks are engaged in the hydraulic fluids and only small is transferred to the chassis of the car. In this case the seismic energy is conveyed through it and dampers is absorbed a small part of it and decrease the magnitude of the force which is acting on a structure. Generally used types of seismic dampers are included the friction dampers (energy is fascinated by surfaces within the friction between them rubbing beside each other), viscous dampers (energy is absorbed by silicone-based fluid passing between piston-cylinder structure), and yielding dampers (energy is fascinated by metallic components that produce). The friction dampers were delivered in an 18-story RC frame structure in Gurgaon, India.

(Fig.100 Seismic Dampers)

C. Steel Plate Shear walls

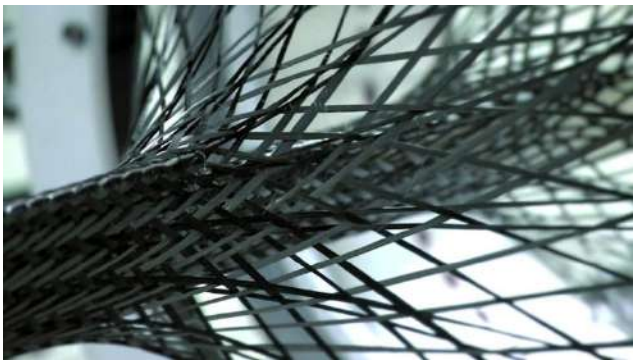
Shear walls are deemed as an important component of a lateral load resisting systems and steel is known for its flexible behavior. Merging these two attractive properties, an efficient load resisting system was established and has noticed wide applications in North America and Japan. These walls are intended and also, they turn as a bend as an alternative of buckling below the action of lateral loads. The walls are substantially lighter and thinner; thus, they reduce the building weight. So, these walls not needed to be cured and consequently, it leads to increase the speed of the construction process.



(Fig.101 Steel Plat shear walls)

D. Carbon Fibers

The tensile features and the constant nature of a spider web was studied by many researchers in Japan. This is the world's first seismic reinforcement structure made of carbon fiber material. A seismic risk Resistant Building Rendered with Carbon Fabric and it is redolent of a giant spider web has been erected in Nomi City of Ishikawa Prefecture in Japan.



(Fig.102 Carbon Fiber)

E. Ecological ductile cementations composite (EDCC) spray

A many researcher from the University of British Columbia (Vancouver, Canada) has established a new extreme method to make up the buildings resist against seismic risks. EDCC blends the fly ash, cement with polymer-based fibers, and other extracts in making it ecological and has been provided the molecular level to be malleable and strong at the same time. This material when utilized as a slim coating (10mm), was noticed to have enhanced seismic resistance of the structure by enduring a seismic risk of intensity 9 to 9.1 on Richter scale (Tohoku earthquake, Japan 2011). So this method has been proposed for retrofitting of the vacant structures such as an uncomplicated school building in Vancouver.

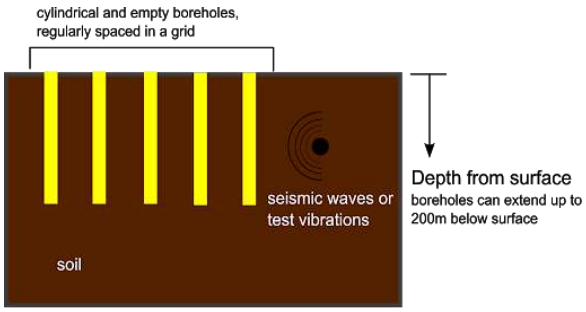
(Fig.103 EDCC Spray)

F. Blue mussels

It is found sea decks and clinging to rocks all laterally the coast of New England. They are affixed in place by a gristly outcrop of cabling that occurs from among their twin shells. Generally the most ferocious of high tides Can't pry them very loose. To remain affixed to their precarious perches, mussels secrete sticky fibers well known as byssal threads. These threads are inflexible and stiff while others are flexible and elastic. Researchers are annoying to combine this particular element into structures in order to make up the building endure the seismic risks.

G. Seismic Invisibility Cloak

A sequence of the borehole is mined about the periphery of the structure that needs to be endangered. These boreholes seem to work as a seismic cloak‖ that could hide a building or possibly an complete city from an earthquake's deadly waves. This makes the use of dampers, isolators, and also other vibration response control devices obsolete.



(Fig.104 Seismic Invisibility cloak)

Strategies for Earthquake Resistant Construction

In accumulation to the earthquake design code 1893 the Bureau of Indian Standards has distributed to applicable earthquake design codes for Earthquake resistant construction Masonry structures (IS-13828 1993).

- Delivering vertical reinforcement at significant locations such as internal corners, and external wall junctions as per code.
- Horizontal bands should be provided at lintel, plinth and roof levels as per code
- Proper workmanship and Quality assurance must be guaranteed for all cost without any concession In RCC framed structures (IS-13920)
- Grade of mortar should be as per codes definite for dissimilar earthquake zones.
- Asymmetrical shapes should be evaded both in vertical and plain configuration.
- In RCC framed structures the arrangement of lateral ties should be retained closer as per the code
- Whenever laps are to be offered, the lateral ties (stirrups for beams) should be at nearer spacing as per code.
- The hook in the ties should be at 135 degree as an alternative of 90 degree for better anchoragement.
- The planning of lateral ties in the columns should be as per code and must be sustained through the joint as well.

14.1.2 Seismic Retrofitting of Buildings

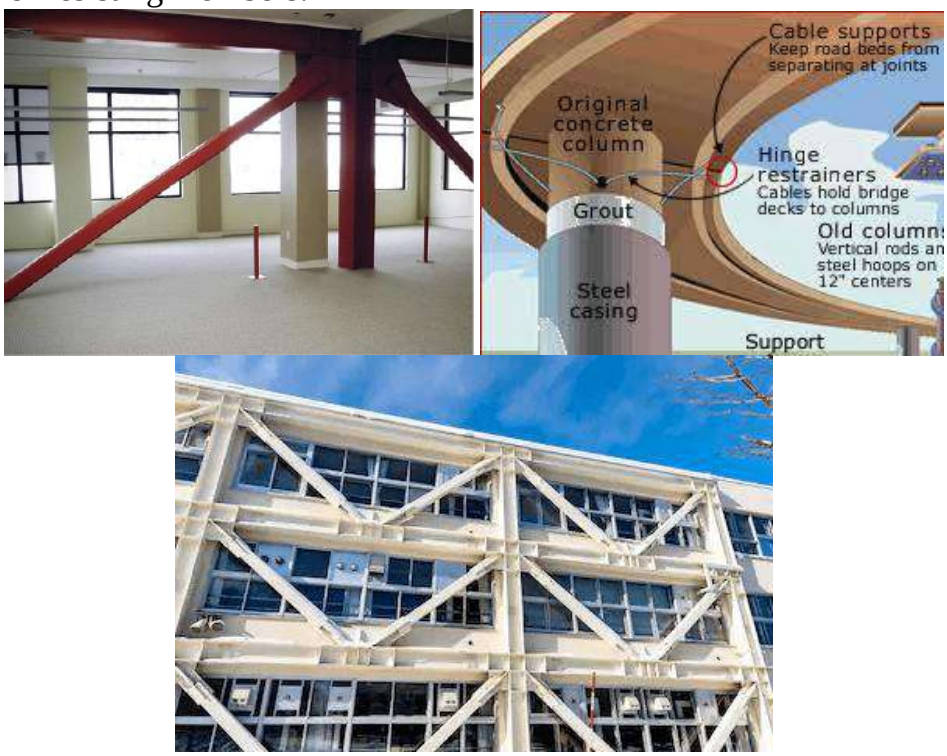
Repair, Strengthening, Remolding, Rehabilitation, Reconstruction, Re- Terms are associated to retrofitting with a marginal difference like Engineering etc.

The most common definitions of Retrofitting are:

- To upgrade the earthquake resistance up to the level of the present day codes by appropriate techniques (IS13935:1993)
- Increasing the seismic resistance of a damaged building is called retrofitting *(Tomazevic, 1999)*
- It is an upgrading of certain building system, such as mechanical, electrical, or structural, to improve performance, function, or appearance(Newman,2001)

Many existing buildings do not meet the seismic strength requirements of present earthquake codes due to original structural inadequacies and material degradation over time or alterations carried out during use over the years. Their earthquake resistance can be upgraded to the level of the present day codes by appropriate seismic retrofitting techniques, such as mentioned about seismic strengthening as below:
The main purpose of the seismic strengthening is to upgrade the seismic resistance of a damaged building while repairing so that it becomes safer under future earthquake occurrences. This work may involve some of the following actions:

a) Increasing the lateral strength in one or both directions by increasing column and wall areas or the number of walls and columns.
b) Giving unity to the structure, by providing a proper connection between its resisting elements, in such a way that inertia forces generated by the vibration of the building can be transmitted to the members that have the ability to resist them. Typical important aspects are the connections between roofs or floors and walls, between intersecting walls and between walls and foundations.
c) Eliminating features that are sources of weakness or that produce concentration of stresses in some members. Asymmetrical plan distribution of resisting members, abrupt changes of stiffness from one floor to the other, concentration of large masses and large openings in walls without a proper peripheral reinforcement are examples of defects of this kind.
d) Avoiding the possibility of brittle modes of failure by proper reinforcement and connection of resisting members.



(Fig.105 Seismic Retrofitting Building)

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

(A) USE OF MODERN MATERIALS:

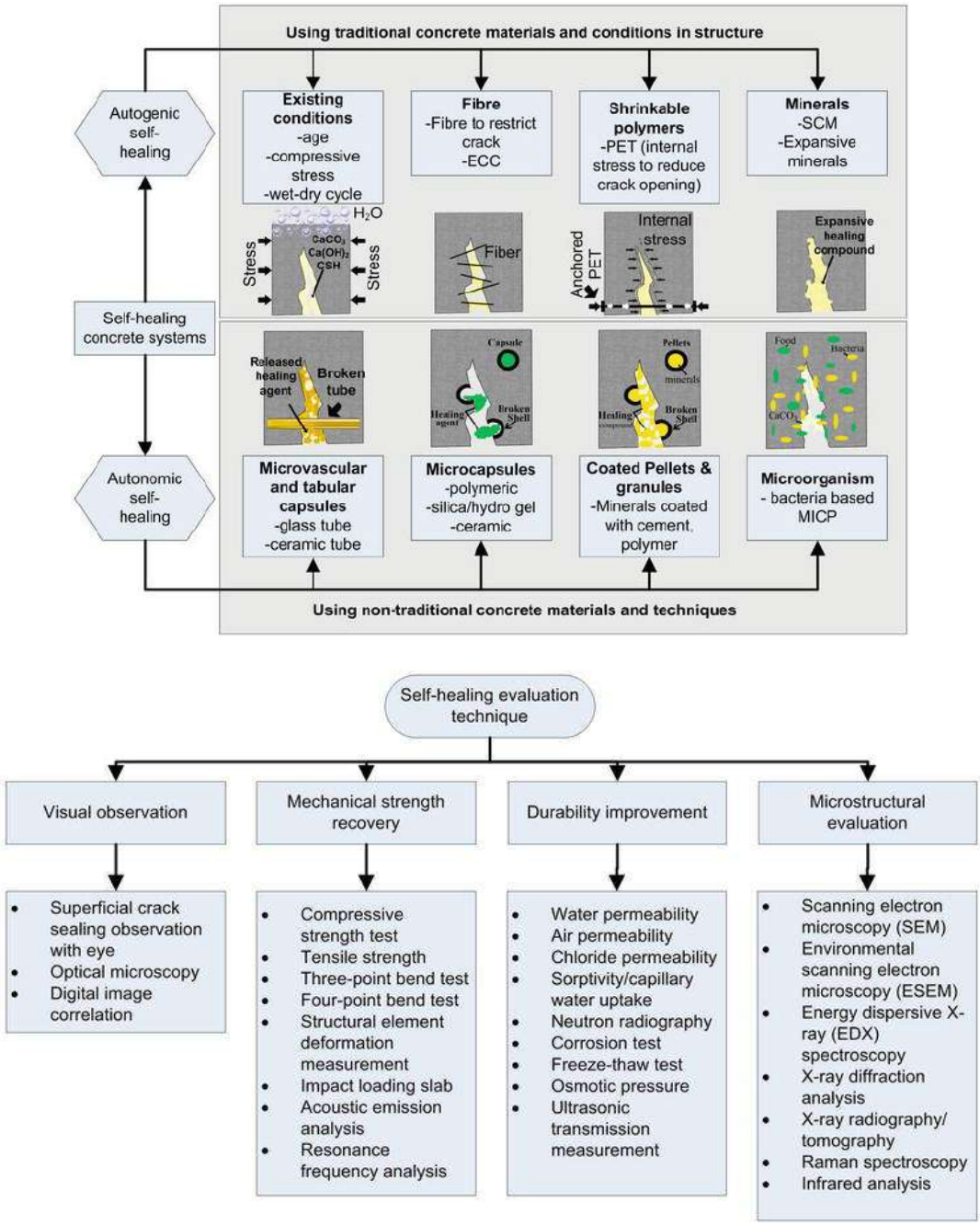
- A new generation of stronger, lighter and more sustainable building materials is coming to solve the construction industry's main challenges. From natural disasters

and sheer costs to environmental concerns and inefficiency, the industry struggles to keep up with demand while maintaining its output. Building projects consume 50% of our resources from nature, often leading to added costs, delayed construction times, and wasted materials.

- To address some of these challenges, many innovative firms are developing a generation of new building materials. Materials are being engineered to be smarter, stronger, self-sustaining, sleeker, and easier on the environment.
- To keep a competitive edge, construction companies need to stay up-to-date on these material innovations. Buildings crafted with the most modern materials will be more equipped to solve ongoing challenges, reduce their carbon footprint, and make an impact in the industry.
- While it can take decades for scientific breakthroughs to make their way to a job site, a new generation of materials is coming. Here are 18 materials that are currently making a buzz in construction and that may very well change the way we build.

1. Self-healing concrete:-

The self-healing system in concrete is principally divided into two types, autogenic and autonomic. Autogenic self-healing in concrete is an intrinsic material-healing property wherein the self-healing process initiates from the generic materials present. For example, comentitious materials exhibit a self-repairing ability due to the rehydration property of anhydrate cement remaining on the crack surface. In contrast, a self-healing process that involves the incorporation of material components that are not traditionally used in the concrete is termed autonomic self-healing. Self-healing performance in concrete is assessed using visual observation, mechanical strength recovery, permeability, durability improvement and micro-structure evaluation. There are three fundamental factors in evaluating the self-healing: visual crack sealing and the identification of heading compounds causing it, the improvement of the durability performance and the recovery of mechanical strength properties [3, 15, 16, 17, 18, 19, 20, and 21]. The mechanical strength recovery is limited in most of the concrete self-healing process. Hence the most reliable self-healing performance is based on the physical crack closure, durability improvement, that is, permeability reduction parameters and micro-structural evaluations.



(Fig.106 Self healing Concrete)

(2) The Use of Mineral Admixtures:

- After realization of the need for durable concrete structures, the composition of concrete has undergone changes. From being a product made of three or four materials (cement, aggregates, water), today a typical durable concrete consists of six or more materials. The use of low water cement ratio enables a reduction in the

volume and size of capillary voids in concrete; this alone is not sufficient to reduce the cement based content of concrete which is the source of micro-cracking from thermal shrinkage and drying shrinkage.

- To reduce the cement based content, both the water content and cement content must be reduced as much as possible. Concrete mixes with fewer micro cracks can be produced by blending the cement with mineral admixtures either in the batching plant or in the cement plant. This enhances the service life of concrete structures in a cost-effective manner.

(3) Cement Silos:

- The use of batching plants for producing concrete is gaining increasing acceptance. As large volumes of cement are used in a batching plant, the cement is generally stored in vertical steel silos. When cement is received in bulkers from the factory, the same is directly pneumatically pumped into the silos which have capacities ranging from 50 to 500 tonne depending upon the project requirements. If only bagged cement is available, they are emptied into the silos, usually with the help of screw conveyors. For modern applications, more than one silo will be required depending on the types of cement and mineral admixture used in the concrete mix.
- In a recently commissioned batching plant complex in the Middle East, each of the two plants feature nine cement silos for Portland cement, slag cement, micro silica, fly ash and SRC cement.

(4)Durability Enhancing Products

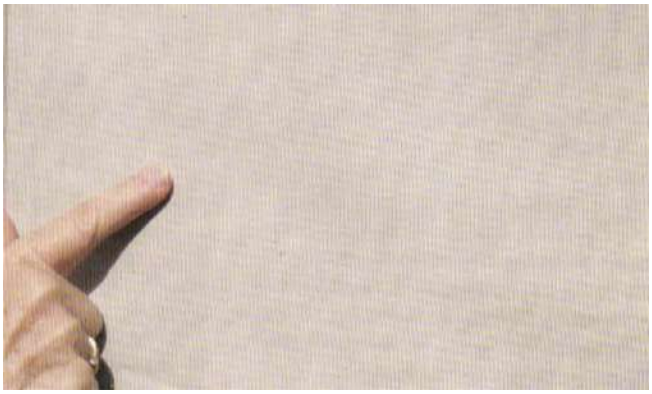
- A full line of products are available to prevent or repair corrosion damage. A typical corrosion inhibiting admixture prevents deleterious expansion and cracking caused by the formation of rust during over-induced corrosion. There are also penetrating sealants to protect new and repaired concrete from the corrosive effects of chloride. The silane and siloxane based reacting sealers soak into the surface, creating a barrier against water or chlorides.

A number of concrete waterproofing admixtures eliminate the need for conventional external waterproofing membranes and saves time, money and hassle at the construction site. It transforms concrete into a water-resistant barrier by becoming an integral part of the concrete matrix.

(Fig.107 Durability enhancing product)

(5)Application of Nano Technology:-

- Reducing particle size of a material to nano–scale often imparts new properties or enhances existing ones. This is typical of nano particles of titanium dioxide, which maintains its photocatalytic activity even when mixed with cement. External cement based surfaces become strongly photocatalytic, leading to a much better appearance and a significant reduction in concentration of pollutants in the surrounding air.
- The photoactive titanium dioxide was found to be a more powerful photocatalytic agent when its particle size decreased to non size. This makes it a ideal vehicle for application in construction. A cement binder containing about 5% of active titanium dioxide produces concrete with a smooth surface and also converts the pollutants, removes them from the surrounding air. In a typical application on a building in France completed in 2000, the quality of concrete surface have remained unchanged till date. The structure looked as if it were freshly built.



(Fig.108 Photo catalytic Surface of Concrete Of the building in France, Built in 2000)

(6) Carbon Dioxide (CO_2):-

- As part of a future global atmospheric stabilization strategy, industrialized countries may lead to use large amounts of carbon dioxide. CO_2 may be used for curing pre-cast concrete units. Manufacturers of concrete masonry units could use CO_2 to reduce energy consumption. Steam curing which is conventionally used is energy intensive. Although CO_2 curing provides slower strength development than steam curing, the performance can be improved if the blocks are properly pre-conditioned before CO_2 curing. It has also been noted that the water absorption of CO_2 cured blocks is lower than that of steam cured blocks.

(B) USE OF MODERN TECHNIQUES:-

- Several of the construction techniques that are still used today have been around for many hundreds of years. Other techniques were just introduced more recently and apparently, while those time-tested approaches that have brought and shaped the construction industry to where it has been today, it still is very interesting to observe

how these new and modern construction techniques and other industry-related innovations are continuously reshaping the approach.

- From modular building techniques to insulation panels, there is a hundred percent of certainty that the innovations beneficially impact every aspect of building construction techniques. Additionally, there's also the builders schedule software that is one of the renowned software applications today in the industry that continues to improve the overall construction phases particularly the project management.
- To make it also much clearer, there are many great new building techniques that are emerging and coming out for the next days and years as well as for builders trends. In this blog, we are covering the newest and the most innovative techniques that are now being applied and used by most developers and builders today. See the list below.

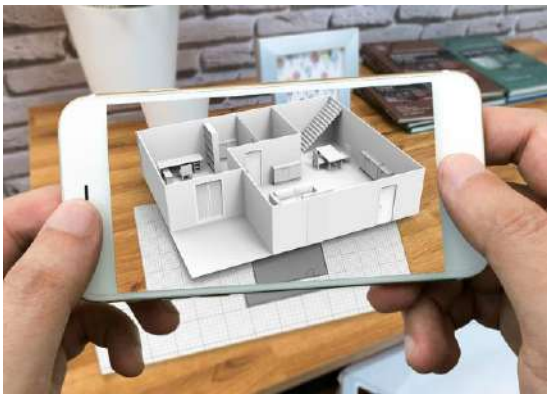
1. Raised Access Flooring

- Several raised flooring options are available now and can choose from. It varies on the facility's needs, HVAC structure, available space, and also the cable routing demands. Systems for raised access flooring have opened up the huge possibilities for any buildings in terms of service distribution. Facility construction is also a subject for these approaches. For example, underfloor air distribution that is one of the best options, and this particular type of system is offering lower energy use and better airflow compared to the conventional HVAC systems.
- These modern types of modifications are very essential in terms of a future-proofing facility in a way of maintaining and keeping reconfiguration costs much lower over from the facility's life cycle. Contractors are being particular in this matter. To manage project is just one of the many responsibilities they've done professionally, in fact, there's a whole lot more. Due to the complexity and intense pressure of the work, they're utilizing construction scheduling software for better management for the project, crew, tasks and other resources involved.

(Fig.109 Raised access flooring)

2. Augmented Reality- Assisted Building

- The integration of AR towards any process has been one of the few anticipated changes when it comes to the latest construction techniques. Through the combination of BIM (Building Information Modeling) together with modern AR wearables, builders and developers can now see complete-rendered visualizations of what a certain construction project will certainly look like. In addition to the process is construction schedule software that is mainly utilized for scheduling purposes and project management allowing the project manager to efficiently manage the project and the involved crew.
- Apart from the obvious advantages to the pre-construction planning for separate developments, this particular technology has usually supported new building strategies in all involved aspects of urban planning – utility management, routing, zoning for the developments of housing, traffic, and many other more.
- AR is capable also of assisting when identifying the types of construction materials to be used on the site and also if whether the building has required insulating concrete and so on.



(Fig.110 Assisted Building)

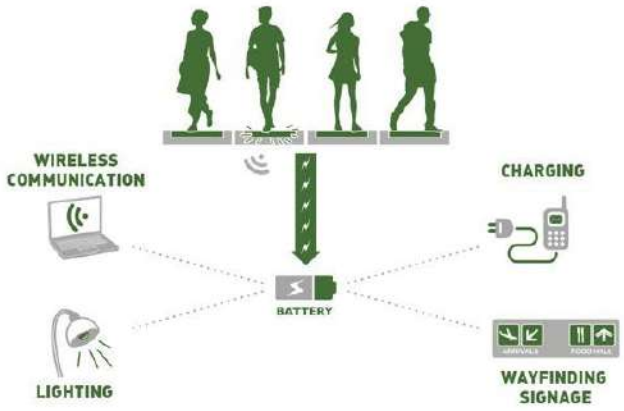
3. Thin Joint Masonry

- Actually, building materials are not just the only one that evolved in masonry because the techniques, as a matter of fact, are evolving too. Take into consideration this technique called as the thin joint masonry – a rather new construction technology that has been offering clear advantages in construction time. This specific method is using a quick-set of adhesives from traditional mortar beds. It should be reaching full bonding strength just in a moment of hours.
- In comparison to masonry that is based on wall panels, this particular approach of thin joint has allowed builders to put up and set walls much faster on the construction sites while the thermal performance is being retained. Collaboration with all crew involved is also one of several factors that make the work faster. That is why project management software is being deployed to the work. Real-time collaboration and communication are best achieved using this software tool.

(Fig.111 Thin joint Masonry)

4. Kinetic Football Energy Harvesting

- Integrating alternative energy in numerous forms is considered as one of the huge areas of the latest construction techniques. The harvesting of kinetic football energy is practically involved in placing and setting ground sensors usually in higher traffic areas. These particular areas can store and generate thermal mass-energy that can be taken from pedestrian steps.
- For long-term planning, it is perceived as an innovative way in the integration of more sustainable energy solutions. Basically, the kinetic solutions are being tested as well on roadways and by so far, this innovation has obtained mixed reviews. The implementation or execution of the whole process of harvesting is best monitored through the application of construction management software. All tasks, the assigned crew members, and the overall project itself can be supervised and tracked effectively. Hassles and pressure will be lessened and productivity will be obtained.



(Fig.112 Kinetic Football energy Harvesting)

5. 3D Printed Buildings

- 3D printing technology when being introduced to the industry is streamlining the construction. Today, there are many companies that have started to leverage 3D printing in order to fabricate on-site materials in an almost perfect imitation of factory settings. By doing so, it ultimately decreases reliance towards on extensive supply chains and overall, the project costs will be reduced as well.
- However, today, there have been pretty much changes going on where more extensive use cases have become prevalent. Most of the architectural designs nowadays are being uploaded automatically to 3D printing software. Thus, letting the builders to automate the construction process in an easy way as much as possible. It also widely opens the doors to a much smarter, faster system of development that certainly takes lesser time and effort for all involved parties. It's not really bad for a new building system.

Benefits of Modern Construction Techniques:-

- The faster speed for construction has been considered already as one of the primary benefits offered by these construction techniques. However, there is more of what it can actually offer. Here is a list of other advantages it does offer.

- Insulation – by having and keeping the home for more natural warm temperatures during winter and cooler in the season of summer, when modern building techniques are being applied to the construction of the home, its beneficial impact will affect the people's lifestyle by making it more comfortable.
- Better for the environment – apart from saving money and at the same time making the temperature constantly maintained, this type of technique including the materials used for it are proven to be good towards the environment as it results in much fewer emissions. And if these techniques are being combined with extra energy-savings features, carbon footprints can intensely reduce.
- Lower bills – when a place is very well-insulated, it doesn't require so much of energy to either cool or warm despite if it is necessary. If this is usually the case every single time, it will absolutely result in much lower bills for heating and air conditioning. Remember, at a time when the energy cost is constantly rising, modern building techniques are definitely a sensible option.

For a very long time, there has been a dedicated work towards the development of a fast building technique. But truly the very main goal for such development is that it mustn't compromise the quality or the structural integrity. The arrival of the above-mentioned modern methods and techniques has definitely allowed for this to really happen and become a reality.

In actuality, prefabricated materials are available now. This type of materials is purposely designed for faster construction yet maintaining high-quality infrastructures, buildings, facilities that can firmly withstand the elements. Prefab construction is involved in solid components of the building that is actually being made from a factory environment before getting transported to another location. It is important also to remember that prefabricated materials have been including panelized systems, pods, and volumetric construction for a much faster construction time.

Key Takeaways:-

New innovative techniques and construction methods are constantly changing and challenging everyone to rethink on how to effectively manage projects. And while a few of these advancements haven't quite ready to hit at the market scale, there are always expectations and tendencies that it'll produce developmental effects to the construction industry particularly all project's phases.

(C) USE OF MODERN EQUIPMENT:-

(1) Earth moving:-

Excavators:

For earth work, the commonly used excavators are hydraulic excavators, which work with great efficiency. They consist of a boom, stick (dipper arm), bucket and cab on a rotating platform known as the house that sits atop an undercarriage with tracks or wheels. The undercarriage includes the blade (if fitted), tracks, track frame, and final drives, which have a hydraulic motor and gearing providing the drive to the individual

tracks, and the house includes the operator cab, counterweight, engine, fuel and hydraulic oil tanks. The house attaches to the undercarriage by way of a centre pin, allowing the machine to slew 360° unhindered.

The main boom attached to the house can be one of several different configurations:

- Most are mono booms having no movement apart from straight up and down.
- Some others have a knuckle boom which can also move left and right in line with the machine.
- Another option is a hinge at the base of the boom allowing it to hydraulically pivot up to 180° independent to the house; however, this is generally available only to compact excavators.

Attached to the end of the boom is the stick (called as dipper arm), which provides the digging force to pull the bucket through the ground. The stick length is optional depending whether reach (longer stick) or break-out power (shorter stick) is required. On the end of the stick is usually a bucket with a straight cutting edge used for cleanup and leveling where the material to be dug is soft. A general purpose bucket is generally smaller, stronger, and has hardened side cutters and teeth used to break through hard ground and rocks.

(Fig.113 Excavator)

Trenchers:

Trenchers must be handled with extreme care because they are very dangerous equipments. However, trenchers perform following functions like Landscaping; Irrigation; Plumbing; Underground utility construction for gas, telephone, electrical, and water and sewer services; Special trenching components available to cut through rocky soils, paving and frozen ground etc. Based on the size and usage these can be categorized as chain trenchers, wheel or disc trenchers and bucket trenchers. With attachments like backhoes, saws and reel carriers, trenchers become more versatile and efficient.

(Fig.114 Trenchers)

Loaders:

Loader is a machine usually wheeled that uses a wide tilting bucket on the end of movable arms to lift and move materials such as sand, debris, dirt and mud into other vehicles, thereby clearing rubble and digging materials in the construction sites. The wheeled loaders are more popular and provide better mobility and speed. The flexibility of usage is low as compared to a backhoe. Loaders are largely used as complimentary products for material re-handling in construction and mining applications.

(Fig.115 Loader)

Backhoe Loader:

An important engineering machine which comprises of a small backhoe in the rear end, a tractor, front shovel and replaceable bucket, can duplicate the work of a bulldozer, front end loader and excavator. The backhoe loader also has the advantage of being driven directly to the different job areas. These can also be associated with variety of other instruments like augers, hydraulic hammers, asphalt grinders and grapples.

(Fig.116 Backhoe Loader)

(2) MATERIAL HANDLING:

Lift Truck:

A lift truck is a machine which lifts and transports materials by using forks under the load. These are available in different models and capacities for different working environment and requirement. These are generally powered by an LPG, gasoline or diesel fuelled internal combustion engine or electric motor powered by battery. Counterweight which compensates for the load is at the rear of the machine. Load is lowered, raised and tilted by the mast which is operated hydraulically and consists of a cylinder and interlocking

rails. The applications of lift trucks are lifting and removing of materials to the job sites and in various construction projects like roads, highways, buildings etc

Dumper:

A dumper is usually an open four wheeled vehicle with the load skip in front of the driver. The skip can tip to dump the load; this is where the name "dumper" comes from. They are used to carry loads and materials to the construction sites. A towing eye is fitted for secondary use as a site tractor to tow such things as an air compressor to run pneumatic drills. The main applications of dumpers are in transporting materials to construction sites, in manufacturing and production line.

(Fig.117 Dumper)

Dumper Trucks:

Dumper trucks (also called as Tipper) are those trucks whose contents can be emptied by raising the front end of the platform pneumatically so that the load is discharged by gravity. They are available in various sizes and mainly used in activities such as to clear material wastes from the building construction sites, in road and port construction, to supply materials to the construction sites etc.

Crawlers Dumper:

These are used for the purpose of supplying materials to the construction sites and removing the wastes from the sites. These are mounted on the tracks which allow them to work even in rough terrains. Crawlers dumper too have a box hinged at the rear of the truck which through hydraulic operations lift the front of the dumper and allow the contents to be deposited on the ground behind the truck at the site of delivery. They are used in various construction and engineering projects; in road construction in rough terrain; for the clearance of the sites; for supplying materials to the construction sites; in certain mining operations.

(Fig.118 Crawlers Dumper)

Rail Lorries:

Machine crushed ballast duly phasing out hand broken ballast, is collected alongside the track as per land availability. About 25% of Ballast is collected in depot to truck out with hoppers or ballast Lorries at required locations. In addition, mini depots are created nearby the LCs for loading, leading and dumping using Rail Lorries with shorter lead.

(Fig.119 Rail Lorries)

(3) CONCRETE PRODUCTION:-

Crushing Plants:

Crushing plants are the huge assembly of machines designed to recycle and reprocess the rubbles of buildings, roads, or other materials into commercially sized aggregate for use as base materials or other value-added applications such as ballast for railway track. Crushing plants are either static assemblies or mobile assemblies and consist of different arrays of equipments like screens, pre-screener, intake hopper, magnetic separator, conveyor both undersized and oversized, loading conveyor and crushing units like jaw crusher, cone crusher etc. They find their applications in Road Construction; Building Construction; Construction of over bridges; Construction of pavements and paths etc. There are two types of Crushing Plants.

(Fig.120 Crushing Plants)

Sand Making Machine:

Sand is an important constituent for the construction industry. River sand is generally preferred but sand mining from the river bed and its transportation is not an easy task. Sand making machine fulfills the demand of the construction industry in a substantial manner. The machine consists of feeding hopper, rotopactor, sand screen, conveyors, elevators, electrical prime movers and controls, etc. Rotopactors of varying sizes

are used to crush stone from which sand is obtained. The sand so produced is utilized in the construction of buildings, pavements, streets, roads etc.

Sand Washing Machine:

Sand washer is used to remove the dust in sand. It aims at improving the quality of sand. It is widely used for cleaning materials in the following industries: quarry, minerals, building materials, transportation, chemical industry, water conservancy and hydropower, cement mixture station and so on. Sand washing machinery drives the impeller in the water groove to move like a circle transmitted by electric motor and decelerator and then mixes,overturns, cleans and discharges the sand or slag pellets in the water groove.

(Fig.121 Sand washing machine)

Concrete Block Machine (Stand Type):

Hydraulically operated concrete block machine produces blocks of different types like solid, hollow, paving, tree guard blocks of different shapes and sizes. The tabletop vibrator in machine provides optimum vibration in the mix so that the ratio of cement used can be reduced substantially without affecting the strength of the blocks. The other important equipments used in stand type hydraulically operated concrete block machines are vibratory motor, pump motor, hydraulic levers, hopper and hydraulic filler box etc.

(Fig.122 Concrete Block Machine)

Concrete Batching and Mixing Plant:

A concrete batching and mixing plant is a huge set up of machines meant to combine cement, aggregates such as sand or gravel, and water to form concrete (ready-mixed). These plants are either mobile or stationary and their sizes range from portable mixer to heavy industrial mixing plant. Stationary plant mixer mixes the concrete before it is discharged into a truck mixer. Revolving drums, conveyor and diesel or electric powered engines are used in this plant. The truck mixer is used primarily as an agitating haul unit at a central mix operation. Dump trucks or other non-agitating units are sometimes used for low slump and mass concrete pours supplied by central mix plants. Apart from stationary concrete plant mixer, mobile concrete mixing plant is also very popular and widely used. Mobile concrete mixer plant is a unit mounted on a trailer which carries sufficient unmixed materials, such as cement, sand, coarse aggregates, water, and any chemicals required, for special mix specifications to the job site. In this type of plant

cement, sand and aggregates are carried in separate bins. The materials mixed proportionately are mixed with water and then discharged through the conveyor system.

14.1.4 Engineering Aspects of Environment Impact Assessment

Environmental impact assessment:-

Introduction

- Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.
- UNEP defines Environmental Impact Assessment (EIA) as a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers.
- Environment Impact Assessment in India is statutorily backed by **the Environment Protection Act, 1986** which contains various provisions on EIA methodology and process.

The EIA Process

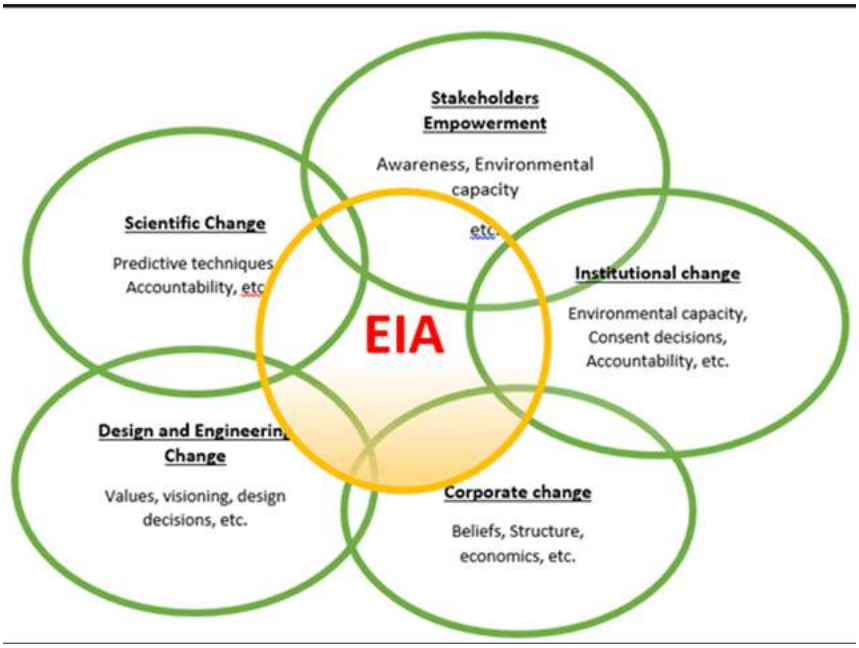
EIA involves the steps mentioned below. However, the EIA process is cyclical with interaction between the various steps.

- **Screening:** The project plan is screened for scale of investment, location and type of development and if the project needs statutory clearance.
- **Scoping:** The project's potential impacts, zone of impacts, mitigation possibilities and need for monitoring.
- **Collection of baseline data:** Baseline data is the environmental status of study area.
- **Impact prediction:** Positive and negative, reversible and irreversible and temporary and permanent impacts need to be predicted which presupposes a good understanding of the project by the assessment agency.
- **Mitigation measures and EIA report:** The EIA report should include the actions and steps for preventing, minimizing or by passing the impacts or else the level of compensation for probable environmental damage or loss.
- **Public hearing:** On completion of the EIA report, public and environmental groups living close to project site may be informed and consulted.

- **Decision making:** Impact Assessment Authority along with the experts consult the project-in-charge along with consultant to take the final decision, keeping in mind EIA and EMP (Environment Management Plan).
- **Monitoring and implementation of environmental management plan:** The various phases of implementation of the project are monitored.
- **Assessment of Alternatives, Delineation of Mitigation Measures and Environmental Impact Assessment Report:** For every project, possible alternatives should be identified, and environmental attributes compared. Alternatives should cover both project location and process technologies.

Once alternatives have been reviewed, a mitigation plan should be drawn up for the selected option and is supplemented with an Environmental Management Plan (EMP) to guide the proponent towards environmental improvements.

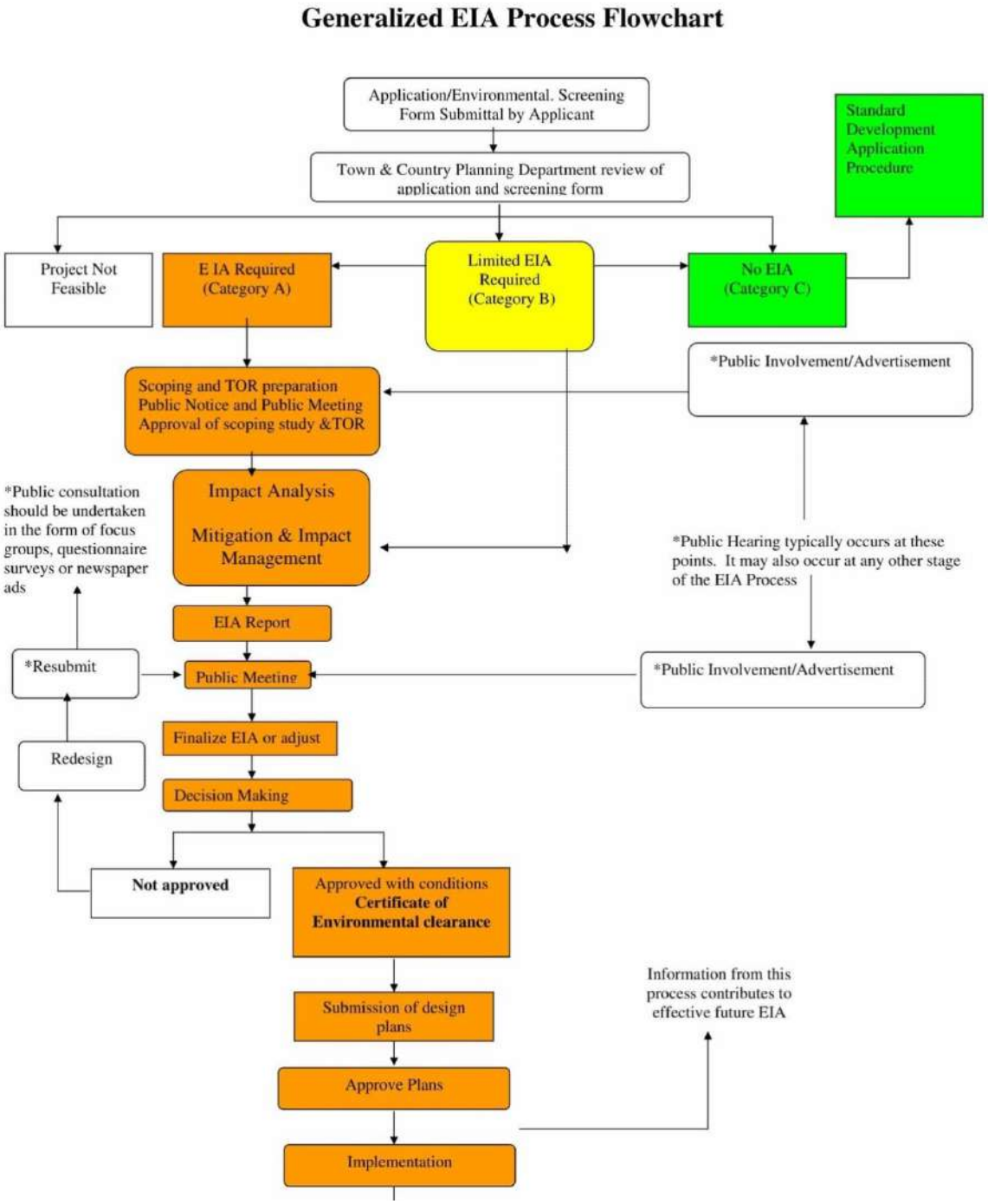
- **Risk assessment:** Inventory analysis and hazard probability and index also form part of EIA procedures.



(Fig.123 Risk assessment)

Stakeholders in the EIA Process

- Those who propose the project
- The environmental consultant who prepare EIA on behalf of project proponent
- Pollution Control Board (State or National)
- Public has the right to express their opinion
- The Impact Assessment Agency
- Regional centre of the MoEFCC



(Fig.124 Generalized EIA process Flowchart)

Importance of EIA

- EIA links environment with development for environmentally safe and sustainable development.
- EIA provides a cost effective method to eliminate or minimize the adverse impact of developmental projects.
- EIA enables the decision makers to analyse the effect of developmental activities on the environment well before the developmental project is implemented.
- EIA encourages the adaptation of mitigation strategies in the developmental plan.
- EIA makes sure that the developmental plan is environmentally sound and within the limits of the capacity of assimilation and regeneration of the ecosystem.

Shortcomings of EIA Process

- **Applicability:** There are several projects with significant environmental impacts that are exempted from the notification either because they are not listed in schedule I, or their investments are less than what is provided for in the notification.
- **Composition of expert committees and standards:** It has been found that the team formed for conducting EIA studies is lacking the expertise in various fields such as environmentalists, wildlife experts, Anthropologists and Social Scientists.

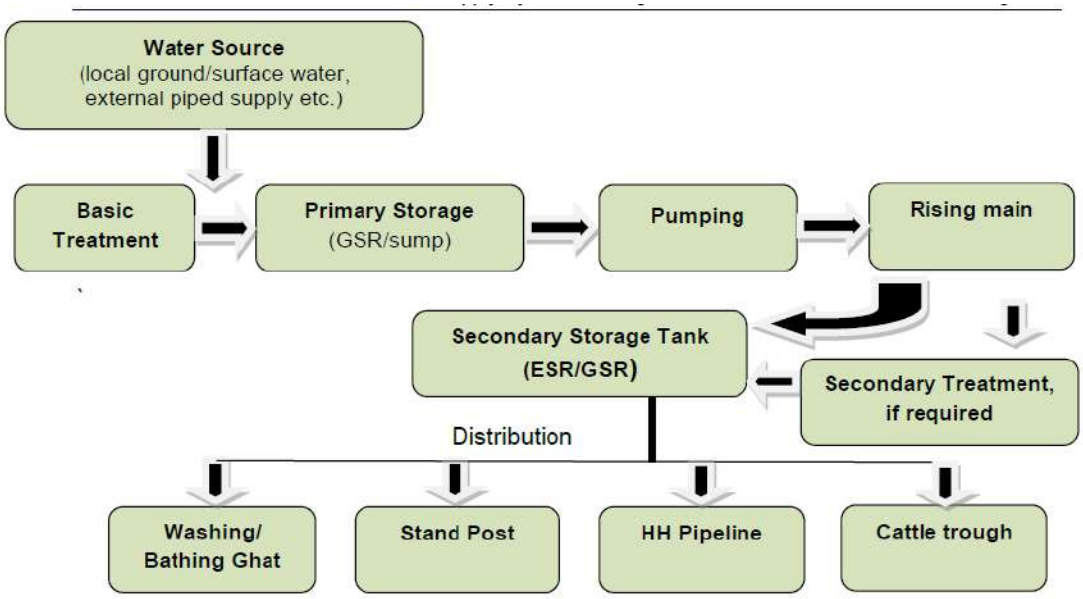
Public hearing:

- Public comments are not considered at an early stage, which often leads to conflict at a later stage of project clearance.
- A number of projects with significant environmental and social impacts have been excluded from the mandatory public hearing process.
- The data collectors do not pay respect to the indigenous knowledge of local people.
- **Quality of EIA:** One of the biggest concerns with the environmental clearance process is related to the quality of EIA report that are being carried out.
- **Lack of Credibility:** There are so many **cases of fraudulent EIA studies** where erroneous data has been used, same facts used for two totally different places etc.
- Often, and more so for strategic industries such as nuclear energy projects, the EMPs are kept confidential for political and administrative reasons.
- Details regarding the effectiveness and implementation of mitigation measures are often not provided.
- Emergency preparedness plans are not discussed in sufficient details and the information not disseminated to the communities.

14.1.5 Water Supply – sewerage system – waste water – suitable development techniques

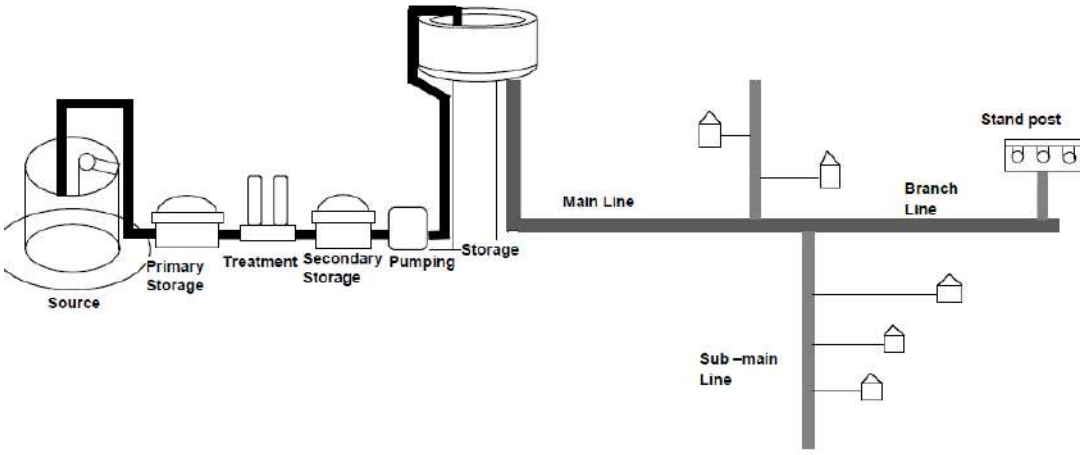
1. Water supply system:-

Components of water supply system:-



(Fig.125 Water Supply system)

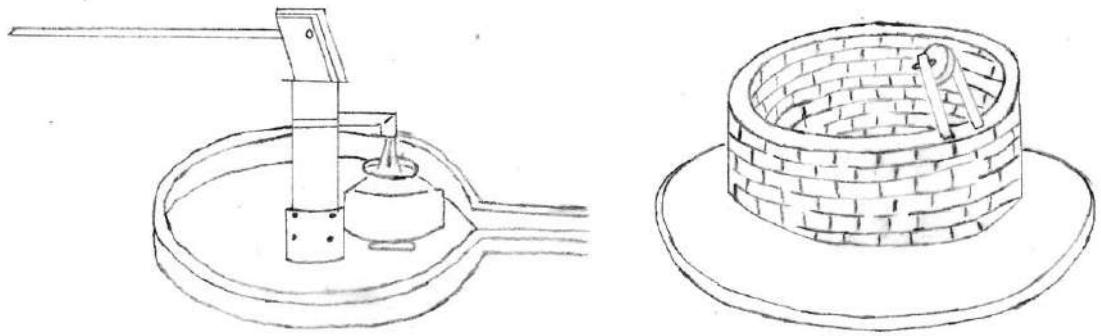
Sources	Open Well, Tube Well, Hand pump, Pond, Dam Site, External Pipe Supply, Rain Water Harvesting System/Tank
Village/town level Treatment	Reverse Osmosis System (RO), Chlorination, Sedimentation, Sand Filter, etc.
Storage	Elevated Surface Reservoirs (ESR), Ground Service Reservoirs (GSR), Sump
Distribution	Main Line, Sub-Main Line, Branch Pipe Line, Household Level Tape, Stand Post, Washing Unit.



(Fig.126 Water distribution system)

1. Sources of water:-

Ground water: Open well, tube well/bore well, hand pump are sources which make water available from ground.



(Fig.127 Hand pump and open well)

Open Well: Where ground water is available at low depth (less than 15 meters - and water is available all year round, open well is used.

Hand Pump: Where safe ground water is available up to 60 m depth, hand pump is ideal choice for a cluster or habitation.

Bore Well/Tube Well: Where ground water is at greater depth and open wells or hand pumps are not viable, bore well or tube well is installed.

Surface Water: River, pond, dam site are sources where surface water is available.

Moreover, rain water can be harvested and stored directly in storage tanks. This water is potable after first rain and can be used for drinking purpose also.

Classification of Water based on its Availability

A. Local Source: Sources which are available at village/town level like river, pond, open wells and bore wells.

B. Distant Source: When perennial reliable and safe source is not available, pipeline from distant sources can be laid. This bulk water is available from river, pond, dam, bore wells or storage tank itself, where water is available.

2. Water treatment:

- Water from source is treated at village level and even at household level, if needed. If bulk water available from the distant source is treated and potable, then further treatment may not be required at village level. There are various processes of treatment based on the source and quality of water in specific region.
- Village/town level water treatment systems are located mainly near head works. The treatment units are located in such a manner, where possible that flow of water from one unit to other can be done by gravity, so that additional pumping of water is not required. Sufficient area should be reserved near the treatment units for further expansion in future. Basic treatment system at village/town level involves removal of suspended solids through sedimentation, removal of micro-organisms and colloidal matter through sand/gravel filters, water softening through reverse osmosis (RO) system, disinfection through chlorination and any other chemical/specialized treatment for removal of fluoride, salinity etc.
- Treatment at household level is needed as there may be chances of water contamination while transmission of water. This mainly includes basic filtration for removal of any silt, etc.; boiling for removal of micro organisms or chlorination for disinfection.
- It is very important to carry out water test in order to decide upon the type of treatment. It is also essential to carry regular water testing from various points starting from source to distribution points to maintain potable water quality.

3. Water Supply Mechanism:-

- For efficient distribution, it is required that water should reach end use with required flow rate with needed pressure in the piping system. There are three main types of distribution system that can be adopted in villages/towns:

Gravity Fed Distribution

When the ground level of water source/storage is sufficiently raised than the core village/town area, such system can be utilized for distribution. The water in the distribution pipeline flow due to gravity and no pumping is required. Such system is highly reliable and economical.

Pumping System
In such system, water is supplied by continuous pumping. Treated water is directly pumped into the distribution main with constant pressure without intermediate storing. Supply can be affected during power failure and breakdown of pumps. Hence, diesel pumps also in addition to electrical pumps as stand by to be maintained. Such system works only in condition where there is continuous power supply, reliable water source and where intermediate storage system cannot be installed.

Dual/Combination
In such system, both gravity as well pumping systems are used. Such systems are used where there are variations in topography in town/village.
Minimum Residual Pressure in a distribution system should be 7 m for single storied, 12 m for two storied and 17 m for three storied building

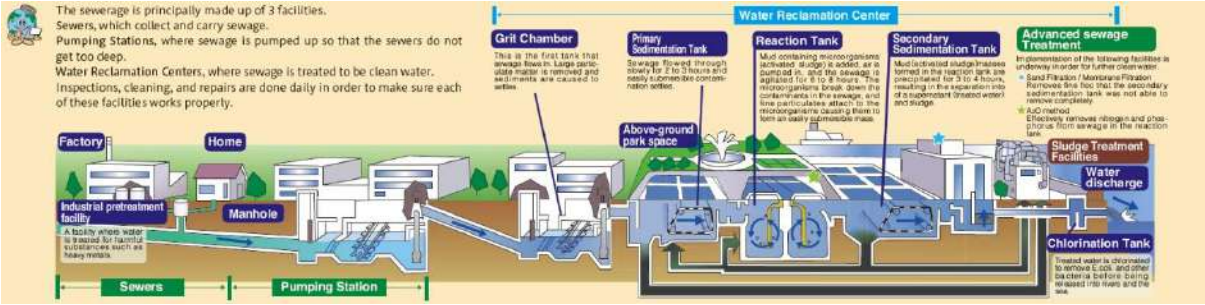
4. Type of water supply:-

A. Continuous
In this system, there is continuous water supply (for 24 hours). This is possible where adequate quantity of water is available. The major advantage of such system is that due to continuous water supply, water remains fresh and rusting of pipes will be low. However, losses of water will be more in case of any leakage.

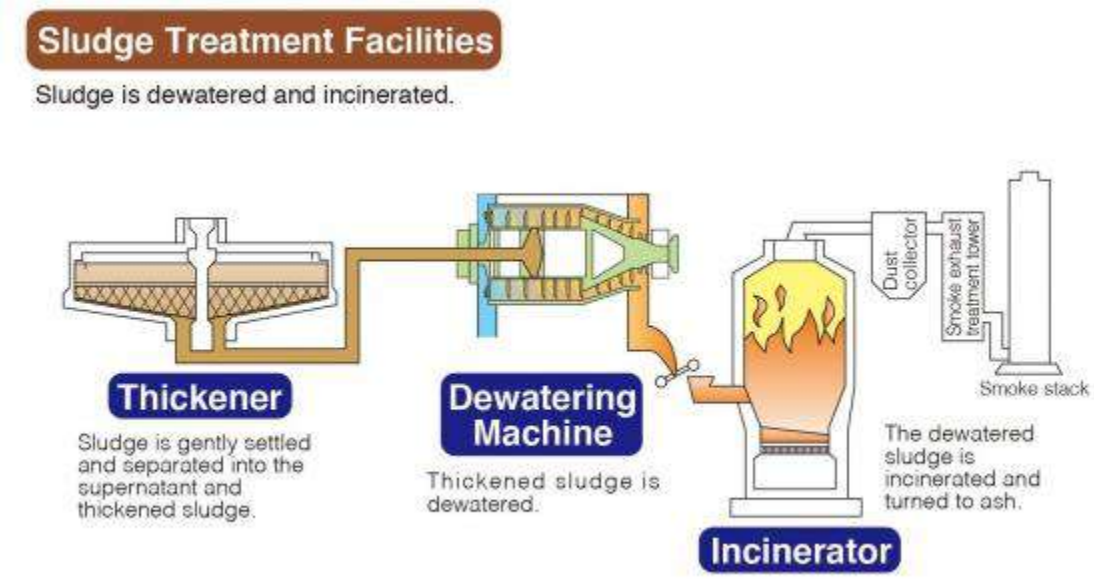
B. Intermittent
In such system, supply of water is either done in whole village/town for fixed hours or supply of water is divided into zones and each zone is supplied with water for fixed hours in a day or as per specified day. Such system is followed when there is low water availability, however, in certain cases, wastage of water is more due to tendency of community for storing higher amount of water than required. In such system, pipelines are likely to rust faster due to wetting and drying. However, maintenance can be easily done during no-supply hours.

Water sewerage system:-
A **sewerage system**, or wastewater collection **system**, is a network of pipes, pumping stations, and appurtenances that convey sewage from its points of origin to a point of treatment and disposal.

COMPONENTS OF SEWARAGE SYSTEMS:



(Fig.128 Components of sewage system)



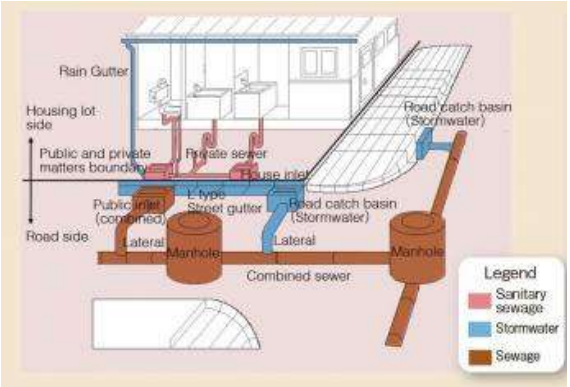
(Fig.129 sludge treatment facilities)

Types of sewerage system:-

"Sewage" consists of both sanitary sewage from households and factories and storm water. There are two types of collection system, combined and separate sewer systems.

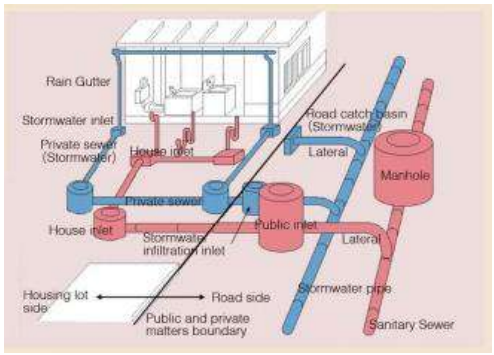
In the combined system, sanitary sewage and storm water are collected to the same sewers and transported to a water reclamation center. On the other hand, in the separate system, sanitary sewage and storm water are collected to the separate sewers. Sanitary sewage is sent to water reclamation centers and storm water is discharged directly to rivers and the sea.

Combined sewer systems:-
Sanitary sewage and storm water are collected in the same sewers.



(Fig.130 Combined sewer system)

Separate sewer systems:-
Sanitary sewage and storm water are collected in separated sewers.



(Fig.131 separate sewer system)

Sustainable development techniques:-

Waste water treatment: - Wastewater treatment is the process of cleaning the sewage and domestic water by removing contaminants in the form of organic matter. It is done so to improve the quality of water so that humans and animals can consume it and make use of it for other purposes.

Methods of cleaning the wastewater:- There are three different methods for wastewater treatment.

1. Biological Water Treatment:-
When the water is used for drinking or cleaning, it should be cleaned so that there are no contaminants in it which can affect the human health. For this purpose, biological water treatment is used in which microorganisms especially bacteria play an important role.

They decompose the wastewater biochemically or they break down the organic material and improve the quality of water so that it can be used domestically. Biological water treatment is divided into three categories that are aerobic, anaerobic and composting. -
Aerobic process:- In this process, bacteria degrade or eat the organic matter and convert it into carbon dioxide which can be used by plants for their growth. Oxygen is used during aerobic process.
Anaerobic Process:- In this process, fermentation process is used to ferment the sludge or waste at a specific temperature. Oxygen is not used in this process.
Composting:- It is the type of aerobic process in which in the presence of oxygen, sludge is mixed with sawdust or other carbon sources. In this way, wastewater is treated. Every day, wastewater or sewage is produced. It is produced when waste of factories is thrown in the lakes and ponds; it makes the water dirty and unhealthy for human use as well as for the water creatures like fish. Sewage is also the wastewater produced at home. It is necessary to treat this water effectively to use it for drinking. Before it's used for drinking or other environmental purposes, it should be transferred to the sewage treatment plants with great care because if there is leakage in the pipe, it will damage the clean water and soil. It is necessary to clean the wastewater otherwise it will become a source of causing diseases in humans.

2. Physical Water Treatment:-

In this method physical methods are used in cleaning the wastewater and making its quality better. In this method, no chemicals are biological processes are involved. There is a prominent method for physical water treatment called **sedimentation**. Sedimentation is a process of suspending out the insoluble heavy particles from the wastewater. This method is best for purifying the water. When the insoluble materials settle down at the bottom of the water, pure water is removed. Another method which can be used for physical water treatment is called as **aeration**. In this process air is circulated through the water to provide oxygen to it. It is also an effective method of cleaning the wastewater. Another method **filtration** is used to filter out the contaminants. Special kinds of filters are used to pass sewage or wastewater due to which the insoluble particles or contaminants are separated. The most commonly used filter is the sand filter. Some wastewaters contain grease or oil on their surface; they can also be removed from the surface easily.

3. Chemical Water Treatment:-

As the name shows, to clean the water or sewage, chemicals are used. Most commonly used chemical is **chlorine** and the method in which chlorine is used called as **chlorination**. Chlorine is the oxidizing chemical used to kill the bacteria which decomposes water by adding contaminants to it. Another oxidizing disinfectant called as **ozone** is used to purify the wastewater. These chemicals are very useful as they disallow the bacteria to reproduce in the water thus making the water pure. When the **treatment of industrial wastewater** is concerned then a special method is used called **neutralization.**

A base or acid is added to the water to level its pH. Lime is the base which is most commonly used in the acidic wastewaters. Metals which have more than one valence are most commonly used chemicals in the chemical wastewater treatment. There are some methods of purifying sewage and wastewater which are used in both physical and chemical water treatments. Carbon usage is the best example which has the ability to absorb harmful substances from the wastewater

14.2 Electrical Engineering

14.2.1 Design of Power Electronics converter

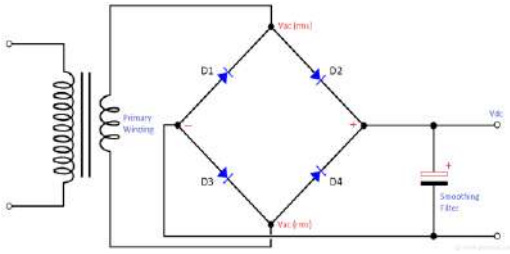
What is power converter?
It is an electromechanical device for converting electrical energy. A power converter can convert DC into AC and vice versa.

Types of converter:
(1) AC to DC (Converter) (2) DC to AC (Inverter)
(3) AC to AC (4) DC to DC (Chopper)

- AC to DC called rectifier or converter. Its convert AC into DC.
- DC to AC called inverter. Its convert DC to AC current.
- AC to AC called Cyclo converter. It converts AC of desired frequency or desired voltage magnitude from a line AC supply.
- DC to DC called chopper. Its convert variable DC to constant DC.

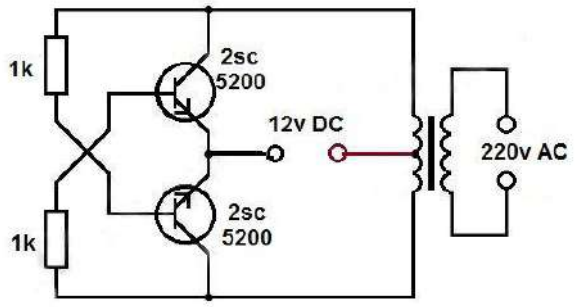
Other converter:
Phase converter, Frequency converter, Voltage converter, Current converter, Reactive power converter

AC to DC Converter (Rectifier):



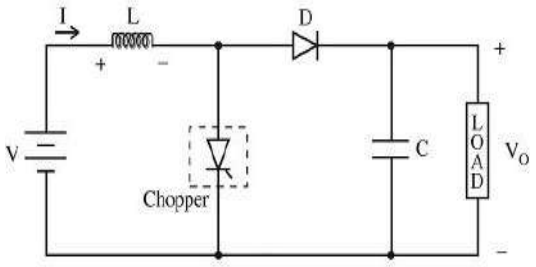
(Fig.132A Rectifier)

DC to AC Converter (Inverter):



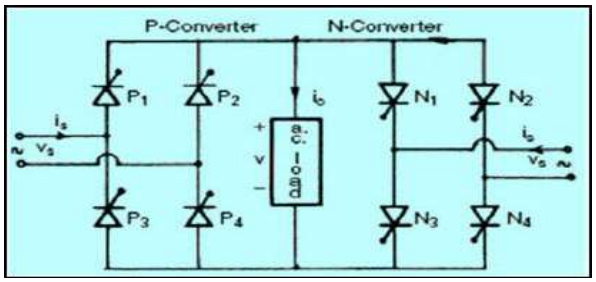
(Fig.132 Inverter)

DC to DC Converter (Chopper):



(Fig.133 Chopper)

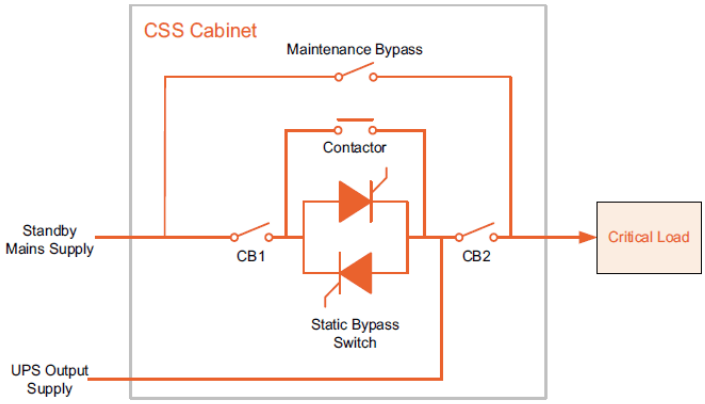
AC to AC Converter (Cyclo Converter):



(Fig.134 Cyclo Converter)

Case Study:

It is used in static switches. There was a part of Uninterruptible Power Supply (UPS). There were 2 lines. Line 1 is from AC mains and Line 2 is a battery backup from line 2. Emergency power to load from battery inverted and then it's fed from isolation transformer. "The supply to the switches can be DC or AC". These switches is called static switch.



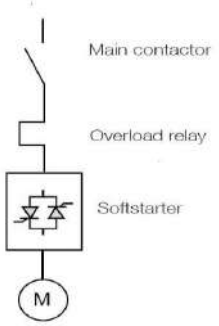
(Fig.135 UPS static bypass switch)

So for rural development, in agricultural activities where Uninterruptible Power Supply is needed when we use these type of switch used for better result. These are a very good for smooth electricity.

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

Nowadays induction motor uses more and for starting of induction current there was 10 times higher current flow. And reduce this inrush current, used soft starter. Also it's limiting torque. It's helped in extend motor life, reduce motor heating and protect the equipment. It's give very soft start to the motor.

Emerson control techniques soft starter have used for long time for providing controlled starting and stopping AC motor. It's price also less than others.



(Fig.136 Block diagram of soft starter)

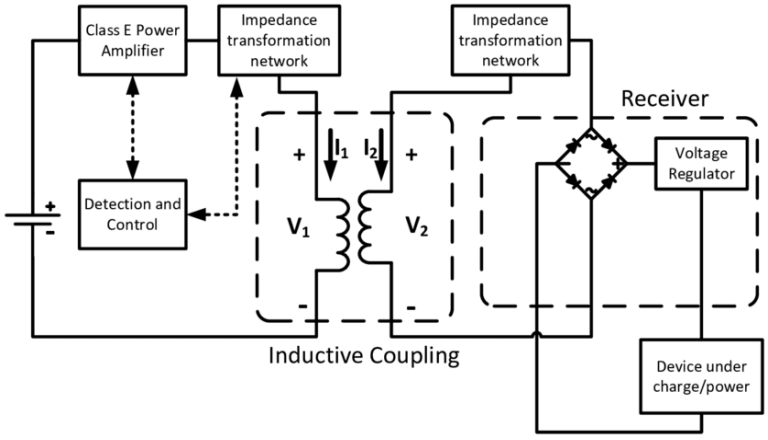
Soft Starter Application:
Dust collector, Water supply system, Heavy load conveyor system, Textile industry, Cement industry, Sugar plant, In industrial application have a high inertia load and its high inrush current so the soft starter is ideal for controlling.

Types of starter:
Manual Starter, Magnetic Starter, Direct Online (DOL) Starter, Stator Resistance starter, Rotor Resistance or Slip Ring Motor Starter, Autotransformer Starter, Star Delta Starter Soft Starter, Variable Frequency Drive (VFD)

Advantages of soft starter:
Easy operation, smooth starting by torque control, Reduce starting current, Improve efficiency, Low cost and size

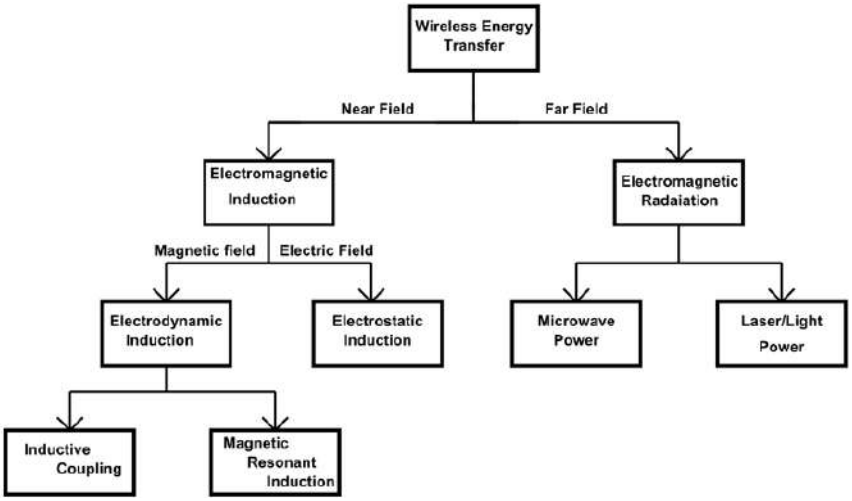
Disadvantages of soft starter:
It's not used for speed control

14.2.3 Advanced Wireless Power transfer system



(Fig.137 Wireless power transfer system circuit diagram)

Given input supply, AC to DC convert from supply and then DC to AC converted then its connected with transformer and its primary coil and secondary coil are mutually coupled and transfer the power and it's connected with our appliance.

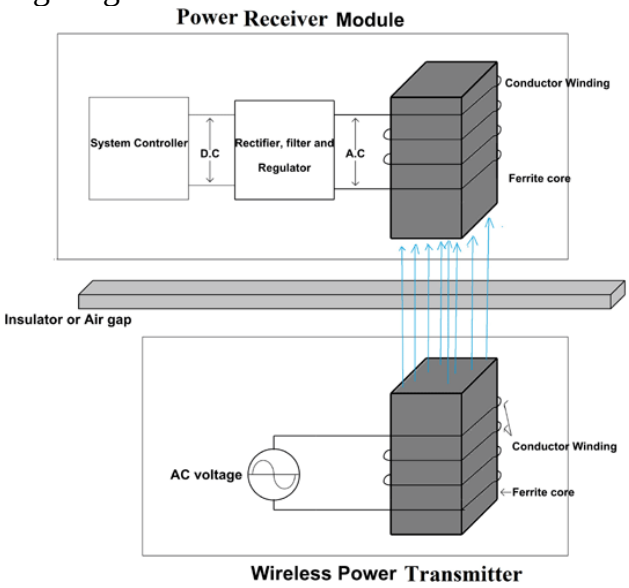


(Fig.138 Block diagram of wireless power transfer system)

Different techniques to wireless power transfer. :

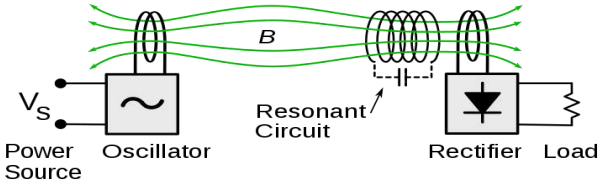
Inductive coupling:

It is based on mutual induction. There was no physical connection between two coils. Both the coil is connected without wires. It is important technique for future aspects because of its "reliability and simplicity ". Use of This type of technique in nowadays in laptop, cell phone charging. But it has also Disadvantages is the "Range ". It's work for smaller range not for long range.



(Fig.139 Wireless power transmitter)

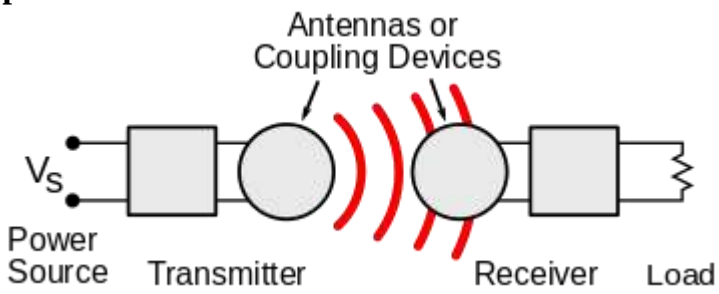
Magnetic resonance coupling:



(Fig.140 Magnetic resonance coupling)

These types of coupling are based on the concept of resonance. In resonance natural frequency and excitation frequency same. Here some distance between two coil increases. The advantage of this type of technique its efficiency increases with reduces power loss. Disadvantages are that can be not used for long range.

Microwave wireless power transfer:



(Fig.141 Microwave wireless power transfer)

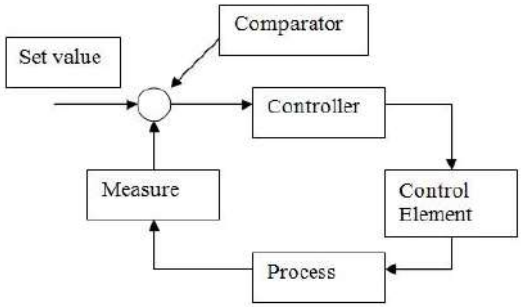
It is used for several kill meters with transfer “high amount of power." Disadvantages is that the radiation coming out its harm to human being.

Laser wireless power transfer:

Here power transfer through the laser beam. By the use of Photovoltaic cell the laser beam converted into electricity. It's laser beam harm to human so it’s not used. In space and military more use of Laser beam. 1.

14.2.4 Industrial Temperature Controller

Basic structure of temperature controller



(Fig.142 Block diagram of temperature)

Types of Controller:
Ana log, Limit, General purpose temperature controller, Valve motor drive, Profile Multi-loop

Working:

In temperature controller, if temperature set at 60 degree Celsius. Temperature Controller load connector is on till 60 degree Celsius. When temperature goes above 60 degree Celsius the contactor connected with motor is on so blower can reduce the temperature of machine and when temperature comes below 60 degree Celsius the load contactor again on and motor contactor is off.

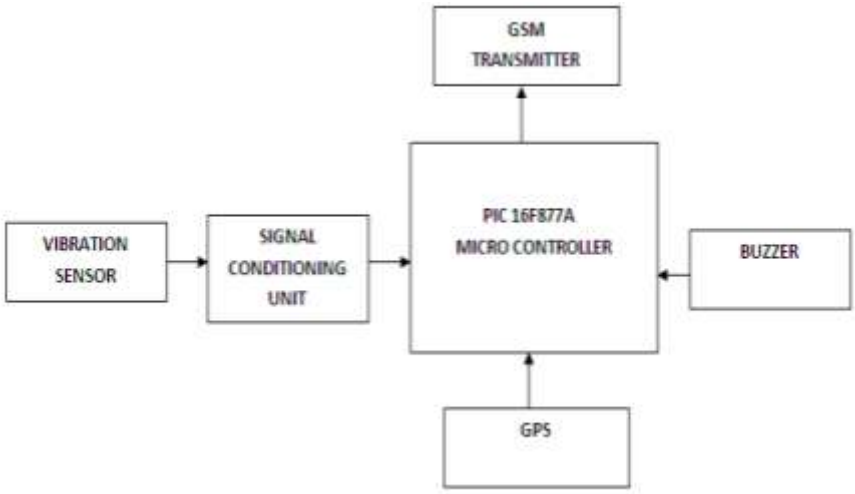
14.2.5 Accident Alerts in modern traffic signal control system – camera surveillance system

Abstract:

- This project is developed for the users to have accident alert in modern traffic system. This device can be used in highly accidental area and pin drop curves to avoid accidents.
- It consists of two transmitters and two receivers. One transmitter is connected first (One arm of the curve) and a receiver is fixed just opposite to the transmitter. The other transmitter is connected at the same side (Other arm of the curve) and the receiver is fixed just opposite to the second transmitter.
- When the vehicle passes the first transmitting and receiving unit (One arm of the curve), it senses that one vehicle is crossing. When it crosses the second unit (Other arm of the curve), it also senses. The microcontroller unit calculates the speed=displacement/time taken.
- If the speed exceeds the particular value, it sends signal to the other side vehicle to be alert. It also alerts the other side vehicle when someone crosses one side. Also it captures the high speed vehicle. Thus the high speed vehicle can be traced easily.
- This project is very much used in traffic controller. It is very accurate and cost effective.

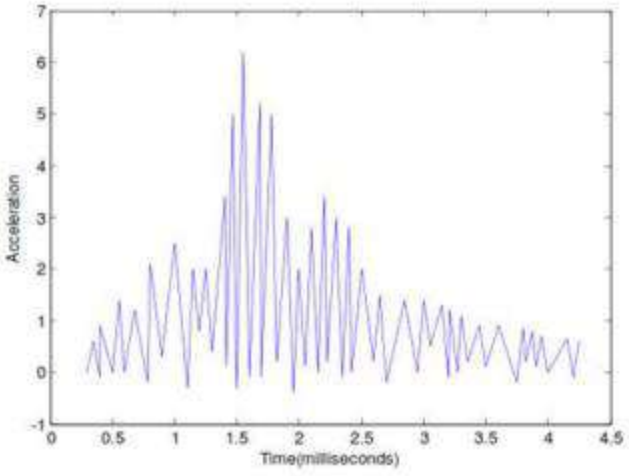
Proposed System:
In proposed system if a vehicle has met accidents, immediately an alert message with the location coordinates is sent to the Control centre. From the control centre, a message is sent to the nearby ambulance. Also signal is transmitted to all the signals in between ambulance and vehicle location to provide RF communication between ambulance and traffic section. The vehicle accident observed using vibration sensor and in the control section it is received by the microcontroller and then the nearby ambulance is received

from the PC and controller sends the message to the ambulance. The signal to Traffic signal section is transmitted through RF communication. Also if any fire occurs, it is detected using fire sensor and an alarm message is directly sent to the fire station.
Block Diagram:



(Fig.143 Block diagram of accident alerts modern traffic system)

Vibration Sensor:
According to our system, every vehicle should have a vehicle unit. The vehicle unit consists of a vibration sensor, Microcontroller, a user interface, GPS system and a GSM module. There is need to process the low level voltage signal properly given by vibration sensor. We can use multiple sensors for detection of accident to avoid any error in detection. These sensors can be installed in vehicle body at most vibration sensitive locations. A central system can be implemented inside vehicle to process the signal coming from sensors and to detect the accident from the signals coming from multiple sensors.



(Fig.144 Vibration sensor graph)

GPS (Global Positioning System):
It stands for "Global positioning system". It is having 24 satellites it will transmit the coded information. These 24 satellites will rotate one time over the earth in every 12 hours. In order to provide the information about velocity, time etc… GPS will help us

identify the distance between the two different places on the earth and it will show the route to reach the required destination. Figure shows the GPS module. There are three different segments in GPS they are:

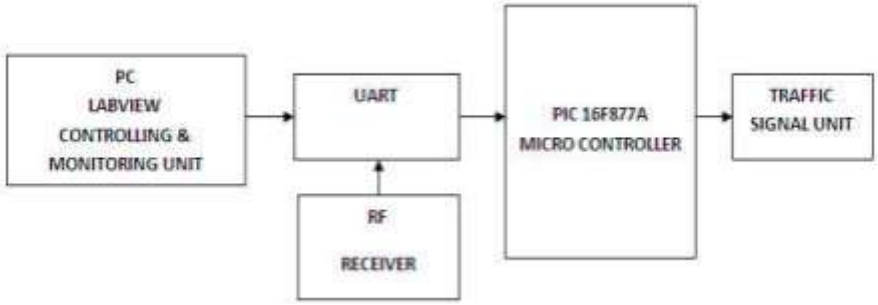
1) Space segment 2) Control segment 3) User segment

When satellites transmit information and each satellite will have a different code and it also transmit information at different frequencies so that the GPS can discriminate with the different signal received by the different satellites. This condition will help to calculate the time taken to travel the distance between the satellite and the GPS receivers and then the travel time is multiplied by the light speed gives the distance between the satellite and the GPS receiver The control segment will identify the satellite and it will guide with the proper orbit and proper time taken by the satellite to reach the GPS.

(Fig.145 GPS Model)

It is having four unmanned station with single master control station. These unmanned stations will receive the information from different satellites and this information is send to the master station and this is send to the GPS satellite. The user segments consist of users and the GPS receivers. Working of GPS: When a GPS receiver is started to work, firstly it will start to download the orbit information about each and every satellite to download this information it will take around 12.5 min once this information is completely downloaded it will be stored in the receivers in order to use further. The GPS knows the exact location of the satellite but still it needs to know the exact distance between the satellite and the receiver. This distance can be calculated by the receiver, by multiplying the time taken by the signal to reach the receiver and the velocity of the transmitted signal. But the receiver already knows the velocity which is 18600 miles/ sec.

Block Diagram of Traffic Unit:



(Fig.146 Traffic Block diagram)

Whenever the ambulance reaches near to the traffic signal(approximately 100m), the traffic signal will be made to green through RF communication. Thereby the ambulance is recommended to reach the hospital in time.

System Implementation:

Our system consists of three main units, which coordinates with each other and makes sure that ambulance reaches the hospital without any time lag. Thus our system is divided into following three units,

(1) The Vehicle Unit:

The vehicle unit installed in the vehicle senses the accident and sends the location of the accident to the Controller According to our system; every vehicle should have a vehicle unit. The vehicle unit consists of a vibration sensor, controller, siren, a user interface, GPS system and a GSM module. The vibration sensor used in the vehicle will continuously sense for any large scale vibration in the vehicle. The sensed data is given to the controller GPS SYSTEM inside the vehicle. The GPS SYSTEM finds out the current position of the vehicle (latitude and the longitude) which is the location of the accident spot and gives that data to the GSM MODULE. The GSM MODULE sends this data to the control unit whose GSM number is already there in the module as an emergency number.

(2) Control Unit:

The controller finds the nearest ambulance to the accident spot and also the shortest path between the ambulance, accident spot and the nearest hospital. The controller then sends this path to the ambulance. Also using this information the controller controls all the traffic signals in the path of ambulance and makes it ready to provide free path to ambulance, which ensures that the ambulance reaches the hospital without delay. At the same time, the ambulance unit turns ON the RF transmitter. This will lead to communicate with the traffic section.

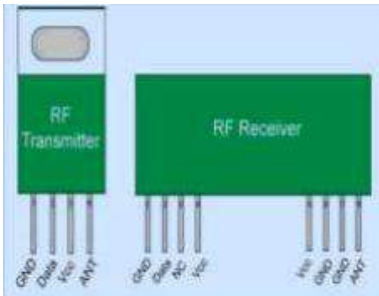
(3) Traffic unit:

Whenever traffic signal section receives the information about accident, the RF receiver in this section is turned ON to search for ambulance nearing the traffic signal. Whenever the ambulance reaches near to the traffic signal(approximately 100m), the traffic signal will be made to green through RF communication. Thereby the ambulance is recommended to reach the hospital in time.

Transmitter and Receiver Unit:

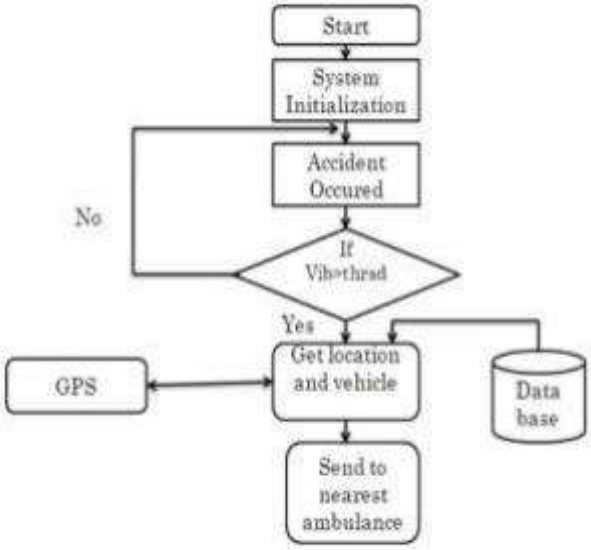
In generally, the wireless systems designer has two overriding constraints: it must operate over a certain distance and transfer a certain amount of information within a data rate. The RF modules are very small in dimension and have a wide operating voltage range i.e. 3V to 12V.

Basically the RF modules are 433 MHz RF transmitter and receiver modules. The transmitter draws no power when transmitting logic zero while fully suppressing the carrier frequency thus consume significantly low power in battery operation. When logic one is sent carrier is fully on to about 4.5mA with a 3volts power supply. The data is sent serially from the transmitter which is received by the tuned receiver. Transmitter and the receiver are duly interfaced to two microcontrollers for data transfer. Figure 3 shows the Pin Diagram of RF Transmitter and Receiver.



(Fig.147 Transmitter and receiver)

Flowchart:



(Fig.148 Flowchart of accident alert system)

Automatic accident detection using sensors, location tracking using GPS, sending location coordinates to ambulance, finding exact spot of accident using GPS viewer application, starting of rescue operation and traffic signal monitoring using RF transmitter and receiver all these steps are executed according to response of the circuit.

CHAPTER: 15

Smart and/or suitable features of chapter 8 & 13 design, impact on society

With the smart village development concept as per idea and Village visit, modern technology with innovation
With doing small changes, period, amount expenditure and benefits –
A) Immediately B) With 1 year C) Long Term (3-5 years) along with cost estimation

A) Immediately

1. Dispensary
Dispensary for animals is beneficially for the villagers who have animals and don't need to transport in town for animal sickness
2. Bus stop
For the people who transport in town bus stop is used for waiting for transportation vehicle
3. Public Library
Villagers can read newspaper and students who live in village go for reading in library.
4. Agro Storage
Villagers can good fertilizer and hybrids for good framing
5. E - Seva Kendra
Villagers Aadhar update facilities, banking, Mobile recharge, DTH recharge, etc.

B) With 1 year

1. Rain water harvesting system
In rainy season tank of harvesting system is full by water and this water is used whole year for drinking and solving the problem of lack of drinking water.
2. Public toilet
By using of public toilet by villagers either in use of open place, hygiene condition of village can be improve and villagers or outers people can used it anytime.
3. Post office
Post office is used for multipurpose not only for post a card; villagers can use it for postcard, buying stamp paper etc. without going in town.
4. Recreation Garden
Garden is best place to enjoy environment for all the age group of people living village also it is gives happiness and good amount of oxygen to breath.

C) Long term (3-5 years)

1. Bio-Gas plant

Bio – gas will be a future prospective development and a public mind changing Environment

2. Open Air Theater

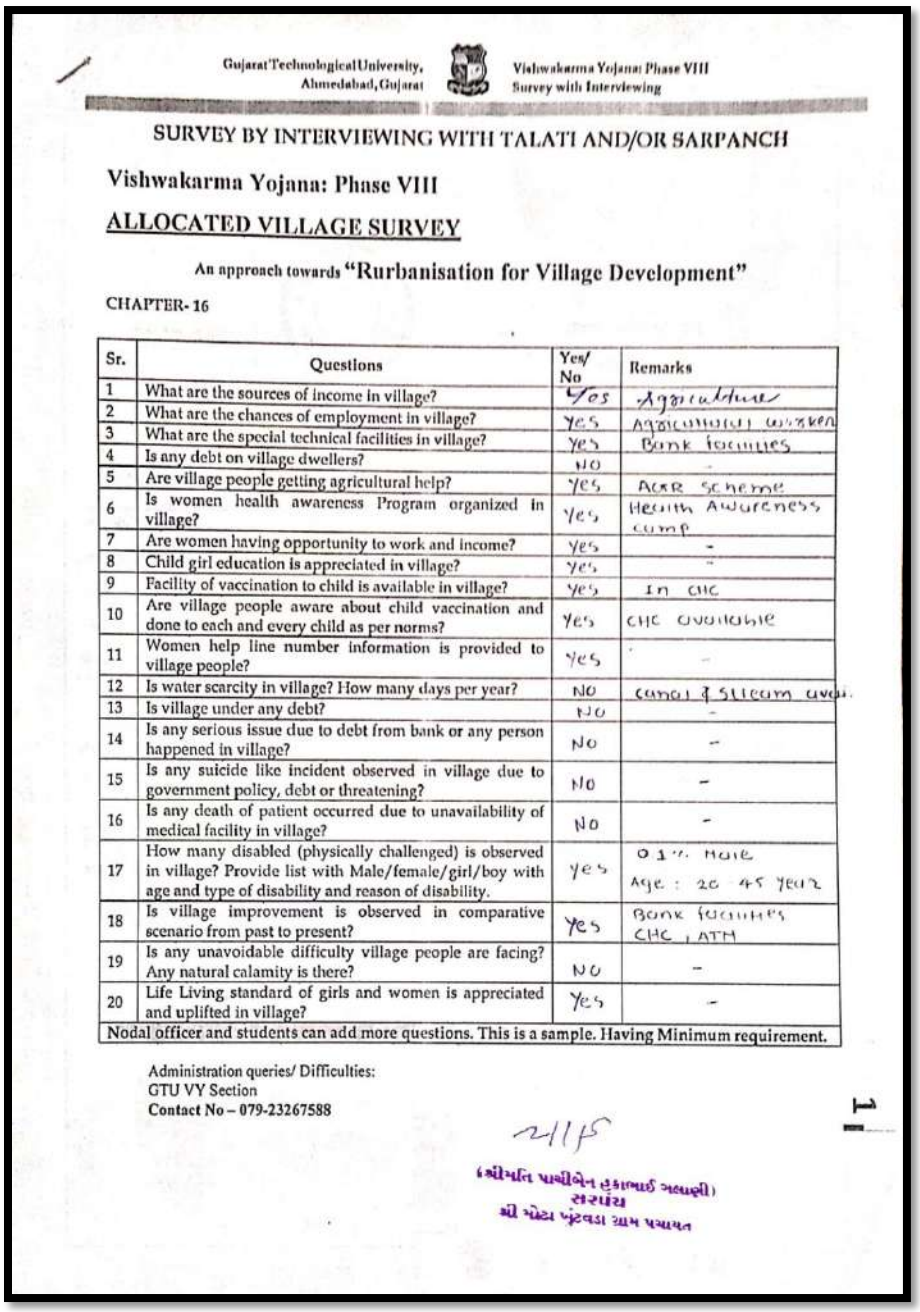
This type of theatre is low cost and maintains point of view for smart village

Sr. No.	Design Name	Period	Amount Expenditure	Benefit
1.	Dispensary	1 to 2 Year	4,14,000/-	Animal sickness
2.	Bus Stop	1 Year	13,88,390/-	Waiting place for villagers for vehicle
3.	Public Library	Up to 1 year	19,84,203/-	For reading of villagers
4.	Agro Storage	1 year	1,078,041/-	For good fertilizer
5.	E – Seva Kendra	Up to 1 year	5,32,780/-	For banking, mobile recharge, aadhar service
6.	Rain water Harvesting	3 to 5 month	18,500/-	Storing of drinking waste in rainy season.
7.	Public Toilet	6 to 9 month	3,44,000/-	Used by villagers or outer people tor toilet
8.	Post Office	2 to 3 Year	10,74,900/-	Post office work
9.	Recreation Garden	1 to 2 Year	1,16,600/-	For play and refreshment and happiness
10.	Bio-gas plant	Up to 1 year	5,35,850/-	Financial as well as environment welfare
11.	Open Air Theater	2 to 3 Year	81,130/-	Enjoyment for everyone

(Table 56 Cost table of all design)

CHAPTER: 16

Survey by Interviewing with Talati And/or Sarpanch



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Survey with Interviewing

SURVEY BY INTERVIEWING WITH TALATI AND/OR SARPANCH

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

CHAPTER- 16

Sr.	Questions	Yes/ No	Remarks
1	What are the sources of income in village?	Yes	Agriculture
2	What are the chances of employment in village?	Yes	Agricultural worker
3	What are the special technical facilities in village?	Yes	Bank facilities
4	Is any debt on village dwellers?	NO	-
5	Are village people getting agricultural help?	Yes	ACAR scheme
6	Is women health awareness Program organized in village?	Yes	Health Awareness camp
7	Are women having opportunity to work and income?	Yes	-
8	Child girl education is appreciated in village?	Yes	-
9	Facility of vaccination to child is available in village?	Yes	In CHC
10	Are village people aware about child vaccination and done to each and every child as per norms?	Yes	CHC available
11	Women help line number information is provided to village people?	Yes	-
12	Is water scarcity in village? How many days per year?	NO	canal & stream avai.
13	Is village under any debt?	NO	-
14	Is any serious issue due to debt from bank or any person happened in village?	No	-
15	Is any suicide like incident observed in village due to government policy, debt or threatening?	No	-
16	Is any death of patient occurred due to unavailability of medical facility in village?	No	-
17	How many disabled (physically challenged) is observed in village? Provide list with Male/female/girl/boy with age and type of disability and reason of disability.	yes	01 Male Age : 20 45 years
18	Is village improvement is observed in comparative scenario from past to present?	Yes	Bank facilities CHC, ATM
19	Is any unavoidable difficulty village people are facing? Any natural calamity is there?	No	-
20	Life Living standard of girls and women is appreciated and uplifted in village?	Yes	-

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

Administration queries/ Difficulties:
GTU VY Section
Contact No – 079-23267588

2/1/5

(શ્રીમતિ પારૂલબેન હુકાભાઈ ચાવડા)
સરપંચ
શ્રી મોટા ખૂંટવડા ગ્રામ પંચાયત

1

CHAPTER: 17

Irrigation / Agriculture Activities and Agro Industry, Alternate Techniques and solution

- **Sprinkler Irrigation Method**

  In the sprinkler irrigation method, water is applied to the land in the form of a spray. It resembles a light rainfall in the form of a drizzle. The sprinkler irrigation is also sometimes called overhead irrigation. The greatest advantage of sprinkler irrigation is its adaptabilities to use under conditions where surface irrigation methods are not efficient.

  This method is more useful under following situations:

(i) The land cannot be prepared for surface methods.
(ii) Topography is irregular
(iii) Slopes are excessive
(iv) Soil is erosive
(v) Soil is excessively permeable or impermeable
(vi) Depth of soil is shallow over gravel or sand

In this system, the cost of land preparation and permanent water delivery system of channels or conduits is less. However, there is large initial investment in the purchase of the pumping and sprinkler equipment.

Components of a sprinkler irrigation system:

A sprinkler irrigation system consists of the following main components:

1. Pumping Unit
2. Main delivery pipes
3. Laterals
4. Sprinklers
5. Other accessories

1. Pumping unit:

- The pump lifts water from a water sources and supplies it to the main pipe line.
- Normally, to lift water from a depth up to 5.0m single stage centrifugal pump is required.

2. Main delivery pipes:

- These are usually buried in the ground.
- They are made of concrete, asbestos, cement, G.I., plastic or C.I. the mains are laid at a depth 0.50 to 0.75 m below the ground.
- The diameter of mains varies from 5 to 15 cm.

3. Lateral pipes:

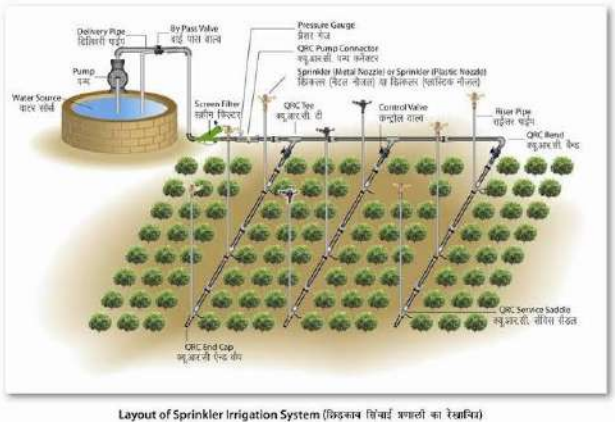
- Lateral pipes are connected to the main pipelines.
- Sprinklers are fitted on the laterals with risers.
- These pipes are 50 mm in diameter and 6m long.

4. Sprinkler:

- Sprinklers are mainly two types:
  Sprinklers with fixed head
  Sprinklers with rotating head

5. Other Accessories:

- Special couplings
- Regulating valves
- Pressure gauges
- Bends, elbows, tees
- Reducers, plugs, clamps, etc.



Layout of Sprinkler Irrigation System

(Fig.149 Sprinkler irrigation system)

- **Drip Irrigation**

Drip irrigation is also called trickle irrigation. It is one of the latest developed methods of irrigation which is becoming increasingly popular in areas with water scarcity and salt problems. This method was first introduced in Israel. In India, it is being increasingly practiced in Gujarat, Maharashtra, Kerala and Karnataka.

In drip irrigation, water is applied in the form of drops directly near the roots of the plants through a special outlet device called an emitter or a dripper. These emitters have drip nozzles to supply water drip by drip at a very slow rate, varying from about 2 liters per hour to 10 liters per hour. The water applied near the root zone of plants spread laterally as well as vertically due to capillary action in the soil. The water applied is just sufficient to keep the soil moisture within the desirable range for the plant growth.

Components of drip irrigation units:

1. Control head
2. Pipe network
3. Emitters

1. Control head:

The control head consists of

- An overhead tank
- A flow control valve
- A water measuring device
- Pressure control device
- Filters
- Pumping unit, etc.

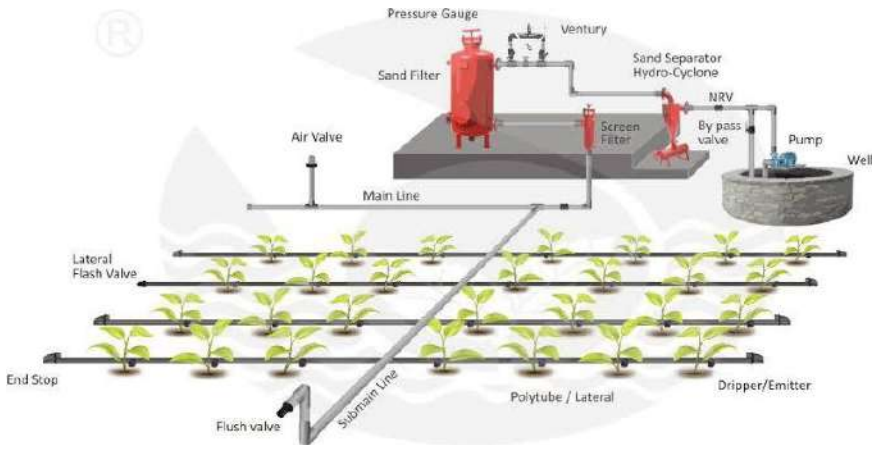
The control head is usually located near the source of water. The water is pumped into the overhead tank. The size of overhead tank is usually 3 x 3 x 3, resting on a raised platform to maintain a pressure head of 3 to 5 m. the filters are used to remove all debris, sand and clay I the water to prevent cogging of the emitters. Generally, a fertilizer injection system is also provided at the control head.

2. Pipe Network:

The pipe network consists of a main line and a number of lateral pipes. Sometimes sub main lines are also required between main lines and the lateral pipes. A number of small diameter pipes (10 to 20 mm) called trickle lines are provided from lateral pipes to carry water to the roots of the crops. Generally, there is one trickle line for each row of crops. All the pipes are usually made of P.V.C

3. Emitters:

Emitters are provided on each trickle line at a suitable spacing depending upon the type of crop and soil conditions. Emitter is a precise metering device which has a very low flow rate, usually 1 to 10 liters per hour.



(Fig.150 Drip irrigation system)

CHAPTER: 18
Social Activities – any activities planned by student

1. Beti bachao beti padhavo 2. Digital India 3. Entrepreneurship 4. One day Health Awareness / Education Camp 5. Women Empowerment and her Rights

❖ **Women Empowerment and her Rights:**

We gave a speech on women empowerment in the village to awaken the people of the village during the village visit.

Women must be given equal opportunities in every field, irrespective of gender. Moreover, they must also be given equal pay. We can empower women by abolishing child marriage. Various programs must be held where they can be taught skills to fend for themselves in case they face financial crisis. There are various ways in how one can empower women. The individuals and government must both come together to make it happen. Education for girls must be made compulsory so that women can become illiterate to make a life for themselves.

(Fig.151 Women Empowerment and rights)

Most importantly, the shame of divorce and abuse must be thrown out of the window. Many women stay in abusive relationships because of the fear of society. Parents must teach their daughters it is okay to come home divorced rather than in a coffin.

In India, women empowerment is needed more than ever. India is amongst the countries which are not safe for women. There are various reasons for this. Firstly, women in India are in danger of honor killings. Their family thinks its right to take their lives if they bring shame to the reputation of their legacy. Almost every country, no matter how progressive has a history of ill-treating women. In other words, women from all over the world have been rebellious to reach the status they have today. While the western countries are still making progress, third world countries like India still lack behind in Women Empowerment.

Women empowerment refers to making women powerful to make them capable of deciding for themselves. Women have suffered a lot through the years at the hands of men. In earlier centuries, they were treated as almost non-existent. As if all the rights belonged to men even something as basic as voting. As the times evolved, women realized their power. There on began the revolution for women empowerment.

As women were not allowed to make decisions for them, women empowerment came in like a breath of fresh air. It made them aware of their rights and how they must make their own place in society rather than depending on a man. It recognized the fact that things cannot simply work in someone‘s favor because of their gender. However, we still have a long way to go when we talk about the reasons why we need it.

CHAPTER: 19

SAGY Questionnaire survey Form

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Mota Khutavada Gram Panchayat: M.K Ward No. ____

Block: Mahuva District: Bhavnagar

State: Guj L S Constituency: Gov. school

1. Family Identity and Size

Name of Head of Household	Bhupathbhai Babubhai Gohel							Male/ Female	M
SECC Survey ID:		Family Size	6	Over 18	4	6 to 18	2	Under 6	0

2. Category & Entitlement Details (Tick as appropriate)

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

2. Adults (above 18 years)

Name	Age	Sex M/F/O	Disability Status Y/N	Marital Status[3]	Education Status[4]	Adhaar Card (Y/ N)	Bank A/C (Y/N)	Social Security Pension[5]
Bhupatbhai	60	M	N	Y	10th	Y	Y	Y
Geetaben	55	F	N	Y	7th	Y	N	N
Girishbhai	33	M	N	Y	12th	Y	Y	N
Ashaben	29	F	N	Y	10th	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
Ramesh	16	M	N	N	8th	Y	9th	Yes
Nisu	12	F	N	N	5th	Y	6th	No

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: 2
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	0.25 km
Hand Pump (Public / ~~Private~~) Yes / ~~No~~		1 km
Open Well(Public / Private) Yes / No		1 km
Other (mention): Bore wells		1 km

11. Source of Lighting and Power

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

12. Landholding (Acres)

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

13. Principal Occupations in the Household

Livelihood	Tick if applicable
Farming on own Land	✓
Sharecropping /Farming Leased Land	✗
Animal Husbandry	✓
Pisciculture	✗
Fishing	✗
Skilled Wage Worker	✓
Unskilled Wage Worker	✓
Salaried Employment in Government	✗
Salaried Employment - Private Sector	✓
Weaving	✗
Other Artisan(mention)	
Other Trade & Business (mention)	

14. Migration Status
Does any member of the household migrate for Work: Yes / ~~No~~. If Yes Entire Year / ~~Seasonal~~
Does anyone below 18 years migrate for work: Y/~~N~~

15. Agriculture Inputs

Do you use Chemical Fertilisers	Yes/~~No~~
Do you use Chemical Insecticides	Yes/~~No~~
Do you use Chemical Weedicide	~~Yes~~/No
Do you have Soil Health Card	~~Yes~~/No
Irrigation: None/ Canal/ Tank/ Borewell/Other	
Drip or Sprinkler Irrigation: Drip /Sprinkler / None	

16. Agricultural Produce in a normal year (Top 3)

Name	Unit	Quantity
Cotton	kg/m	51.77
onion	kg/m	97.50
Jowar	kg/m	25.70

17. Livestock Numbers

Cows: 110	Bullocks: 25	Calves: 15
Female Buffalo: 150	Male Buffalo: 25	Buffalo Calves: 15
Goats/ Sheep: 20	Poultry/ Ducks: —	Pigs: —
Any other: Type —		No. —
Shelter for Livestock: Pucca / Kutcha / None		
Average Daily Production of Milk(Litres): 1728.75 lit		

18. What games do Children Play
Cricket, Kho-Kho
Kabbadi

19. Do children play musical instrument (mention)
Tabla

Schedule Filled By:
Principal Respondent:
Date of Survey: 02/04/2021

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: Mota khutavada

b. Block: Mahuva

c. District: Bhavnagar

d. State: Gujarat

e. Lok Sabha Constituency: Gov. School

f. Number of Wards in the Gram Panchayat: -

g. Number of Villages in the Gram Panchayat: 1

h. Names of Villages: Mota khutavada

Demographic Information

Number of Households 2058 Total Population 10,339 Male 5295 Female 5039

SC HHs 378 ST HHs 24 OBC HHs - Other HHs -

I. Access to Infrastructure / Facilities / Services

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
a.	ANM/ Health Sub Centre	No	-
b.	Nearest Primary Health Centre (PHC)	No	-
c.	Nearest Community Health Centre (CHC)	Yes	In village
d.	Nearest Post Office	Yes	in village
e.	Nearest Bank Branch (Any)	Yes	"
f.	Nearest Bank with CBS Facility	No	-
g.	Nearest ATM	Yes	In village
h.	Nearest Primary School	Yes	"
i.	Nearest Middle School	Yes	"
j.	Nearest Secondary School	Yes	"
k.	Nearest Higher Secondary School / +2 College	No	-
l.	Nearest Graduate College	No	-
m	Nearest ITI / Polytechnic Centre	No	-
n	Kisan Seva Kendra	No	-

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
o	Agriculture Credit Cooperative Society	NO	
p	Nearest Agro Service Centre	NO	Halvad (20 Km)
p	MSP based Government Procurement Centre	NO	-
q	Milk Cooperative /Collection Centre	yes	in village
r	Veterinary Care Centre	NO	-
s	Ayurveda Centre	yes	in village
t	E – Seva Kendra	NO	20 Km
u	Bus Stop	NO	20 Km
v	Railway Station	NO	20 Km
w	Library	NO	20 Km
x	Common Service Centre	NO	20 Km

IV. Sports Facilities in the Gram Panchayat

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

b. Mini Stadium : NO ~~Yes(Y)~~ /No (N) *(Playground with equipment and sitting arrangement)*

V. Education, ICDS

a. Number of Angan Wadi Centres: 9

b. Number of villages without Angan Wadi Centres –

Names of such villages: –

c. Schools (Number)

Primary Private: – Primary Govt.: 2

Middle Private: – Middle Govt.: 1

Secondary Private: – Secondary Govt.: 1

Higher Secondary Private: – Higher Secondary Govt: –

VI. Public Distribution System

	Item	Private Contractor	Women's SHG	Gram Panchayat	Cooperative	Other (Mention)	Location in GP (mention Location)	If outside GP, Location & distance from GP HQrs)
a.	Cereal (Rice/ Wheat/ Millets)	–	–	✓	–	–	0.5 Km	–
b.	Kerosene	–	–	✓	–	–	0.5 Km	–
c.	Other (mention)	–	–	✓	–	–	0.5 Km	–

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 ✓	Village is not Covered with the Connection of Pipe water.	-
b.	Hand Pump Coverage in Villages:	Covered ✓ Not Covered	M. K	-
c.	Coverage under Covered Drains:·	Covered Not Covered ✓	1 -	Mota Khutavada
d.	Coverage under Open Drains:	Covered Not Covered ✓	-	Mota khutavada
e.	Villages with Household Electricity Connection (Numbers)	Connected ✓ Not Connected	Mota Khutavada	-

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	2443.06	d.	Pasture / Grazing Land	-	g.	Check Dam	1
b.	Irrigated Land	2405.62	e.	Forests/ Plantations	-	h.	Wells/Bore Wells	4
c.	Un-irrigated Land	142.10	f.	Other Common Land	634.45	i	Tanks /Ponds	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 (Approximately)

		Number
a)	Number of eligible Households for pension (old age, widow, disability)	33
b)	Number of Households receiving pension (old age, widow, disability)	24
c)	Number of eligible Households who are not receiving pension	13
d)	Number of Households eligible for Ration Card	71
e)	Number of eligible HHs having ration cards	67
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	0
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	17
h)	Number of active Job Card holders under MGNREGA	52
i)	Number of Job Card holders who completed 100 days of work during 2013-14	50
j)	Number of shops selling alcohol	6
k)	Number of BPL families	91
l)	Number of landless households	0
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	5
q)	Number of Households headed by physically handicapped persons	7
r)	Total number of Persons with Disability in the village	8
s)	Number of SHGs	-
t)	Number of active SHGs	-
u)	Number of SHG Federations	-
v)	Number of Youth Clubs	0
w)	Number of Bharat Nirman Volunteers	0

Name and Signature of Surveyor and Respondent'

Surveyor	PRI Respondent (Preferably Gram Panchayat Chairperson)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey
1) Jambuch Hardik 2) Jani Bhavik 3) Tukadiya Nam			02/04/2021

~~Due to covid-19 form fill by talking on phone call with supervisor~~

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

4

(શ્રીમતિ પાર્વતીબેન હકાભાઈ ગલચણી)
સરપંચ
શ્રી મોટા ખૂંટવડા ગ્રામ પંચાયત

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: Hotel Khutavada
b. Ward Number: –
c. Gram Panchayat: Hotel Khutavada
d. Block: Mahuva
e. District: Bhavnagar
f. State: Gujarat
g. Lok Sabha Constituency: Gov. School
h. Number of Habitations / Hamlets in the Gram Panchayat: 1
i. Names of Habitations / Hamlets: Hotel Khutavada

Demographic Information

Number of Households 2058 Total Population 10,334 Male 5295 Female 5039

SC HHs 378 ST HHs 24 OBC HHs – Other HHs –

II. Access to Infrastructure/Amenities etc.

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
a.	Nearest Primary School	Y	in village
b.	Nearest Middle School	Y	"
c.	Nearest Secondary School	Y	"
d.	Kisan Seva Kendra	N	20 km (Mahuva)
e.	Milk Cooperative /Collection Centre	Y	
g.	Health Sub Centre	Y	
h.	Bank	Y	
i.	ATM	Y	
j.	Bus Stop	N	20 km (Mahuva)
k.	Railway Station	N	"

[1] While filling this the surveyor must collect the information from the Ward Member/s and relevant government officials

1

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

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	Y	—
m	Common Service Centre	N	20 Km
n	Veterinary Care Centre	N	11

Ii. Road Connectivity

a. Habitations connected by All-weather Roads *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations where not available: 3 - Some

Iii. Drinking Water Facilities

a.Piped Water Supply Coverage to Habitations: NO *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered: None

b.Hand Pump Coverage in Habitations: Yes *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered: Some

Iv. Coverage of Habitations under Waste Management System

a. Coverage under Covered Drains: NO *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered: None

b. Coverage under Open Drains: Yes *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered: Some

c. Coverage under Doorstep Waste Collection: *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered: None

v. Coverage of Habitations under Electrification

a. Coverage under Household Connections: *(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered: All

b.Coverage under Street Lighting: All*(1-All 2-None 3-Some)*
If 3 mention the name of the habitations not covered: Some

vi. Sports Facilities in the Village

a.Number of Play Grounds in the Village (minimum size 200 square meters): 2
b.Mini Stadium : NO Yes(Y) /No (N)

vii. Education, ICDS

a. Number of Anganwadi Centres: 9

c. Schools (Number)

Primary Private: — Primary Govt.: 2

Middle Private: — Middle Govt.: 1

Secondary Private: — Secondary Govt.: 1

Higher Secondary Private: — Higher Secondary Govt: —

2

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

viii. Land Category		Area in Acres		Land Category	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	2043.06	d.	Pasture / Grazing Land	—	g.	Check Dam	1
b.	Irrigated Land	2405.62	e.	Forests/ Plnatations	—	h.	Wells/Bore Wells	4
c.	Un-irrigated Land	14.2.10	f.	Other Common Land	634.45	I	Tanks /Ponds	1

ix. Entitlement Related Parameters		
1	Number of active Job Card holders under MGNREGA	52
2	Number of active Job Card holders who have completed 100 days of work	50
3	Number of shops selling alcohol	6
4	Number of BPL families	91
5	Number of landless households	0
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	NO
13	Number of Bharat Nirman Volunteers	NO

Name and Signature of Surveyor and Respondent'

1) Hardik 2) Bhavik 3) Hanoj Surveyor	PRI Respondent (Preferably a ward member from a ward that is fully or partially covered under the Village)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	02/04/2021 Date of Survey

* Due to ~~covid-19~~ ~~form~~ is filled by phone call with Sarpanch.

3

2/4/21

(શ્રીમતિ પાર્વતીબેન હકાભાઈ ગલાણી)
સરપંચ
શ્રી મોટા ખૂંટવડા ગ્રામ પંચાયત

CHAPTER: 20

TDO – DDO – Collector email sending soft copy

Existing & Development Scenario of " Mota Khutavada" Village, Mahuva, Bhavnagar
1 message

HD HaRdik <hardikjambucha2404@gmail.com> Fri, Apr 16, 2021 at 10:00 AM
To: tdomahuvadp@gmail.com, ddo-bav@gujarat.gov.in

Respected Sir/Madam,

We are the students of Shantilal Shah Government Engineering College, Bhavnagar, Gujarat Technological University-GTU. GTU has been assigned to Vishwakarma Yojana - VY in which students survey various village and Designs various ameities To Deliver it to them making them ideal for living better life as per requirements & village problem statements.

As a part of Vishwakarma Yojana's guidelines, we have been asked to inform all the respected officers about our project in which we will shortly notify about Bedi Village profile of issues for development and our design work for them which is as below.

Facilities required in village.
Please find here with attached,

Prepared By : Jambucha Hardik
Jani Bhavik
Tukadiya Manoj

CHAPTER: 21

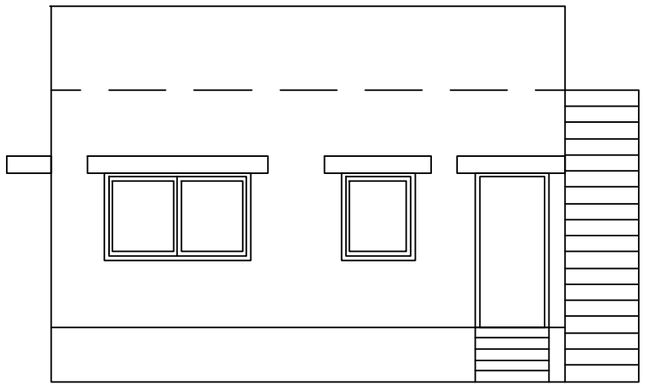
Compressive Report for Entire Village

Vishwakarma Yojana is a Gujarat government project allotted to GTU in which we the students of GTU who were involved in this project were allocated with a village in our district for Rurbanisation. We visited & completed surveys Mota Khutavada, Budhel & pavthi and did the SWOT analysis, which helped us to know our strengths, weaknesses, opportunities & threats. From this we analyzed problems and requirement of our allocated village and started finding the solution. We prepared as good as possible designs for the development of the Mota Khutavada village. Also, we saw their poor condition of village and its infrastructures, etc.
We eagerly hope through that our project may be a good help in development of Mota Khutavada Village. Here the Mota Khutavada village has 24hrs electricity but it lags at educational level, where we had provided school designs to fulfill this requirement.

Due to Covid-19 we had some problems; however we managed our prospective works. We know that there are always ups and downs in life; it doesn't mean to stop there. Instead of this we worked and for full filling the proper financial problem we designed the Bus stand, post office, Public Library, Agro Storage, Open Air Theater etc.

With the help of Gap Analysis of Mota Khutavada Village we can conclude that the village needs better infrastructures such as Higher Secondary Schools, ITI Buildings, Colleges, Banks, PHC, Bus Stand, Recreational Park, Community Hall, Clean Water Drinking & Storage Facility, Cinema Theater (Luxury), and Cemetery, Petrol Pumps, Toilets, Biogas Plant, Gram panchayat office and other public conveniences.

Use of renewable energy and create design of sustainable development. Also we try to give security design to safe village. And overall good experience among the people. Also we make a documentary film on Mota Khutavada village and try to make modern India and make in Indian.



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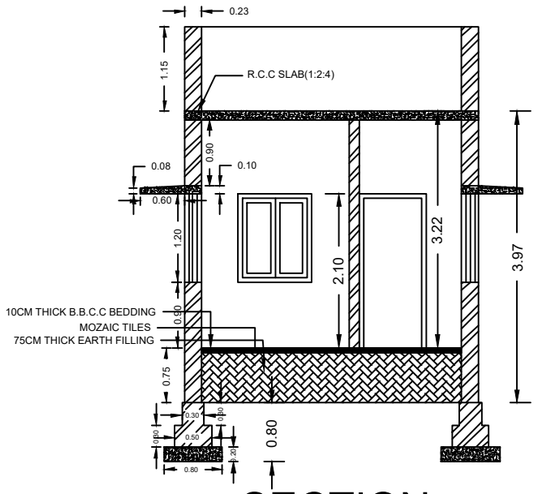

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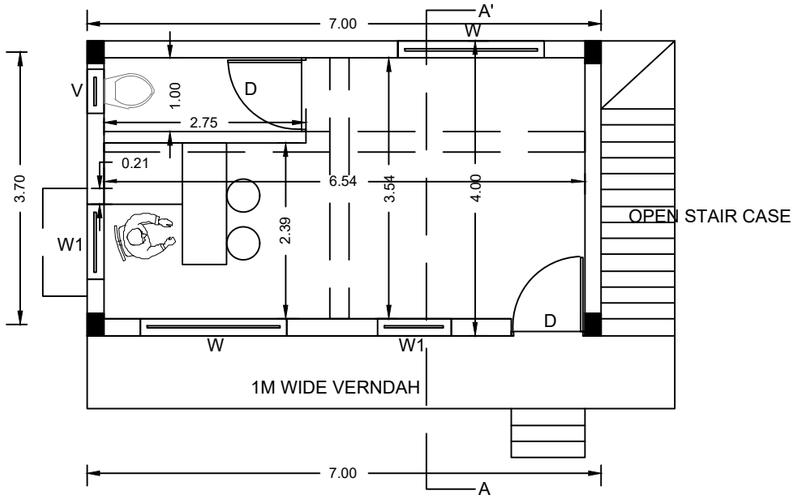

PLAN

NOTES :

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- All Concrete shall be machine mixed and machine vibrated.
- All load bearing brick masonary wall in cement mortar in proportion of 1:6.
- Design is prepared only for education purpose, corrected all data must be check before use.

N

Design No : 01

TITLE OF WORK :

Dispensary

Prepared By :

JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE
RISER-0.17
TRADE-0.25

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	26.15	40.00	40.00
FRIST FLOOR	-	-	-
TOTAL	26.15	40.00	40.00

DOORS & WINDOWS SCHEDULE :

D1 - 1.00 X 2.10

W - 2.00 X 1.20
W1 - 1.00 X 1.20
V - 0.60 X 0.60

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

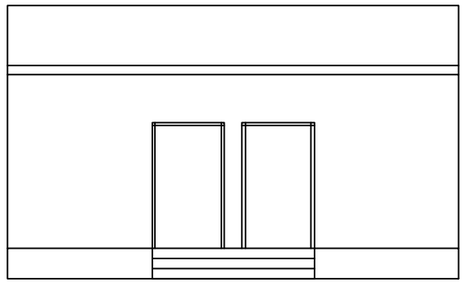
Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

Shantilal Shah Government Engineering College
Sidsar,Bhavnagar

University Name :

Gujarat Technologycal University



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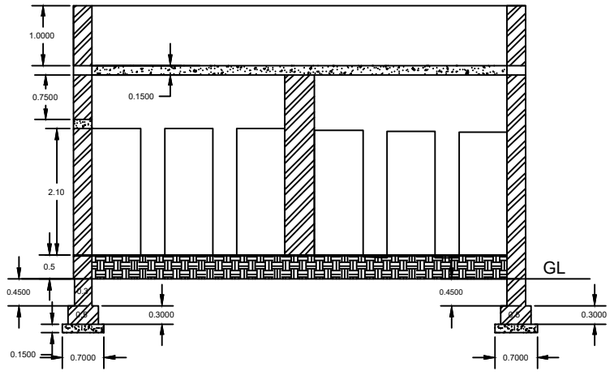
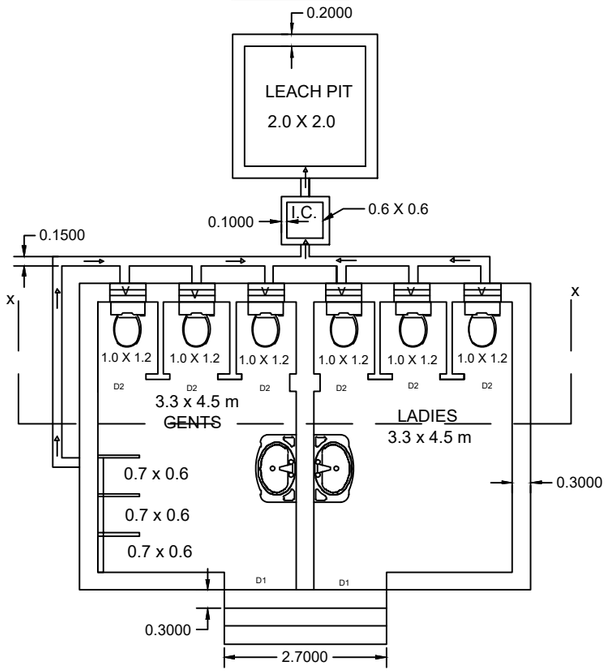


SECTION AT X-X



PLAN

NOTES :

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- Design is prepared only for education purpose, corrected all data must be check before use.

Design No : 02

TITLE OF WORK :

Public Toilet Block

Prepared By :

JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE

RISER-0.17
TRADE-0.25

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	29.7	38.25	38.25
FRIST FLOOR	-	-	-
TOTAL	29.7	38.25	38.25

DOORS & WINDOWS SCHEDULE :

D1 - 1.2 X 2.10
D2 - 0.9 X 2.10
V - 0.60 X 0.60

SCALE :

1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

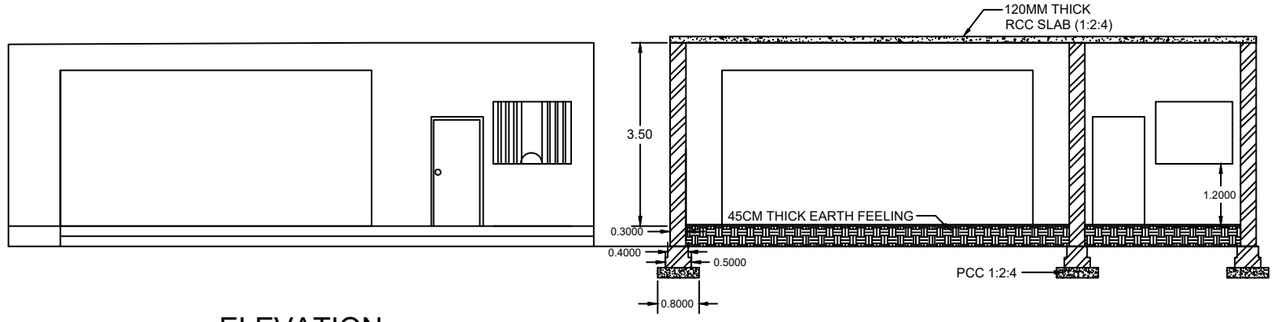
Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

Shantilal Shah Government Engineering College
Sidsar,Bhavnagar

University Name :

Gujarat Technologycal University



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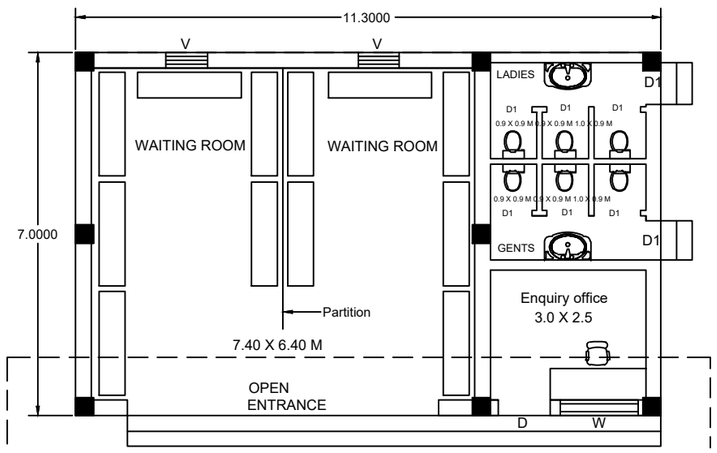

PLAN

NOTES :

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- All load bearing brick masonary wall in cement mortar in proportion of 1:6.
- Design is prepared only for education purpose, corrected all data must be check before use.

Design No : 03

TITLE OF WORK :

Bus Stop

Prepared By :

JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE
RISER-0.17
TRADE-0.25

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	69.38	79.10	79.10
FRIST FLOOR	-	-	-
TOTAL	69.38	79.10	79.10

DOORS & WINDOWS SCHEDULE :

D - 1.00 X 2.10
D1 - 0.80 X 2.10
W - 1.50 X 1.20
V - 0.80 X 0.60

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

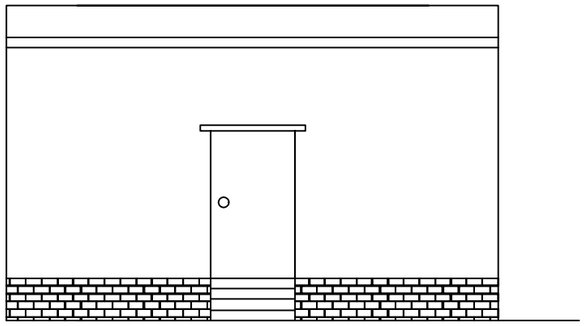
Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

Shantilal Shah Government Engineering College
Sidsar,Bhavnagar

University Name :

Gujarat Technologycal University



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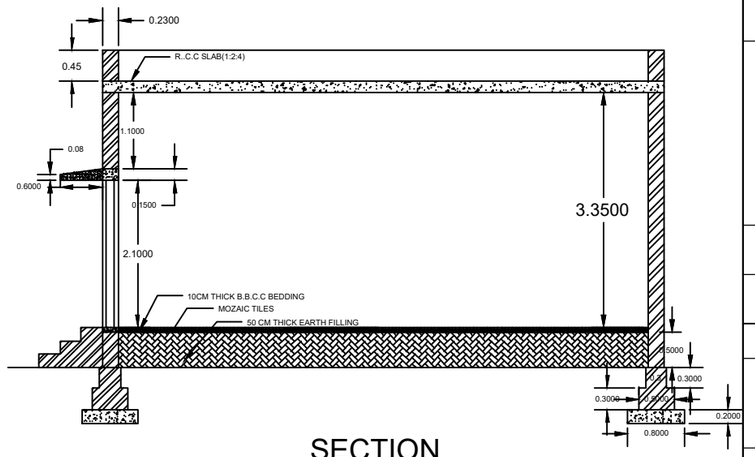

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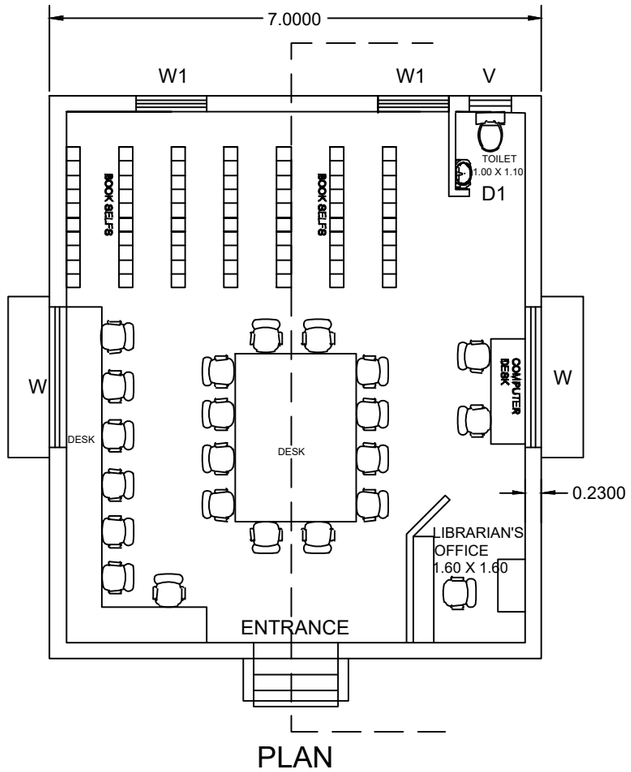

PLAN

NOTES :

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- All Concrete shall be machine mixed and machine vibrated.
- All load bearing brick masonary wall in cement mortar in proportion of 1:6.
- Design is prepared only for education purpose, corrected all data must be check before use.

Design No : 04

TITLE OF WORK :

Public Library

Prepared By :

JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE

RISER-0.17
TRADE-0.25

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	49.31	56.00	56.00
FRIST FLOOR	-	-	-
TOTAL	49.31	56.00	56.00

DOORS & WINDOWS SCHEDULE :

D1 - 1.00 X 2.10

W - 2.00 X 1.20
W1 - 1.00 X 1.20
V - 0.60 X 0.60

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

Shantilal Shah Government Engineering College
Sidsar,Bhavnagar

University Name :

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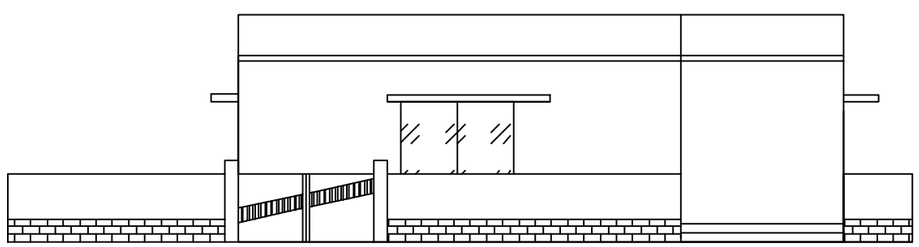

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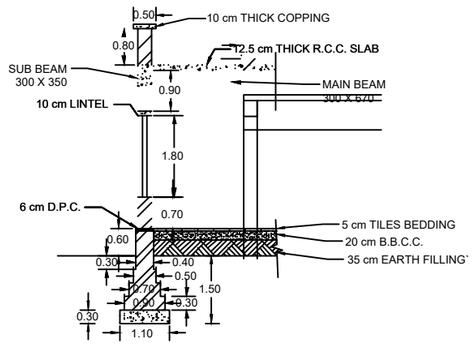

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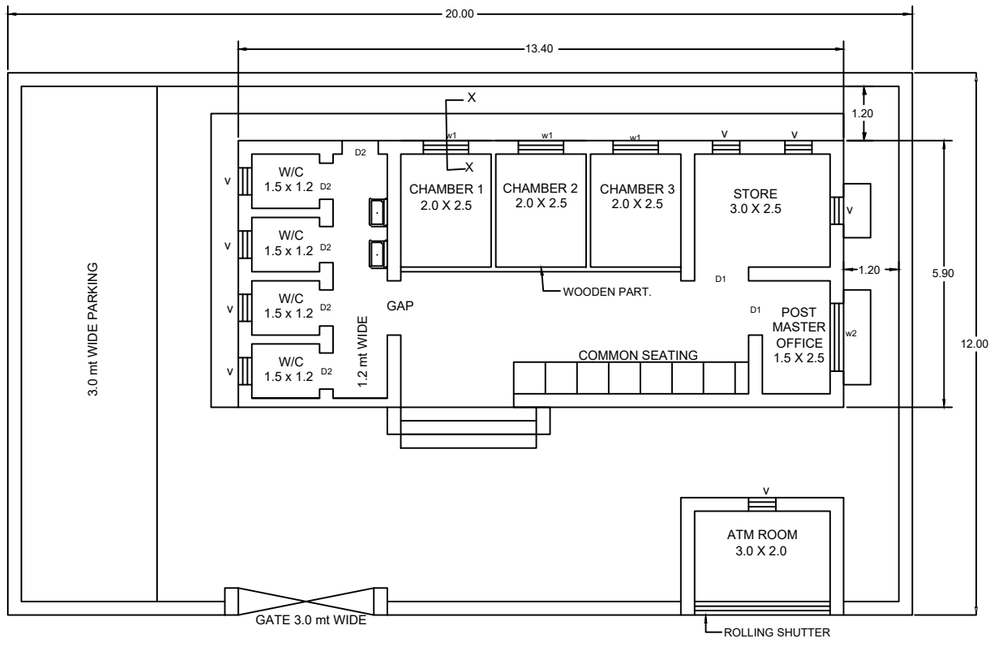

SECTION AT X-X

Design No : 05

TITLE OF WORK :

Post Office

Prepared By :

JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE

RISER-0.17
TRADE-0.25

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	75.93	86.27	86.27
FRIST FLOOR	-	-	-
TOTAL	75.93	86.27	86.27

DOORS & WINDOWS SCHEDULE :

D1 - 1.20 X 2.10
D2 - 0.80 X 2.10
W1 - 1.00 X 1.20
W2 - 1.50 X 1.20
V - 0.60 X 0.80

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

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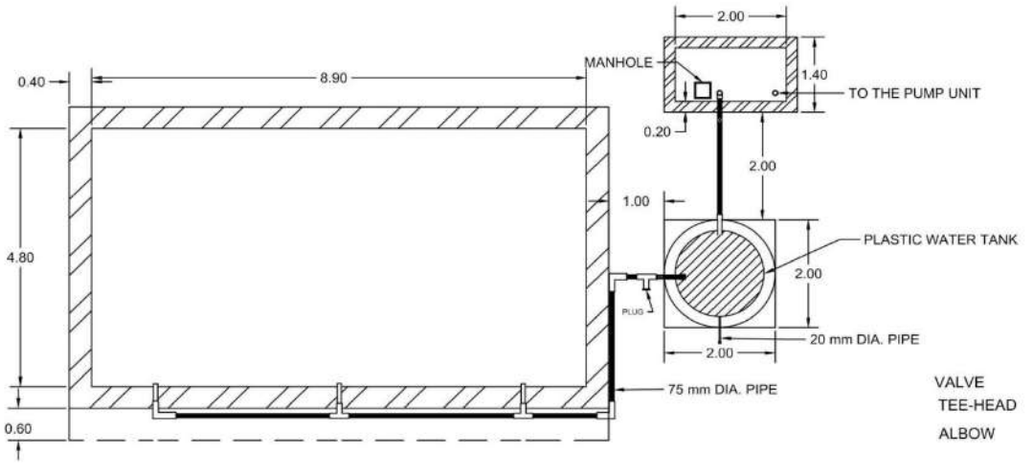
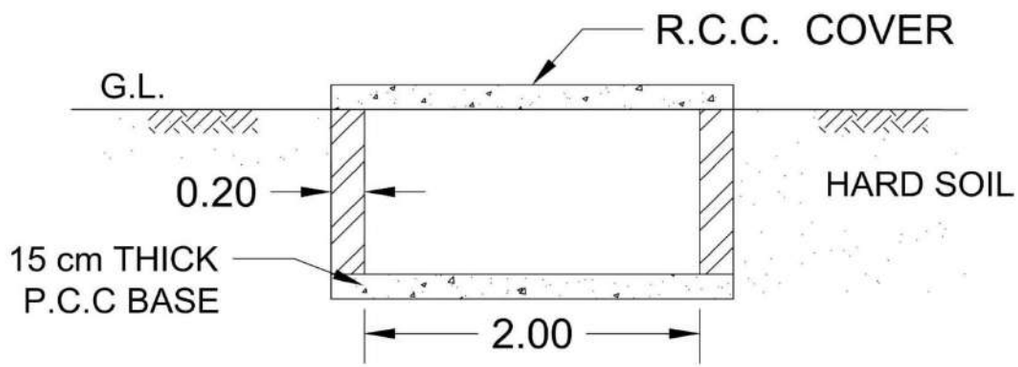
Sidsar,Bhavnagar

University Name :

Gujarat Technologycal University





Rain Water harvesting

Design No : 06

TITLE OF WORK :

Rain Water Harvesting

Prepared By :

JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE

AREA TABLE :

AREA TABLE AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	-	-	-
FRIST FLOOR	-	-	-
TOTAL	-	-	-

DOORS & WINDOWS SCHEDULE :

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

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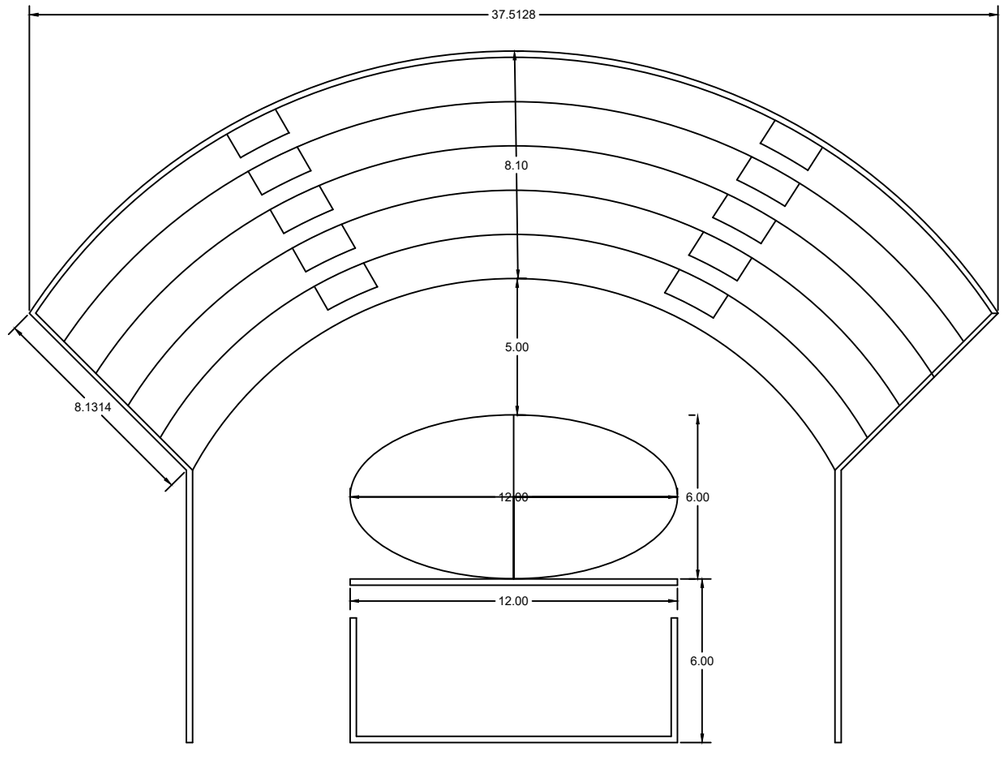
Sidsar,Bhavnagar

University Name :

Gujarat Technologycal University



PLAN

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- Design is prepared only for education purpose, corrected all data must be check before use.

Design No : 07

TITLE OF WORK :

Open Air Theater

Prepared By :
JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE
RISER-0.17
TRADE-0.25

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	-	-	-
FRIST FLOOR	-	-	-
TOTAL	-	-	-

DOORS & WINDOWS SCHEDULE :

D - 1.20 X 2.10

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

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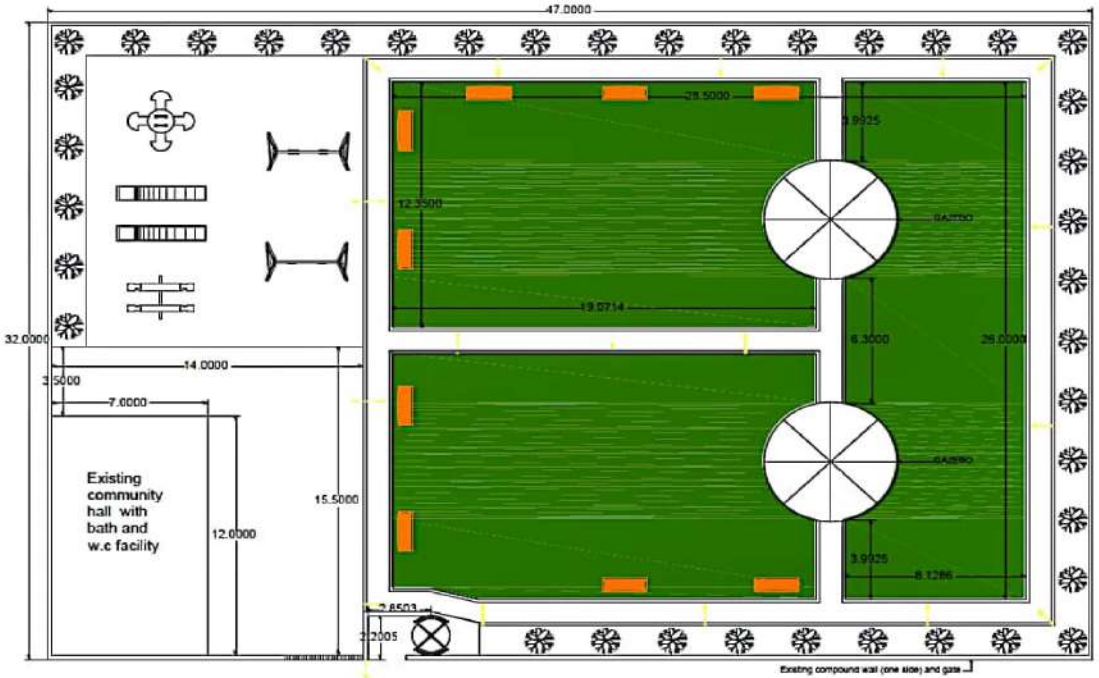
Sidsar,Bhavnagar

University Name :

Gujarat Technologycal University



Recreation Garden

NOTES :

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Design No. - 07

TITLE OF WORK :

Recreation Garden

Prepared By :
JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	-	-	-
FRIST FLOOR	-	-	-
TOTAL	-	-	-

DOORS & WINDOWS SCHEDULE :

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

Shantilal Shah Government Engineering College
Sidsar,Bhavnagar

University Name :

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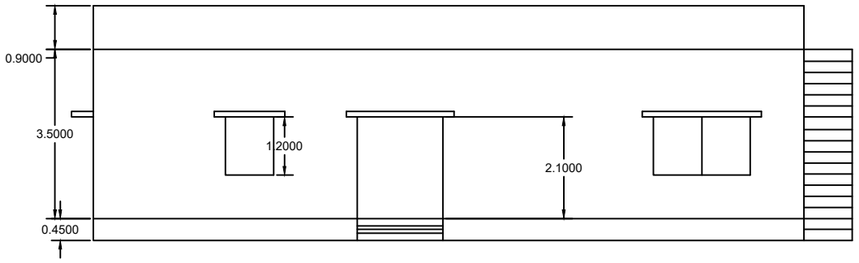
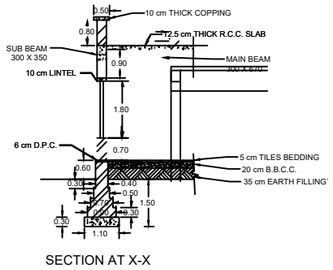
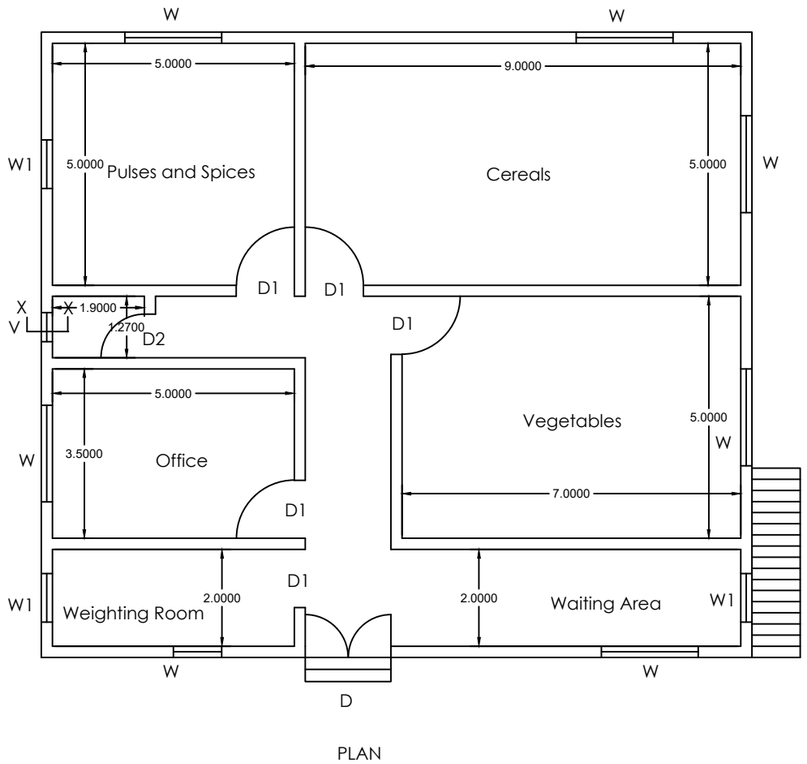


ELEVATION



SECTION AT X-X

SECTION X-X



PLAN

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Design No : 09

TITLE OF WORK :

Agro Storage

Prepared By :

JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE

RISER-0.17
TRADE-0.25

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	168.32	189.80	189.80
FRIST FLOOR	-	-	-
TOTAL	168.32	189.80	189.80

DOORS & WINDOWS SCHEDULE :

D - 1.85 X 2.10		W - 2.00 X 1.20	
D1 - 1.20 X 2.10		W1 - 1.00 X 1.20	
D2 - 0.90 X 2.10		V - 0.60 X 0.60	

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

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University Name :

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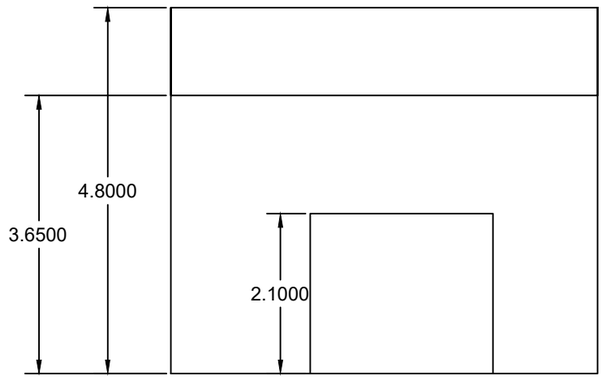
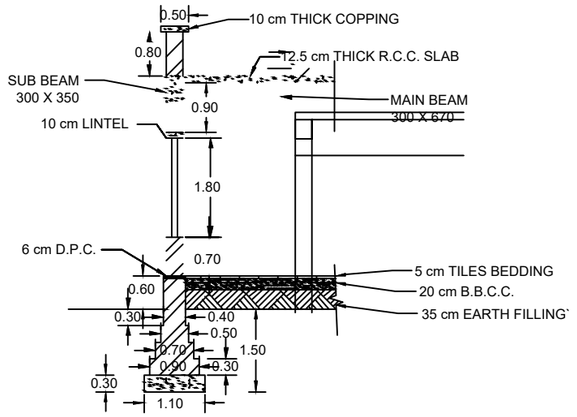
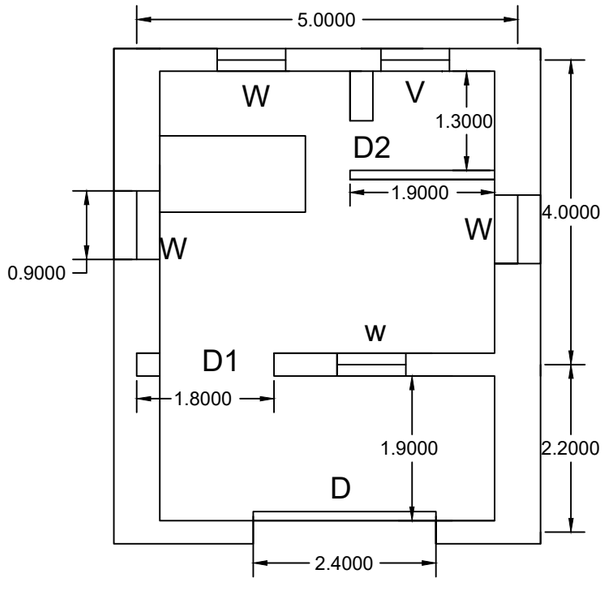






NOTES :

- All Dimensions and levels are in meter until stated.
- Do not scale the drawing only written dimension shall be followed.
- Unless otherwise specified all the concrete should be mixed proportion of M-20 grade as per IS:456-2000.
- All Concrete shall be machine mixed and machine vibrated.
- All load bearing brick masonary wall in cement mortar in proportion of 1:6.
- Design is prepared only for education purpose, corrected all data must be check before use.

N

Design No : 10

TITLE OF WORK :

E-Seva Kendra

Prepared By :

JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE

RISER-0.17
TRADE-0.25

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	26.82	34.025	34.025
FRIST FLOOR	-	-	-
TOTAL	26.82	34.025	34.025

DOORS & WINDOWS SCHEDULE :

D - 2.40 X 2.10
D1 - 1.80 X 2.10
D2 - 0.80 X 2.10
W - 0.90 X 1.20
V - 0.60 X 0.60

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

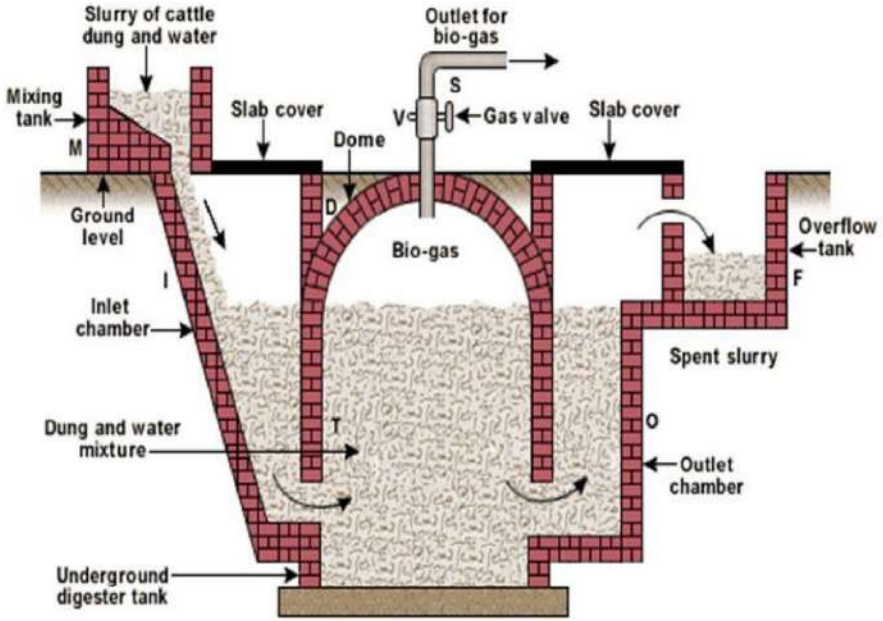
Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

Shantilal Shah Government Engineering College
Sidsar,Bhavnagar

University Name :

Gujarat Technologycal University



Fixed-dome type bio-gas plant.

Design No. - 11

TITLE OF WORK :

Bio-Gas Plant

Prepared By :

JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	-	-	-
FRIST FLOOR	-	-	-
TOTAL	-	-	-

DOORS & WINDOWS SCHEDULE :

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

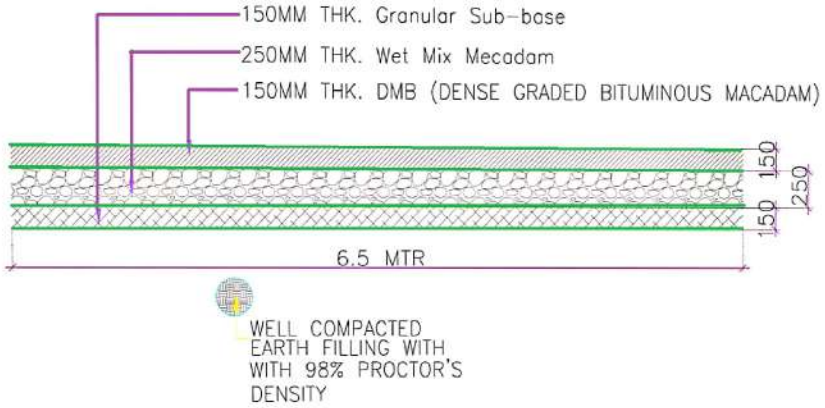
Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

Shantilal Shah Government Engineering College
Sidsar,Bhavnagar

University Name :

Gujarat Technologycal University



R.C.C Road Work

NOTES :

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- Unless otherwise specified all the concrete should be mixed proportion of M-20 grade as per IS:456-2000.
- All Concrete shall be machine mixed and machine vibrated.
- All load bearing brick masonary wall in cement mortar in proportion of 1:6.
- Design is prepared only for education purpose, corrected all data must be check before use.

Design No. - 12

TITLE OF WORK :

R.C.C Road Work

Prepared By :

JAMBUCHA HARDIK DHIRUBHAI

JANI BHAVIK BHALASHANKARBHAI

STAIRCASE

AREA TABLE :

AREA TABLE — AREA (Sq.Mt.)

PARTICULARS	BUILT UP AREA (Sq.Mt.)		F.S.I. AREA
	CARPET	BUILT UP	(Sq.Mt.)
GROUND FLOOR	-	-	-
FRIST FLOOR	-	-	-
TOTAL	-	-	-

DOORS & WINDOWS SCHEDULE :

SCALE :
1CM : 1M

COLOUR NOTE :

☐ SHOWS PLOT BOUNDARY ☐ SHOWS COM. WORK

Project Name :

Vishwakarma Yojana Phase - VIII
Mota Khutavada, Bhavnagar

Institute Name :

Shantilal Shah Government Engineering College
Sidsar,Bhavnagar

University Name :

Gujarat Technologycal University