DETAIL PROJECT REPORT

VISHWAKARMA YOJNA: VIII
AN APPROACH TOWARDS RURBANISATION
Meghpar Zala Village
RAJKOT District

PREPARED BY

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YEAR: 2020-21

GUJARAT TECHNOLOGICAL UNIVERSITY
Chandkheda, Ahmedabad – 382424 Gujarat

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Year: 2020-21

Gujarat Technological University,
Chandkheda, Ahmedabad – 382424 Gujarat

CERTIFICATE

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

Detail Project Report for,

VILLAGE: MEGHPAR ZALA
DISTRICT: RAJKOT

Under

Vishwakarma Yojana: Phase-VIII

In partial fulfillment of the project offered by

GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA

During the academic year 2020-21.
This project work has been carried out by them under our supervision and guidance.

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ABSTRACT

The Government of Gujarat has launched "Vishwakarma Yojana: An Approach towards Rurbanisation" for the development of villages which is implemented by "Gujarat Technological University". Vishwakarma Yojana would provide a "Design to Delivery" solution for the development of villages in 'City' areas. In this Project, we describe the ecosystem for a village and then map out an integrated design procedure for building an Ideal Village. We define an Ideal Village as a bundle of services that are delivered to its residents and businesses effectively and efficiently. Computing, communication, and information technologies play a major role in the design, delivery, and monitoring of the services. The selected village is surveyed, data has been analyzed for the village and an Infrastructure facility has been found out by this Yojana with the help of UDPFI guidelines.

The village allotted to us is Meghpar zala Ta. Tankara Dis. Rajkot. It is situated 12km away from sub-district headquarter Tankara and 54km away from district headquarter Rajkot. Total 211 households, 1079 population, and total village geographical area is 1735.72 hectares. The village is administrated by Sarpanch who is elected representative of the village.

Meghpar zala has no any Government or Private Pre-Primary and secondary School and only one government primary school. Preprimary school is more than 10km far from village in "Maliya village". Nearest helth care center is more than 10km away. Water supply in the village is covered by untreated tap water, uncovered wells, hand pumps, and tube wells. The village has a Open Kuccha Drainage and poor garbage disposal facilities. It has landlines, mobile coverage.it has post office with pin code 363650. It also has public bus services, Railway station and taxi service is available more than 10km away. It is connected by SH, MDR, ODR, WBM. Nearest banking facility is available more than 10km away. It also has nutritional and community centers. No recreational facilities are available like gardens, sports fields. Major agricultural production is ground nut, cotton, and wheat.

The village needs proper schools, medical/hospital facilities, water supply, drainage system, garbage disposal system, and recreational facilities.

Higher educational facilities like colleges, good recreational facilities, proper drainage and garbage disposal system. Better living standard of people.

Rurbanisation, Development, Living standard

ACKNOWLEDGEMENT

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

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Chapter 1: Ideal village visit

1.1 Background & Study Area Location

We have visited the ideal village Raj-Samadhiyala (Rajkot), located in the Rajkot district. The village follows the Panchayati raj system. The village has undergone transformation under the panchayat. There has been use of advanced technology in education. Efforts have been made for empowerment of women and increasing the security in the village. For example, village contains a network of 16 CCTV cameras over entire area of the village boundary in order to restrain maximum security. Some of the facilities provided by the panchayat include local gutter project, door to door waste collection, and banking facility with 24-hour ATM etc.

Raj-Samadhiyala is a village located around 5-7 kilometers from Tramba, Rajkot district in the state of Gujarat. The village is located at about 33-35 km from the District, Rajkot.

1.2 Concept: Ideal Village, Normal Village

1.2.1 Objectives

The development of model villages, called Adarsh Grams, through the implementation of existing schemes, and certain new initiatives to be designed for the local context, which may vary from village to village.

Creating models of local development which can be replicated in another village

1.2.2 Examples/Live Case Studies of Ideal Village of India/ Gujarat

Source of income for the gram panchayat except the grants and funding from various state and Union government schemes.
The urban village flaunts a Wi-Fi and optical fibre broadband network, classrooms with CCTV cameras, its own mini-bus transport system and CCTVs located on important junctions to spot litterbugs.

The gram panchayat also provides facilities of loud speaker covering entire village, gutter project, clean primary health care centre, 8 kinder garden schools, banking facility, toll free complain receiving phone service, among other.

The flow of waste water dispose from Raj-Samadhiyala is reused as an irrigation purpose or in other activity. Door to door system is almost used for collection of garbage from village. Also, peoples are aware to clean surround area therefore, environment is clean in village.

Raj-Samadhiyala has 16 loud-speakers covering each corner of the village. Villagers listen to prabhatiya in the morning and bhajan and bhakti songs in the evening. Also important announcements like telephone bill, power bill, results of 10th and 12th are made through these speakers. Unique feature is that the village sarpanch can pass on any announcement from his mobile phone.

1.2.3 The Idea of Model Smart Village

The idea of an “Adarsh Gram” or model village has been explored earlier as well, most notably through the Pradhanmantri Adarsh Gram Yojana, launched by the Central Government in 2009-10. The scheme was implemented in pilot mode in 1000 villages of Assam, Bihar, Himachal Pradesh, Rajasthan and Tamil Nadu, with an allocation of Rs 10 lakh per village. This limit was later raised to Rs. 20 lakh per village. The target villages

under the scheme were those with more than 50% of the population belonging to Scheduled Castes (SCs). Additionally, State governments have also taken steps in this direction. Himachal Pradesh launched a Mukhya Mantri Adarsh Gram Yojana along similar lines in 2011, with the allocation of Rs. 10 lakh per village.

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

In villages in ancient times there was no proper irrigation for agriculture, improper and kachcha households, poor waste disposal and sanitation systems, improper roads, poor administration by government, etc.

But in modern times there has been some development by government initiatives like smart villages, Swachh Bharat Abhiyan, Digital India, Make in India, etc., proper roads are now seen in the villages, proper irrigation facilities, awareness in farmers, proper life amenities like schooling, health care, transportation, etc.

In ancient times in villages there was poor to no distribution of electricity, there were power outages, rural areas were UN aware about use of electricity and its benefits. Poor wiring systems were used with high maintenance cost were used. Load shedding was a major concern in that times due to which there were damage in the equipment running on electricity.

Nowadays electricity distribution is done to most remote areas of the country. Awareness among people has been seen. Benefits of electricity and information technology are developed in villages. Problems like poor wiring system, high maintenance of electrical equipment, load shedding etc. has been reduced. Use of sustainable and renewable energy sources like solar and wind energy is widely spread.

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

Physical & Demographical Growth

Around 15 years ago, this village was suffering from the water crisis. About 10 years ago, this village was declared a desert area and put under the arid zone development program of the state government. Due to proper guidance of the sarpanch of the village, new check dams are constructed and various other micro watersheds also created. This leads that the village is having water table near about 3 m from the ground and less than that in some areas. Also village hadn't faced any problem during low rain of about 316 mm (last year rainfall) instead of 500 mm average rainfall for the area, they able to grow crops and had plenty of water that had preserved.

Specific data and numbers can create a much vivid and clear picture of the difference of conditions and positions of moviya in last couple of years according to the census reports.

Table 1.1: Demographical Growth

Sr. no.	Census	Population	Male	Female
1	2001	1747	872	875

2	2011	2569	1324	1245

Table 1.2: Physical Growth

Sr. no.	Description	Information/Detail
1	Agricultural Land Area (Approx.)	930 hectares
2	Residential Area (Approx.)	2.5 hectare
3	Nearest Town & Distance	Rajkot (about 33-35km)

Table 1.3 Occupation Chart

Occupation	**Agriculture**	Business	Labor
Village groups in	70-75%	10-15%	15-20%

Social scenario

As long as Indian culture, Raj-Samadhiyala contains many high ended as well as rational options for social activities. Provision of a common town hall, temples, and stay homes are remarkably diversified in accordance to its needs at a stage of sub-urban or rural atmosphere.

Infrastructure Facilities

Raj-Samadhiyala contains

1. Town halls: 1 general.
2. Temples: 5 nos of value varying from 1-10 crore rupees
3. Public Garden: 1 fairly good conditioned.
4. Ponds and/or lakes: 7 nos of ponds and 48 Cause Way.
5. Election provisions: EVM is provided.

In addition to this, Raj-Samadhiyala also has general facilities already provided in amazingly directed manner. Facilities such as Post-office, Telecommunication, 4 Shops market, 1 Main Panchayat building also contain 2 working small offices around the village, 1 primary health Centre PHC, a Milk co-operative society, more than 2 small scale industries, etc.

Panchayat also manages to aware people of the village twice a day by clocking a tower bell on well specific time intervals.

As far as education is a concern, Raj-Samadhiyala is surrounded with 2 school buildings. Raj-Samadhiyala has 2 playgrounds, 1 secondary school each for girls and boys, 1 higher secondary school for combined boys and girls.

Also, provisions for farmers such as irrigation, and check dams are sufficiently and in satisfactory amounts are provided around the village. 90% of 527 housing are well conditioned pakka houses, 90% of houses has personal toilets included, door to door waste collection facilities.

fig1.3.1 To honor the Sarpanch of the village

fig1.3.2 irrigation system

fig1.3.3 camera system

fig1.3.4 R.O. Plant

1.4 SWOT analysis of Ideal village / Smart Village

Strength

- Education facilities
- 24 hours Electricity supply
- Telecommunication facilities available
- Good Water distribution network
- Road network is good
- Public transportation facilities
- Health care facilities and proper medicine shops
- Proper gardens and re-creational centers

Weakness

- Industrial zone is near so pollution problems are occurring
- Some roads are mud oriented, gets swelled in rainy seasons
- No community toilet
- No provision cinema or vide halls
- No provision of any kind of non-conventional energy resources such as Wind, Solar, Biogas, etc.
- No plans and provisions of harvesting rain water, or managing ground water

Opportunities

- Tourism can enhance economy of dwellers
- Storm water network will boost agriculture economy.
- Rain water harvesting system will be helpful in gaining more crop.

Threats

- Pollution generation
- Agriculture land is losing fertility due to improper drainage network, and ground water management
- Health condition of village dwellers.

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

An ideal village makes all possible provision for the all-round development of their people. It is main duty that to lift every village of India to much higher level. The idea of an ideal village will certainly help in discharging duty.

1.6 Benefits of the visits of Ideal village / Smart Village

This visit taught us a lot about the sustainable growth of the village and also helped us for better understanding of the basic concept of village development. Various projects that can be work in the village for the development of village.

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

Civil Aspects

- Smart buildings like Dairies, Medical Centers, Smart Schools, etc.
- Proper Irrigation throughout the village
- Fire Safety
- Proper Road Network
- Proper Drainage and Waste Disposal Facilities

Electrical aspects

- Proper Lighting Facilities
- Security Cameras
- Weather Forecast and Remote Sensing for Crop Production
- Proper Internet Connectivity
- Proper Communication Facilities
- Proper electricity Distribution Throughout the Village

Chapter 2: Meghpar zala Literature Review

2.1 Introduction: Urban & Rural Village Concept

Urban-A Pertaining to a large city. An urban area might be defined as an area with a large amount of people residing in it, an area that has been significantly developed, or an area where the distance between buildings is very small. Urban is used in contrast to rural, which generally indicates a low- population, often agricultural-based area. Population of at least 1,000 people where the density is no fewer than 400 persons per square km2.

Rural-A rural area is an open swath of land that has few homes or other buildings, and not very many people. A rural areas population density is very low. Many people live in a city, or urban area. Their homes and businesses are located very close to one another.

2.2 Importance of the Rural development

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

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

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

2.3 Ancient Villages/Different Definitions of: Rural Urban Villages

Rural Village: A village is a clustered human settlement or community, larger than a hamlet but smaller than a town (although the word is often used to describe both hamlets and smaller towns), with a population typically ranging from a few hundred to a few thousand.

Urban Village: An urban village is an urban development typically characterized by medium-density housing, mixed use zoning, good public transit and an emphasis on pedestrianization and public space. Contemporary urban village ideas are closely related to New Urbanism and smart growth ideas.

Rurban Village: The word rurban (rural+urban) refers to a geographic territory /landscape which possess the economic characteristics and lifestyles of an urban area while retaining its essential rural area features.

Rurbanization: Rurbanization is a process of altering rural forms with pre-selected urban patterns and lifestyles, which creates new genetically altered rurban forms.

2.4 Scenario: Rural/Urban Village of India Population Growth

Population census is the total process of collecting, compiling, analyzing demographic, economic, and social data, at a specific time, to all person in a country or a well-defined part of country. As such, the census provides a snapshot of the country's population and housing at a given point of time.

Data highlights – census 2011(in Crore)

Table 2.1: Population Data-Census 2011

	2001	2011	Different
India	102.9	121.0	18.1
Urban	28.6	37.7	9.1
Rural	74.3	83.3	9.0

- Rural – Urban distribution: 68.84% & 31.16%
- Level of urbanization increased from 27.81% in 2001 Census to 31.16% in 2011 Census
- The proportion of rural population declined from 72.19% to 68.84%

Table 2.2: Growth Rate of population

	2001	2011	Difference
Overall, India	**933**	**940**	**7**
urban	900	926	26
rural	946	947	1
India	**927**	**914**	**-13**
urban	906	902	-4
Rural	934	919	-15

Table 2.3 Sex Ratio

	1991-2001	2001-2011	Different
India	21.5	17.6	-3.9
Urban	31.5	31.8	+0.3
Rural	18.1	21.2	-5.9

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 same. The improvement in overall sex ratio is largely in urban areas.

Though the Urban Child sex ratio is far worse than in the rural areas, the fall in Child sex ratio in rural areas is around 4 times that in urban areas. In fact, the decline is more gradual in urban areas.

There is a decline of 8.9 million children in rural areas, while in urban areas has shown increase of 3.9 million.

Table 2.4 Literacy Rate

	2001	2011	Difference
overal l India	64.8	74.0	+9.2
Urban	79.9	85.0	+5.1
Rural	58.7	68.9	+10.2

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

There has been a vast change in villages in Gujarat from 2011 and now. Proper education systems, proper transportation system, connectivity with the outer world, electrical benefits, proper health care centers, awareness among farmers for a better yield in crop production, organic farming and its implementation, internet connectivity, sustainable development, use of renewable energy sources, etc. different government and non-government initiatives has helped a lot in development of the villages and its people leading them to a better living standard and urbanization.

2.6 Rural Development Issues - Concerns – Measures

The Rural Society of India is very much backward. It backwardness is very much due to the several problems that haunt the Rural Society. The process of change is very slow and so the problems are more or less age old in recent years, the process of change has been accelerated and so new problems are also cropping up.

1. The financial, manpower and managerial resources devoted to the implementation of rural development programs are utterly inadequate.
2. Better implementation of rural development programs can be ensured only if those responsible for actual implementation are paid reasonably well, appropriately trained, and sufficiently motivated. But this has not been done as yet.
3. People are directly or indirectly dependent on agriculture and a large number of landowners have small and medium-sized landholdings. The upper caste people still hold large lands while people of the lower castes own either marginal land or work as landless laborer.
4. It is being increasingly observed that the objectives of one program conflict with those of others, and there is no institutional mechanism for reconciling them. Consequently, many programs utterly fail in fulfilling their objectives. In addition, they also affect other programs.
5. In many cases, instruments of rural development are not properly selected, and their levels are not consistent with the objectives they seek to achieve. The is results in the wastage of valuable public resources, and unnecessary delays in achieving the objectives.
6. Honesty, hard work, helping others, thrift and such other virtues indirectly help in economic development. In the Indian context, not much attention has been paid to this aspect of development.
7. Observance of rituals, lack of rational decisions in economic matters, spending huge amounts of money on marriage, birth or death ceremonies, prevalence of the caste system and the joint family system in the rural areas and illiteracy are some of the factors which

arrest the rural development in India.

8. The political parties have a vital role to play in rural development. But unfortunately this role has not been effectively realized by any democratic political party so far. The political parties, today, are guided more by party interests rather than by national interests.

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

Improving the Competitiveness of Agricultural and Forestry sector

While agriculture is increasingly losing importance as a predominant activity in a growing number of rural areas, it still matters a great deal for the management of the EU territory, for its contribution to rural economies, and for supplying food and public goods and services. At the same time competition in this sector has increased due to the growing liberalization of agricultural trade. To meet these challenges, efficiency and competitiveness remain key aims while taking into account the diversity of agricultural potential in different rural areas, especially in the new Member States whose rural areas will continue to undergo far-reaching structural change. Competitiveness requires that a reasonable balance is found between farm viability, environmental protection, and the social dimension of rural development. To enhance competitiveness investment support for physical capital will remain important. At the same time investments in human and social capital will be ever more important to enable agriculture and forestry to remain an innovative and dynamic sector contributing to growth in rural areas.

Pursuing competitiveness means improving the economic performance of agriculture by, for example, reducing production costs, increasing the economic size of holdings, promoting innovation and more orientation towards the market. Increasing competitiveness must also take advantage of the opportunities offered through diversification of economic activities, a focus on food quality and safety, value-added products that consumers demand, including non-food products and biomass production, and on cleaner and more environmentally friendly production techniques.

Under this kind of process, 4 Groups can be formed to understand concept behind Rural

Development .

1. Human resources
2. Physical capital
3. Food quality
4. Transitional measures for the new Member States

1. Human resources:

Young farmers, early retirement, training and information, farm advisory services. A series of measures target human resources within and linked to the agriculture and forestry sectors. Vocational training and information actions are available to all adult persons dealing with agricultural, food and forestry matters in order to provide an appropriate level of technical and economic expertise covering issues under both the agricultural and forestry competitiveness and the land management and environmental objectives.

Support is provided to young farmers (under 40 years of age) to facilitate their initial establishment and the structural adjustment of their farms after their initial setting up. With the new Regulation, the setting-up support will be made conditional to the establishment of a

business plan which will be an instrument to ensure over time the development of the activities of the new farm. Early retirement involves offering financial incentives (annual payments) to older farmers and farm workers to leave the farm earlier than planned. The land released may be transferred to another farmer able to improve the economic viability of the holding, or assigned to non-agricultural use.

Support can also be granted to help farmers and forest holders to cover costs arising from the use of advisory services for the improvement of the overall performance of their holdings. Finally, support will be available for the setting up of farm management, farm relief and farm advisory systems as well as for forestry advisory services.

2. Physical capital:

The EU provides support for modernization of agricultural holdings aimed at modernizing and improving their overall performance through the introduction of new technologies and innovation, targeting quality, organic products and on/off farm diversification, including non-food sectors and energy crops, as well as improving the environmental, occupational safety, hygiene and animal welfare status. Investments could, for instance, aim to modernize farm machinery and equipment so as to meet one of these objectives. Support is also available for the improvement of the economic value of forests through investments.

Improvements in the processing and marketing of primary agricultural and forestry products can also be financed under the measure Adding value to agricultural and forestry products. This measure aims to improve efficiency in the processing and marketing sector, promote the processing of agricultural and forestry production for renewable energy, introduce new technologies and innovation, open new market opportunities for agricultural and forestry products, put emphasis on quality, improve environmental protection, occupational safety, hygiene and animal welfare. With the new Regulation, support will be focused on micro, small and medium-sized enterprises8 and other enterprises under a certain size (up to 750 workers) as these are better placed to add value to local products and to enhance the local growth potential.

Support will also be available for the cooperation for development of new products, processes and technologies between farmers, the food and the raw materials processing industry and other parties to ensure that the agriculture and food sector and the forestry sector can take advantage of market opportunities through widespread innovative approaches in developing new products, processes and technologies.

Finally, support will be also available for infrastructure related to the development and adaptation of agriculture and forestry to cover operations related to access to farm and forest land, land consolidation and improvement, energy supply and water management.

3. Quality:

Under food quality, two measures exist: incentive payments for farmers and information and promotion actions. Incentive payments will be available for farmers who participate voluntarily in EU or national schemes designed to improve the quality of agricultural products and production processes and which give assurances to consumers on these issues. The following EU quality schemes are eligible for support:

- Protection of geographical indications and designations of origin for agricultural products and foodstuffs
- Certificates of specific character for agricultural products and foodstuffs,
- Organic production of agricultural products and indications referring to these,
- Quality wine produced in specified regions.

In addition, Member States may offer aid for other national food quality schemes recognized within their programs if they respect a set of EU criteria. Participating farmers may receive annual payments for up to five years and up to a maximum of EUR 3000 per holding per year. Second, support will be possible for producer groups for activities intended to inform consumers about, and promote, the products produced under quality schemes recognized under the first measures above, at up to 70 % of eligible project costs.

4. Transitional measures for the new member states:

Support will be available during the period 2007–2013 for the new Member States via the measures supporting semi subsistence farming and the setting up and operation of producer groups in order to ensure a smooth transition for these countries which address their particular challenges.

Improving the Environment and Countryside

Payments under Axis 2 aim at ensuring the delivery of environmental services by agri-environment measures in rural areas, and preserving land management (including in areas with physical and natural handicaps). These activities contribute to sustainable rural development by encouraging the main actors (farmers, foresters) to keep up land management so as to preserve and enhance the natural space and landscape. This means protecting and improving environmental resources, and ensuring the sustainable use of forestry resources. Such measures also help prevent the abandonment of agricultural land use through payments to compensate natural handicaps or handicaps resulting from environmental restrictions. Co-financed activities should clearly target EU priorities such as combating climate change, enhancing biodiversity and water quality, or reducing the risk or impact of natural disasters.

A general condition for the measures under Axis 2 (at beneficiary level) will be respect of the relevant EU and national mandatory requirements (cross-compliance). If these requirements are not complied with, payments in some measures of Axis 2 can be reduced or cancelled

Measures can be classified in the following Groups

1. <u>Sustainable use of agricultural land</u>

Farmers play an essential role in providing environmental services and therefore, payments may be given to farmers who sign up voluntarily to agri-environmental commitments for a minimum period of five years. Longer periods may be set for certain types of commitment, depending on their environmental effects. Payments are annual, calculated according to the income loss and additional costs resulting from the commitments made, including the costs for letting the transaction take place. Agri- environmental measures are the only compulsory measure to be included in the rural development programs.

This illustrates the political priority attached to the measure. Support for non-productive investments linked to the achievement of these agri-environmental commitments is also available.

In order to compensate farmers for costs incurred and income foregone resulting from disadvantages in the areas concerned related to the implementation of the Nature 2000 network13, and the implementation of the Water Framework Directive14 the Regulation has introduced the possibility to grant annual payments.

The existing arrangements for less favored areas will continue until 1 January 2010 when, subject to an act of the Council, the delimitation of the ‘intermediate zones’ will be

redefined. Existing delimitation for the intermediate zones had been partly based on outdated socio-economic data. The new delimitation will be based on a revised set of criteria such as soil productivity and climatic conditions and on the importance of extensive farming activities for land management. For mountain areas and areas with specific handicaps the current criteria will continue to apply.

Animal welfare payments will be also available for farmers who make on a voluntary basis animal welfare commitment going beyond the relevant mandatory standards

2. Sustainable use of forestry land

Forestry is an integral part of rural development and support for sustainable land use should encompass the sustainable management of forests and their multifunctional role. Forests create multiple benefits: they provide raw materials for renewable and environmentally friendly products and play an important role in economic welfare, biological diversity, the global carbon cycle, water balance, erosion control and the prevention of natural hazards, as well as providing social and recreational services. In this context, support will be available for the first afforestation of agricultural land, first establishment of agroforestry systems on agricultural land, first afforestation of non-agricultural land, Natura 2000 payments to private forest owners to compensate for costs incurred and income foregone resulting from the implementation of the Natura 2000 network, forest-environment payments, actions to restore forestry potential and prevention actions and non- productive investments linked to forest-environment payments.

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

Rural electrification is the process of bringing electrical power to rural and remote areas. Currently, all the villages in India have been electrified i.e. 29 April 2018[26] but it doesn't mean that all households are electrified. By India's own set standards, only 10% of households in a village must have electricity for it to be considered electrified. As of August 2018, 91% of the total households are electrified in India. Rural areas in India are electrified non-uniformly, with richer states being able to provide a majority of the villages with power while poorer states still struggling to do so.

The Rural Electrification Corporation Limited was formed to specifically address the issue of providing electricity in all the villages across the country. Poverty, lack of resources, lack of political will, poor planning, and electricity theft are some of the major causes which have left many villages in India without electricity, while urban areas have enjoyed growth in electricity consumption and capacity. In order to drastically increase electrification rates, the Indian Government has set the target of 175GW of installed renewable energy by 2022 and mandated the electrification of over 18,000 villages. At the end of 2016, India had around 45.6GW of installed renewable energy with a vast amount of work and investment required to meet their lofty targets.[27] The central government is increasingly trying to improve the dire conditions by investing heavily in biogas, solar as well as wind energy. Programs such as The JNN solar mission and Pradhan Mantri Gram Vidyut Yojana are also known as the Saubhagya Scheme have been announced to fasten the pace of electrification and diversify the procedure. The work is also on-going for reducing wastage, providing better equipment and improving the overall infrastructure for electrical transmissions in villages.

2.9 Other Projects / Schemes of Gujarat / Indian Government

Table no. 2.9 Various Projects Schemes

Sr. No	Title	Scheme details Website Link
1.	MGNREGA	https://nrega.nic.in/netnrega/mgnrega_new/Nrega_home.aspx
2.	PMAY-G	https://pmayg.nic.in/netiay/home.aspx
3.	Water Conservation Stories	https://nrega.nic.in/netnrega/JalShakti/MGNrega_water_conservation.aspx
4.	Sabki Yojana Sabka Vikas	https://gpdp.nic.in/
5.	DISHA	https://rural.nic.in/disha
6.	Mission Antyodaya	https://missionantyodaya.nic.in//
7.	DDUGKY	http://ddugky.gov.in/
8.	PMGSY	https://pmgsy.nic.in/
9.	SPMRM (RURBAN)	https://rurban.gov.in/
10	SwachhGram	https://rural.nic.in/swachhgram
11	Gram Swaraj Abhiyan	https://rural.nic.in/gram-swaraj-abhiyan

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

3.1 Introduction: Concepts, Definitions and Practices

A Smart Village is a concept adopted by national, state and local governments of India, as an initiative focused on holistic rural development, derived from Mahatma Gandhi's vision of Adarsh Gram [1] (Ideal Village) and Swaraj (Self Reliance).

The Civil Concept of Smart Village is to provide efforts for sustainable development by providing basic amenities like proper housing facilities, proper health care centers, sanitation, safe drinking water, internal road, tree plantation, water conservation, transportation, irrigation facilities for agriculture, etc.

The Electrical Concept of Smart Village is to provide electricity to provide proper electricity supply, connectivity to the outer world, digitization of the village, using sustainable energy forms for electricity generation like wind energy and solar energy, etc.

Practices involved in a smart village are having proper road network with good roads, using renewable energy sources for water pumping in fields like solar energy, wind energy, etc., use of various digital facilities like remote sensing, weather forecast, etc. for crop production, proper communication facilities like mobile coverage, internet, wi-fi,etc. , fire safety, security cameras, water treatment plants to provide pure potable water, proper educational and sports facilities like school buildings and sports grounds and online expert lecture for the farmers regarding help for crop production.

3.2 Vision-Goals, Standards and Performance Measurement Indicators

Vision-Goals:

The vision of smart village is that modern energy access can act as catalyst for development in education, health, productive enterprise, clean water, sanitation, environmental sustainability and participatory democracy which helps to support further improvement in access to energy.

Standards:

While we look forward into a smart future, with a sense of energy independence and lesser carbon footprints simultaneously we will have to focus on areas which need to be accounted, for giving the term "Smart Village its complete meaning Issues keep clean metalled road proper inter and intra village connectivity, dust free lanes & streets, hygienic and dean wafer supply and access to all primary and secondary Schools with industry driven education community Library with E Library facility, professional institutions within an area of 10 km proper means for Health Check-up and treatment access to multi-facility Hospital within an area of 10 km and primary health centre in each village, empowered panchayats for setting disputes, if possible produce its own grains, vegetable fruits and khadi, fixed place for evacuation along with proper disaster management planning. W-FU Broadband connectivity, recreation and playgrounds for adults and children village theatre, smart schools and public

halls, cooperative activities, common place for grazing cattle, access to seeds, fertilizers, pesticides etc. within an area of 5 km access to means for markets, industries and income marimization access to best practices for agriculture, horticulture, sanitation etc Solid waste management processes, sewage treatment plants and proper water harvesting and management techniques has to be added as per feasibility of the system.

Also, we need to develop a sound 1000-economic party for getting desired results. It is believed that the smart paradigm should cover smart homes as a way of enhancing the quality of life (Harper, 2003 & Kim et al 2012) We need to constantly work on as us therapy for all up to a certain basic course, ensuring an individual is working or have means to work everyone is ensured of a pucca house along with availability of proper food, water and clothing for all seasons All individuals must have a bank account, mobile phone and internet connectivity along with access 1o all basic facilities within the village premises A society having proper scientific limper and a sound social basis free of discrimination is a must for achieving such targets Thus, the model would account for a holistic change in people especially those in rural communities.

Performance Measurement Indicators:

1. **Economic factors in the local territory**

- Employment
- Wages and salaries
- Real estate in village/neighborhood (sa-particularly the seasonality of real estate usage)
- Migration (sa-particularly seasonal migration)
- Entrepreneurship in local territory and in municipality (region) (se-in the fields that are directly connected with sea resources)
- Spending of municipalities on social and other support or discounts for taxes in the village/neighborhood (if applicable; for land or real estate)

2. **Social factors in local territory**

- Structure of inhabitants
- Nationality
- Size of the household
- Level of education
- Treatment of foreigners in the local territories

3. **Environmental**

- Housing information
- Quality and volume of resources delivered and produced in the local territory
- Environmental information (se—protected areas, protection and sustainable usage of sea resources)
- Property structure
- Ecological structure (se-sea resources and the influence of climate changes on these resources)

4. **Cultural**

- Cultural activities.
- Free time for local inhabitants (cafes, walks, forest, shops, short migration, homes, and sport)
- Number of tourists per year, spent financial resources

- Historical links with the territory, traditions in the local community (coffee, sauna, fish smoking, berry picking, etc.) (se—fishing traditions, recreation traditions)
- Population activity and level of cooperation with the municipality

5. Service basket

- Taxi
- Public transport
- Regional and government centers
- Regulations in place
- Health services
- Shop services

3.3 Technological Options

- Enhanced use of fiber optics and smart phones for internet
- Online library and E-education
- E-assistance for farmers on agricultural production and yield
- Smart agriculture techniques like solar water pumps, water harvesting, weather forecast, hybrid seeds, and smart apps for crop marketing and selling, etc.
- Smart sewage management and sanitation
- Smart waste disposal techniques
- Use of renewable energy sources like bio-gas, solar energy, wind energy
- Good irrigation facilities
- Smart dairies, etc.

3.4 Road Map and Safe Guards

Accordingly, one should be clear about the path forward in creating Smart Villages. For example, given the sheer size of a city, a green-field or brown-field Smart City is always viable. Conversely, villages tend to be smaller. Therefore, transforming one village at a time into a Smart Village would erode economies of scale.

Instead, a cluster of villages needs to be taken together in order to make the Smart Village concept viable and economical. A series of contiguous villages in specific Gram Panchayats could be taken up jointly for developing into Smart Villages. India has about 638,000 villages. Around 100 clusters of potential Smart Villages can be created across India, with each cluster holding about 12-15 villages.

That comprises the first challenge. The second lies in finding appropriate products and services as well as suitable vendors to do justice in creating the Smart Village within allocated timelines. In this context, the Government will do best to use experienced, tried-and-tested vendors to implement its mandate. The project could then be commissioned via the PPP (public-private partnership) model.

Simultaneously, it must be borne in mind that electricity is the prime element in the success or failure of a Smart City or Smart Village. Rural electrification will, therefore, be a crucial cog in the success of Smart Villages. Without uninterrupted power supply, Smart products and services would fail to function satisfactorily since connectivity is a key element for Smart devices.

As GDP growth falters temporarily due to the economic challenges a focus on Smart Villages could help bolster the agenda of inclusive development. Smart Villages can then emerge as an apt solution to stop rural migration and transform India's villages by turning them into self-sufficient ecosystems.

3.5 Issues and Challenges

People related problems.

1. Traditional way of thinking
2. Poor understanding.
1. Low level of education to understand developmental efforts and new technology
2. Deprived psychology and scientific orientation ·
3. Lack of confidence.
4. Poor awareness.
5. Low level of education.
6. Existence of unfelt needs.
7. Personal ego.

Agriculture related problems

1. Lack of expected awareness knowledge skill and attitude
2. Unavailability of inputs
3. Poor marketing facility
4. Insufficient extension of staff and services.
5. Multidimensional tasks to extension personnel
6. Small size of landholding
7. Division of land
8. Unwillingness to work and stay in rural areas

Infrastructural related problems

Poor infrastructure facilities like-

1. Water.
2. Electricity
3. Transport
4. Educational institutions
5. Communication
6. Health
7. Employment.
8. Storage facility etc.

Economic problems.

1. Unfavorable economic condition to adopt high cost technology
2. High cost of inputs.
3. Underprivileged rural industries.

Leadership related problem

1. Leadership among the hands of inactive and incompetent people
2. Self-interest of leaders
3. Biased political will

Administrative problems

1. Political interference
2. Lack of motivation and interest
3. Unwillingness to work in villages

4. Improper utilization of budget
5. No proper monitoring of programs and lacking their implementation

3.6 Smart Infrastructure - Intelligent Traffic Management

Smart Infrastructure includes

- Proper pucca households of cement concrete,
- Proper health facilities
- Small scale industries
- Concrete pavement roads
- Smart buildings for fire safety and security
- Automation
- Water treatment plants
- Sewage treatment plants
- Biogas production from agricultural waste
- Electricity production with the help of solar and wind energy
- Proper planning and distribution of households
- Formation of different markets for different purposes
- Mobile coverage and internet connectivity towers
- Wi-Fi connectivity in the entire village
- Smart irrigation techniques
- Proper road network distribution throughout the village to avoid unnecessary traffic, etc.

3.7 Cyber Security or any other concepts

Cyber security plays a great part in our lives in this modern world. Crimes life identity theft, frauds, money withdrawals, fake calling, fake news and rumors, etc. are a major concern these days. People in the village shall be made well aware and must be properly educated about this kind of threats and crimes. They should know about bank frauds and money withdrawals due to PIN or OTP sharing, and report a crime immediately if anything goes wrong to the nearest police station or cyber-crime department. Internet frauds in the name of agricultural guidance and selling of duplicate products and wrong materials must be avoided. A session on cyber security must be organized by the local officials in their own language.

3.8 Retrofitting- Redevelopment- Greenfield Development District Cooling Strategic Options for Fast Development

Retrofitting of a village refers to up gradation in the infrastructure, amenities and system of the village to provide a better living standard and increase its efficiency. For example, retrofitting of an irrigation canal in the village to increase its efficiency of water discharge into the nearby fields.

Redevelopment of a village refers development in the existing infrastructure and amenities that would be helpful to the people of the village. For example, redevelopment of schools to provide better and higher education with the help of information technology, redevelopment of the public offices to provide proper assistance to the people, redevelopment of the sports fields and the recreational facilities in the village.

Greenfield development refers to growing and proper care of village plantation and vegetation, increase in the agricultural yield with the help of modern technologies, guidance

to the people regarding different crops and vegetation, spreading awareness of importance of vegetation and tree plantation.

This development and increase in vegetation will lead to less pollution and will lower the temperature of the area. It would eventually lead to a cooling atmosphere in the whole area. Increase in oxygen supply can be seen and in summer it would be a major benefit for a tropical country like ours.

3.9 Strategic options for fast development

Factors	Strategy	Way
Bio-environmental	Bio-environment management for natural resources	1) control the soil erosion 2) manage the forest and water resources
Economical	Developing the infrastructure (infrastructure development)	1) improve the accessibility roads to villages 2) remove the infrastructure obstacle
Socio-cultural	Control the immigration rate	1) increase the welfare services capacity 2) preserve the culture genuine of a village
Legal-political	Partnership development in planning	1) make new opportunities for the presence of native partnership in decision making 2) give the responsibilities to natives people

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

The Compendium on 'Good Practices in Water Supply and Sanitation in Indian cities' seeks to showcase select good practices across a variety of sub-themes in the water and sanitation sector. The objective of this Compendium is to draw insights on underlying success factors and contextual nuances in these cases and to distil possible lessons and insights for wider adoption/replication across cities in India.

In order to ensure that the Compendium reflects the diversity and multi-dimensional nature of issues confronting India's urban water and sanitation sector, the projects/initiatives were categorized under five themes. These five categories include: (a) Governance and Institutional strengthening, (b) Information management and efficiency improvement, (c) Environment sustainability and technology adoption, (d) Community par- titivation and citizen service and (e) Financial sustainability.

The Compendium details ten case studies under each of these five categories, with the first case as a detailed case (D) and the second one a snapshot case (S). A brief description of each of these themes and a short abstract of the cases profiled in the Compendium are provided below:

Theme 1 governance and institutional aspects

Projects selected under this category involved improvements in governance and institutional structure with a focus on organism- tion and modes of service delivery.

Nagpur- City-wide public-private partnership for water supply

This case profiles the initiative of Nagpur Municipal Corporation (NMC) to implement a 25-year Public-Private Partnership (PPP) project for provision of continuous water supply on a city-wide scale. It offers vital lessons and insights for other cities seeking ways to transform their water supply service delivery by emphasizing the need for holistic planning and an integrated set of actions for implementing city-scale PPPs and highlights the need for

institutional clarity, balanced contractual arrangements, political/administrative commitment, rigorous stakeholder engagement and consumer communication processes, and provides some insights for sequencing of tariff reform.

Surat -formation of a non-revenue Water (nrW) cell

One of the pioneering initiatives of the Surat Municipal Corporation (SMC) was the setting up of an NRW cell as an institutional response for tackling non-revenue water. This case elaborates the activities and positive outcomes for creating accountability and early enthusiasm leading to the tangible results of leakage mapping exercise carried out by NRW cell of SMC. Following the initial leakage mapping exercise, the number of leakages was reduced by 30% annually in all zone.

3.11 Initiatives in village development by local self-government

Local initiatives can be taken for self-development of the village. For this various local officials and panchayat office can help in a major way. The village people can also help in the process. Initiatives like:

- Proper lighting in the village
- Proper roads
- Proper waste management
- Proper irrigation system
- Educating the people about sustainable development,
- Making them aware about the safety measures and cyber security
- Use of internet facilities and information technology for educational and business purposes, etc.
- Tree plantation in the village for greenfield development
- Maintain cleanliness of the villages
- Using safety norms against harmful diseases such as Covid-19.

3.12 Smart Initiatives by District Municipal Corporation

A Smart City Advisory Forum will be established at the city level for all 100 Smart Cities to advise and enable collaboration among various stakeholders and will include the District Collector, MP, MLA, Mayor, CEO of SPV, local youths, technical experts, and at least one member from the area who is a:

- President / secretary representing registered Residents Welfare Association,
- Member of registered Tax Payers Association / Rate Payers Association,
- President / Secretary of slum level federation, and
- Members of a Non-Governmental Organization (NGO) or Mahila Mandali / Chamber of Commerce / Youth Associations.

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

Projects contributed working by the government in Gujarat is as follows

1 Ahmedabad

- Development of Green Areas & Open Spaces
- PPP Based Slum Rehabilitation in Junavadaj area
- Smart Transit: Integrated Transit Management Platform
- Ahmedabad-04-1 Smart Components [City Card Payment System]
- Ahmedabad-03-7 PPP Based Slum Rehabilitation in Junavadaj area[Slum redevelopment]
- Ahmedabad-03-10- Intermodal Transport Hub near Ranipal
- Intermodal hub
- Utility Network (Water, sewerage, drainage, roads, street lighting, etc)
- Wastewater Treatment Plant)
- Command & Control Centre + OFC Network connectivity
- Surveillance Equipment & Integration, Intelligent Traffic Management

2 Vadodara

- Reinvigoration of Vishwamitri Riverfront Influence Area
- Slum free area
- One Vadodara Mobile app
- Urban Mobility
- Development of City Square
- Place making
- Multi utility duct
- WB - Model City

3 Surat

- Remodeling & Restructuring of existing creek to create open spaces
- Affordable Housing (PMAY) (1050 EWS/1950 LIG)
- Affordable Housing (PPP) (5750 Units)
- Surat IT-MAC (Integrated Transport Mobility Administration Center) Intelligent Transit Management System Automated Traffic Control System
- SMAC Center (Smart City Center) MySurat.in [Active Citizen Engagement] Data Center Strengthening & DR Site Open Surat – Open Data Mobile Apps, Mobile tickets, Social Media, M-ID (Mobile ID)
- Surat-01-4 Automatic Fare collection system [Smart cards]
- Surat-01-6 SMAC Center (Smart City Center) [Centralized Command and Control Centre
- Surat-02-39 Biogas plant for organic waste [Waste processing and reuse (including waste-to-energy or fuel)]
- Surat-02-31 Smart Parking (Mechanized Parking) [Parking (including on-street and multi-level car parks)]
- Surat-01-3 Integrated Traffic Control System & Area Surveillance Network [Intelligent traffic management]
- Surat-02-31 Development of Multi-Level Car Parking cum Commercial Complex in Umarwada, Surat City, Gujarat on Design, Build, Finance, Operate and Transfer (DBFOT) Basis under Public Private Partnership (PPP)
- Connected Surat [WiFi-Surat :: FTH (Fiber to Home)]
- Development of ERP with GIS Platform

- Automatic Fare collection system Automated Sliding Door at High Mobility Corridor & BRTS

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

The village of Indonesia that name is Banyuwangi that had implemented "smart kampung". "Smart kampung" related to online services, for example, the management of birth and death certificates. The form of smart kampung was a system. An indicator of smart kampung was the existence of a Wi-Fi network at the village office, which could be accessed freely by the villagers. Meanwhile, "Smart Kampung" program was a program that helped to accelerate and facilitate services to the community like services that was accessed both online and offline.

In India for government document required to go in its regional office which is at in district so villagers need to come at cities. In India for villages we need to develop such system which is online as like "Smart kampung" which is provide online government documentation services so villagers no need to come at in cities.

3.15 Electrical concept (Design Ideal and Prototype model)

The water requirement for agriculture is large. Due to inadequate rainfall, the water requirement is not to be able to meet. Under a conventional irrigation system, irrigated land is either under irrigated or over irrigated resulting in an adverse effect on crop growth and wastage of water. The System which is based on the internet of things logs the sensor data to the cloud and the farmer can monitor and control all the water pumps remotely using the Android application. This project presents an automated irrigation system providing precision agriculture and thus preventing water wastage.

Our project Monitor the weather conditions, soil moisture, and then supplying water depends on the requirement. By taking input from the Soil Moisture Sensor Controller is operate the pump based on the water requirement of corps. When water is enough in a farm sensor is sense and based on that controller will take action. Here we also collect data of sensors in Google spreadsheets and then after according to our data we analyses the condition and at the end of that result we provide input to the pump. And the farmer also monitors the data of the farm and also controls the pump.

We design a model in such a way that water wastage is less as possible through drip irrigation, model is based on IoT so the farmer can easily monitor the farm and pump control through a remote location, also store the data so based on that controller take action of pumping.

Chapter 4 About Meghpar zala Village

4.1 Introduction

4.1.1 Introduction About Meghpar zala Village details

The village is located in Rajkot district of Gujarat. It has total geographical area 1390.03 hectares. It is elevated at a height of 141m above sea level. Pincode the village is 360311. STD code of the village is 02825. Nearby villages are Anida (4 km), Patidad (5 km), Chordi (5 km), Umvada Mota (6 km), Vorakotda (7 km). The village is administrated by Sarpanch who is elected representative of the village. The population of village is 3176. Which is divided into 1669 males and 1507 females?

4.1.2 Justification/ need of study

The rural economy is an example of an agrarian economy. Although farming and agriculture are one of the most important primary activities, the problem lies in the fact that they share in the GDP of the agriculture sector is on a constant decline. At the same time, about two-thirds of India's population depends on agriculture. As a result, the productivity is not up to the mark, with conditions only getting worse.

Moreover, public investment declined since 1991 coupled with a lack of adequate infrastructure, credit, transport, employment, etc. Henceforth the agricultural output has grown at only 3.2% during 2007-2011. All these factors have been denting the process of development. Therefore there is a need to focus on rural development and not just urban development.

4.1.3 Study Area (Broadly define)

The village has 602 households, 2 govt. primary schools. Medical facilities and hospitals are located within 10km. Water supply in the village is covered by untreated tap water, uncovered wells, hand pumps, and tube wells. The village has poor drainage facility and poor garbage disposal system. It has post office with pin code 360311. It has landlines, mobile coverage, PCO, internet. It also has private and public bus services. Nearest railway station and taxi service is within 5km. It is connected by SH, MDR, ODR, WBM. Nearest banking facility is available within 10km. It also has nutritional and community centers. No recreational facilities are available like gardens, sports fields. Major agricultural production is ground nut, cotton, and wheat.

4.1.4 Objectives of the study

- To enhance the standard of living by offering food, shelter, education, employment and clothing.
- To eradicate poverty and increase productivity in villages.
- To involve people in the development and planning through their participation in resolution making.
- To ensure distributive justice

4.1.5 Scope of the study

The study will focus the development trend, intensity of growth of the village, and find out the problems related to the Socio- Cultural or physical development of the area, social infrastructure services, and the administrative systems of the village. Project proposal and sustainability aspect aren't considering in micro level, it is only guiding the way. The study of village gives the reason where there is need of sustainable facilities like infrastructure facilities, community hall, primary health center, post office, general market, pure drinking water, road network, schools, electricity, sanitation, library, aaganwadi, overhead tank, police station, fire station, etc. are available or not.

4.1.6 Methodology Frame Work for development of your village

Project roadmap: Method for development of village
Part-I (Odd Semester) Includes:

- Literature Review
- Visit of Ideal Village of Respective District
- Data Collection- Techno economic survey
- Data Presentation
- Sustainable Design Planning Proposals.
- Repair & Maintenance of Existing Infrastructure
- Facilities Suggestions and Recommendation

Part-II (Even Semester) Includes:

- Gap Analysis (Guidelines, Regulation and Literature will be given for comparison)
- Design Proposals for Over all development of Village includes
  - Physical Infrastructure Facilities
  - Social Infrastructure Facilities
  - Socio Cultural Infrastructures Facilities
- Recommendation & Suggestions For Village Development
- Conclusion

4.1.7 Available Methodology for development of related to Civil/Electrical

Methodology:

- Design objectives
- Technical approach
- Proposed sustainability features
- Identify customer needs
- Identify local/state/federal engineering and construction specifications
- Project management structure
- Budget
- Gantt Chart of project schedule
- Resumes of team members

4.2 Meghpar zala study area profile

4.2.1 Study Area Location with brief History land use details

The village is located in Rajkot district of Gujarat. It has total geographical area 1390.03 hectares. It is elevated at a height of 141m above sea level. Pincode the village is 360311. STD code of the village is 02825. Nearby villages are Anida (4 km), Patidad (5 km), Chordi (5 km), Umvada Mota (6 km), Vorakotda (7 km). The village is administrated by Sarpanch who is elected representative of the village. The population of village is 3176. Which is divided into 1669 males and 1507 females?

4.2.2 Base Location map, Land Map, Gram Tal Map

Base Location Map

Fig4.2.2a Base Map Location

Land Map

Fig4.2.2b Land Map

Gram Tal Map

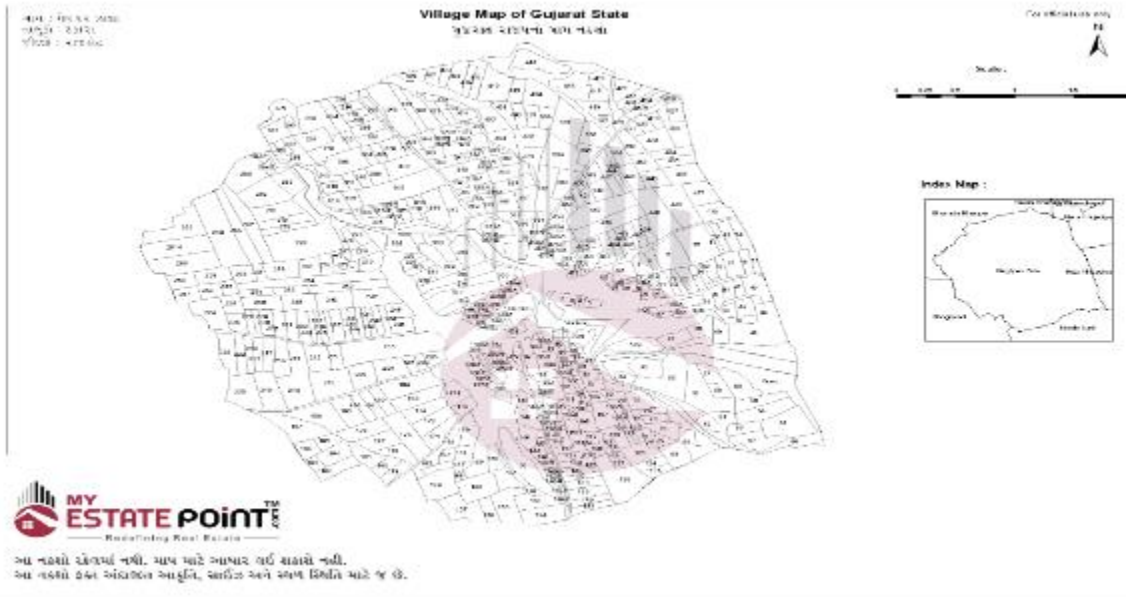

Fig4.2.2c Gram Tal Map

4.2.3 Physical and demographical growth

Around 15 years ago, this village was suffering from the water crisis. About 10 years ago, this village was declared a desert area and put under the arid zone development program of the state government. Due to proper guidance of the sarpanch of the village, new check dams are constructed and various other micro watersheds also created. This leads that the village is having water table near about 3 m from the ground and less than that in some areas. Also village hadn't faced any problem during low rain of about 316 mm (last year rainfall) instead of 500 mm average rainfall for the area, they able to grow crops and had plenty of water that had preserved.

Specific data and numbers can create a much vivid and clear picture of the difference of conditions and positions of moviya in last couple of years according to the census reports.

Table 4.2.3a: Demographical Growth

Sr. no.	Census	Population	Male	Female
1	2011	1079	566	513

Table 4.2.3b: Physical Growth

Sr. no.	Description	Information/Detail
1	Agricultural Land Area (Approx.)	485 hectares
2	Residential Area (Approx.)	11.3 hectare
3	Nearest Town & Distance	Maliya (about 33km)

Table 4.2.3c Occupation Chart

Occupation	**Agriculture**	Business	Labor
Village groups in	70-75%	10-15%	15-20%

4.2.4 Economic generation profile/Banks

The major sources of income are Farming, Animal Husbandry, As Shopkeepers and as workers in mills and factories. The average income of the village dwellers is about ₹6000 to ₹ 25000 per month.
There is one Post Office in Meghpar zala village, There are no banks currently present in meghpar zala village.

4.2.5 Actual Problem faced by Villagers and smart solution

During interaction with people of Meghpar zala village we understood their problems and issues like :

- There are no Public Toilet available in the village
- There are no Reading hall available in the village
- There are no composed Pit available in the village
- There are no Prathmic Arogya kendra available in the village

Smart solutions:
- Public toilet
- Reading Hall
- Solar PV system on the primary school
- Prathmic arogya Kendra

4.2.6 Social scenario -Preservation of traditions, Festivals, Cuisine

The Gujarati's are known for their diverse cultural heritage and rich traditions. It is a vibrant mix of Hinduism, Islam, Jainism and Buddhism and also a blend of different cultures of the Gujarat's like arts, beliefs, customs, traditions, institutions, inventions, language, technology and values. The culture of the people does not stop with one particular generation but instead the elders of the community see to that the future generations also practice it which automatically leads to the wisdom and appreciation of cultural traditions and lifestyles. They also as a part of their culture join hands to greet the guests and the elders. The lifestyle of the people of Gujarat is very balanced because of the fact that they have a perfect system of learning, religious practices and excellent forms of artistic expressions. The culture of the Gujarati's does not only prevails in Gujarat but it has been widespread to different parts of the world and now recognized as an international culture. There is not much of culture shock seen in the people of Gujarat and so it makes people bold and courageous with lot of energy to face different challenges raised by the global scenario.

Mostly Gujarati food is vegetarian because the state is dominated by Jains and the Vaishnavas. Most of their staple food includes wheat and millet varieties like jowar and bajri. No meal of Gujarati will miss roti along with a variety of vegetable curries and dishes. The

food is generally served on a metal tray which is called as thali and 4-5 small bowls placed on it These thali mainly consists of roti, dal or kadhi, sabzi also known as shaak and rice. The Gujarati's are noted for their sweet tongue and every meal will be accompanied by a sweet dish. Sugar is also sometimes alternated by jaggery. Some of the other common food which is a must for the Gujarati's in their thali are dal, steamed vegetables, homemade pickles, buttermilk and salad. Vaghaar is Gujarat food a blend of spices, which is purified in hot oil and then added to the dal. Gujaratis generally use lot of salt, sugar, tomato and lemon in their cuisine. Desserts, which were in the ancient times offered only on festivity or some special occasions, have now found their way in the daily meals. Ghee is a must in the food of Gujarati's. Srikhand is a rich dessert made with curds and spiced with saffron, cardamom, nuts, and fruit. The Gujaratis evening snack include bhakri-shak or khichdi kadhi.

4.2.7 Migration Reasons / Trends

Meghpar Zala migration reasons as per the data available in village profile atlas:

- No. of families who have migrated from village to city for education are 130
- No. of families who have migrated from village to other place in country are 52
- No. of families who have migrated from village to out of country are 18

Reasons: Lack of physical infrastructure facilities in village like community hall, bank, PHC, etc.

4.3 Data collection Meghpar Zala Village

4.3.1 Describe Methods for data collection

The current method for data collection are :
- Census 2011
- Data of year 2001
- Individual interviews
- Observations
- Survey

4.3.2 Primary details of survey

The village is located in Rajkot district of Gujarat. It has total geographical area 1390.03 hectares. It is elevated at a height of 141m above sea level. Pincode the village is 363650. The village is administrated by Sarpanch who is elected representative of the village. The population of village is 1079. Which is divided into 566 males and 513 females?

The village has 211 households, 1 govt. primary schools. Medical facilities and hospitals are located within 10km. Water supply in the village is covered by untreated tap water, uncovered wells, hand pumps, and tube wells. The village has poor drainage facility and poor garbage disposal system. It has post office with pin code 363650. It has landlines, mobile coverage, PCO, internet. It also has private and public bus services. Nearest railway station and taxi service is within 5km. It is connected by SH, MDR, ODR, WBM. Nearest banking facility is available within 10km. It also has nutritional and community centers. No recreational facilities are available like gardens, sports fields. Major agricultural production is ground nut, cotton, and wheat.

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

Geo-Tagging is the process of tagging infrastructure with geographical information like Latitude, Longitude, Distance, place name, etc. It is connected to GPS which are monitored through computer internet networks. It can be used to locate important places like labs, dispensaries, milk center, etc. Geo Tagging is not implemented in Meghpar Zala village.
In Meghpar Zala the average size of a house in village is 4 x 9 m

4.3.4 No. of Human being in one house

Total number of population in Meghpar zala is 1079 as per 2011 census. There are different number of people in each house as there are nuclear families as well as joint families, but the average no of human beings in one house is 3.

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

The materials like milk, other grocery materials, wheat, dangar , cotton and other agricultural cereals are used locally as they are locally easily availablel.

4.3.6 Geographical detail

The total geographical area of village is 1735.72 hectares, elevated 151m above sea level
Latitude: 22.6656

Longitude: 70.6589

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

Total no. hosuse : 211
Population : 1079
SC&ST : 79
Literacy : 65%
Total Workers : 52

4.3.8 Occupational Detail - Occupation wise Details / Majority business.

Major occupations are Farming, Animal husbandry, Labour, etc

4.3.9 Agricultural Details / Organic Farming / Fishery

Majority of the population of Meghpar Zala village are occupied in farming. The main crops grown in the village are: wheat, cotton, rice, etc. There are no any farmers or villagers using organic farming or fishery.

4.3.10 Physical Infrastructure Facilities - Manufacturing HUB / Ware Houses

Transportation facilities are not available from within the village. The village approach roads are not good. Overhead tank is not available. Apart from this primary school, anganwadi, dairy, RO water plant, U/G sump, etc. are also not present in the Meghpar Zala village. There are no any ware houses or manufacturing hub activities active in the Meghpar Zala village.

4.3.11 Tourism development available in the village for attracting the tourist

In Meghpar Zala village, there are no tourist attractions available at the moment.
Tourism Development can be implemented in Meghpar Zala as, Touring Cultural activities, Water-related activities, Health-related activities, Aerial activities, Passive activities, Sporting activities, Hallmark events, Business-related activities etc.

4.4 Infrastructure Details (With Exiting Village Photograph)

4.4.1 Drinking Water / Water Management Facilities

Fig no. 4.4.1 village pond

When we visited village there is one village pond which is empty due to summer season and it is need to redesign or reconstruct for more water storage, for drinking purpose villagers are using wells water.

4.4.2 Drainage Network / Sanitation Facilities

Fig 4.4.2a drainage network

In village drainage system is under construction, they are putting pipe line for drainage also there is one place onside the village where all drainage are collected.

4.4.3 Transportation & Road Network

Fig. 4.4.3a Transportation

Village is not near to highway so single lane road is connecting to the highway and inside the village there is requirement of road construction and some road required reconstruction, also during interaction with villagers they said that during monsoon season sometimes vehicles are stuck in muddy roads.

4.4.4 Housing Condition

Fig 4.4.4a Housing Condition

The housing condition is not good that much in village we got around 65% pakka makans and remain is kachaa makans, also some house conditions are very poor they need to renovation and reconstruction.

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

The village Meghpar Zala consists of primary govt. schools, lacks hospitals and health centers, community halls, libraries, etc. which need to develop.

4.4.6 Existing Condition of Public buildings & Maintenance of existing Public Infrastructure

In the meghpar zala village as per the interaction with the villagers the maintenance is required in the village. Drainage is not proper and requires too much development. Primary school are also not in good working condition. The roads also require to be worked upon.

4.4.7 Technology Mobile/ WIFI / Internet Usage Details

Almost in all the households the villagers have mobile phone but only few are using internet facilities. One internet café is available in pachayat, there are no private WIFI users in the village as per the data collected.

4.4.8 Sports Activity as Gram Panchayat

There are no any sports activities are being done by gram panchayat. The primary school has some sports equipment and tools & also children and students are using these facilities.

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

The Meghpar Zala village has panchayat building and it is in good condition. Public Library is not available in the village. Dairy building is not available in the village. A small playground outside the primary school is present. The village has no public garden, separate play ground or any other recreational facilities.

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

There is no any kind of facilities like smart toilet-coin operated entry, footpath development, self- cleansing, waterless public building, etc. in the Meghpar Zala village.

4.4.11 Any other details

The farmers have farming equipment's like tractor, etc. in village.

4.5 Existing Instution Like- Village Administration - Detail Profile

4.5.1 Bachat Mandali - Not present in village

4.5.2 Dudh Mandali – Not present

4.5.3 Mahila Forum – Not present

4.5.4 Plantation for Air Pollution – Not adequate plantation

4.5.5 Rain Water Harvesting – Not practiced

4.5.6 Agricultural Development – Need advanced tools

4.5.7 Any Other – Needs reconstruction of bus stands, public health centers, and installation of solar panels, etc.

Chapter 5 Technical options with case studies

5.1 Concept(Civil)

5.1.1 Advance Construction techniques

The Indian advanced construction techniques industry is experiencing a period of fast growth. Aiming to overcome the housing problem, it also has to face the dual challenge of fulfilling the needs of the client and maintain the quality standards.

At the same time, the up-gradation of technology through the adoption of new techniques has become necessary to survive in a tough competitive environment.

The traditional methods of construction are inadequate in executing the work speedily with economy and quality. The construction industry in India must switch over to advanced construction techniques to achieve its goal in "minimum time with maximum efficiency"

Advance Construction Techniques – Necessity

1. The building construction activity, especially the residential and commercial complex is highly labor intensive with very little mechanization. Approximately 35% of the total construction cost is spent on labor.
2. The laborers have their limitations and may fail to meet the time limits. The quality of workmanship, too, differs from person to person. Hence, quality standards cannot be maintained. Wastage of material is considerably high as it is handled and utilized manually.
3. The objective of the construction organizations should be 'speed and economy'. This cannot be achieved with labor oriented advanced construction techniques.
4. Only studying and adopting modern industrial techniques and equipment is the solution. By this, one can save material, reduce labor expenses, and increase the speed of work, leading to the economy in construction.
5. Though the scope of the subject is vast, in this chapter we shall discuss only the advanced techniques to be used in advanced construction techniques activities.

EQUIPMENT USED FOR SMALL AND MEDIUM CONSTRUCTION WORK

The equipment with proven utility in building construction may be as listed below

- Chain and pulley block.
- Grouting pumps.
- Sprayers for painting work.
- Tile cutters.
- Portable hand drilling machines.
- Horizontal trolleys, wheelbarrows.
- Pumps.
- Vibrators for compaction of concrete, surface vibrators.
- Auto ramming concrete block machine.
- Sand washing machine.
- Vertical lifts, hoists, winches.
- M.S. tubular scaffolding and formwork.
- Concrete mixers.
- Cranes.
- Earth excavators.

USE OF COMPUTER IN BUILDING CONSTRUCTION TECHNOLOGY

With the evolution of computer technology, the dimensions of the computer have shrunk while increasing its power and speed. The advanced technology of computers has valuable applications in building construction. They are

- Construction management.
- Structural design.
- Estimation and costing
- Financial management.

5.1.2 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure.

Concrete is one of the most widely used construction materials in the world, with many key advantages such as formability and durability. Concrete also has high compressive strength, which is defined as the maximum compressive load a body can bear prior to failure. However, concrete is actually quite weak in tensile strength, meaning that concrete is not an ideal material if the structure is subjected to tension.

Due to this inherent weakness in concrete, another material is needed to strengthen the tensile strength and avoid unacceptable cracking and even failure. Steel reinforcing bars can be added to resist the tension a load could cause for the structure. However, with the added material, new problems arise, such as corrosion of the steel rebar, which can cause a new set of issues for a construction project.

Overall, corrosion is a natural and costly process of destruction, just like earthquakes, floods and the occasional destruction caused by a tornado. However. Unlike the onslaught of a tornado or earthquake, corrosion is silent and can be prevented, or at least controlled. The ASTM (American Society for Testing and Materials) defines corrosion as: ‘the chemical or electrochemical reaction between a material and its environments that produces a deterioration of the material. In the same vein, corrosion is a naturally occurring process and all natural processes tend toward the lowest possible energy states.

Corrosion of reinforcing steel in concrete is a global problem, deteriorating structures at an extremely high rate. The issue makes up for more than 80 percent of all damage to reinforced concrete structures, continuing to rack up repair costs for countries. A 2011 report in the Journal of Climatic Change noted that the annual cost of corrosion worldwide is estimated to exceed $1.8 trillion. With repair to steel in concrete climbing, sustainability measures cannot be feasibly met.

Corrosion

Fig. 5.1.2a when the signs of damage became visible of corrosion

There are three essential components necessary for corrosion in reinforced concrete: steel, water, and oxygen. Eliminating any one of these will prevent the chemical reaction and damage incurred due to corrosion. This is why there is no corrosion in dry concrete and also why concrete fully submerged in water has limited corrosion.

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Overall, concrete is a great host for rebar. Due to the high-alkalinity of concrete, the steel reinforcing bars are passivized by an iron oxide film (Fe2O3) that provides a protective layer to the steel. In this state, concrete normally provides reinforcing steel with corrosion protection. However, while hardening, concrete develops minute pores which become a potential source for the ingress of corrosive agents into the concrete. These corrosive agents, entering into the concrete through the voids, leads to the passive protection layer breaking down around the concrete. Without the passive iron oxide film protecting the steel, corrosion is able to commence at a much higher rate.

The passive layer can deteriorate over time due to atmospheric carbon dioxide (CO2), which, through a process called carbonation, lowers the pH of the concrete until the passive layer becomes unstable. The passive layer can also be rapidly broken down by aggressive chemicals, such as chloride, that are present in coastal environments or used in de-icing chemicals. Once the passive layer is compromised, steel reinforcement corrodes when moisture and oxygen are present at the steel's surface.

The climatic conditions of an area have a great influence on the corrosion rate. In extreme climatic conditions in coastal regions, the rate of corrosion will be high. For example, the Gulf Coast has an extremely aggressive environment, characterized by high ambient temperature and humidity conditions, severe ground salinity with high levels of chlorides, and sulphates in the groundwater. Other factors accelerating the rate of corrosion are the poor quality of construction materials, particularly the aggregates, and the presence of high concentrations of sulphate salts in

Negative Effect

As mentioned earlier, corrosion is a natural process. Steel is a manufactured material produced from iron oxide or iron ore. Unfortunately, the energy added in the refining process also contributes to its instability. When a suitable environment or condition arises, steel releases energy and converts itself into iron oxide. This natural state of iron is a thermodynamically stable material.

The steel rebar used in concrete strengthens the structure by providing a solid tensile strength concrete normally lacks. When the steel begins to rust and produce pits or holes in its surface, a reduced strength capacity is seen, which negatively affects the structure's viability.

Corrosion begins to affect a concrete structure's integrity when the products of corrosion (i.e. rust) occupy a greater overall volume than the original steel. This expansion then creates tensile stresses in the concrete that because the concrete to stain, crack, and spall. By the time the signs of damage become visible externally, as in on the outside of the concrete structure, the extent of the corrosion of reinforcement steel has reached an advanced stage. At this

point, regardless of where the site is located, the rehabilitation costs will be expensive, and the repair process complicated.

There are multiple steps on the way to corrosion, beginning with aggressive elements, such as chloride ions or carbon dioxide being present in the surrounding medium and penetrating the concrete. The second stage after 'initiation' is 'propagation,' which happens when these aggressive bodies are in rather high concentrations at the reinforcement level. The passive layer is gone and corrosion damages the structure at a much higher rate.

Subsequent to corrosion, cracks appear on the external concrete surface. Cracks are a direct path for corrosive agents to penetrate and reach the steel. These cracks will further progress and develop into spalls to the point where the functional service life is reached, prematurely. Therefore, water must be kept from penetrating the reinforced concrete and diverted away from attacking the steel rebar within.

Traditional Methods to prevent corrosion

There are some methods for controlling the corrosion of reinforced concrete. An effective corrosion control system should extend the time to corrosion initiation or, reduce the corrosion rate of embedded steel, or do both.

Some of the traditional measures used to combat the corrosion of reinforced concrete are:

- Catholic protection;
- Corrosion inhibitor admixtures; and
- Anti-corrosion coating.

Unfortunately, these traditional methods meant for tackling concrete corrosion have proven to be less effective than desired considering the current state of deteriorating infrastructure. Thick or dense concrete cover over reinforcing steel will help, but still leaves the concrete vulnerable to cracking and a whole new set of issues. Corrosion inhibitors provide only temporary protection. Catholic protection is expensive and has its own downsides, and repair procedures often have short service lives and may be continuously reinstalled.

The constant repair of reinforced concrete infrastructure results in high lifecycle costs over the structure's required service life. Overall, the shortfall of traditional corrosion preventative measures is they do not adequately prevent or counteract the development of corrosive conditions in the concrete.

As mentioned, water is one of the three required elements for corrosion to occur. Water also acts as a carrier for chloride ions, which is the leading cause of deterioration of the passive layer that would otherwise protect the rebar. Hence, the critical factor in the corrosion of steel reinforcement, as well as concrete deterioration all together, is the penetration of water and waterborne chlorides into concrete.

Therefore, the first line of defense against corrosion in reinforced concrete is to prevent the penetration of water. It is important to use concrete with low permeability and to use an appropriate amount of concrete cover for the application.

Waterproofing strategies

Concrete is a hard material with a network of openings such as capillaries, pores, cracks, and micro-cracks. Water can pass through unprotected concrete, acting as a carrier for aggressive chemicals like chloride, which will corrode reinforced steel rebar.

With the exception of mechanical damage, all the adverse influence on durability in concrete involves the transport of fluids through the concrete Water permeability determines the rate of deterioration, which means if the concrete is protected against the ingress of water, the durability of the structure will increase and in the end the service life. As a result, reducing the permeability of the concrete is key. Unfortunately, as with the protection of reinforced concrete, traditional measures are not living up to expectations.

Surface-applied membranes or sheet membranes are one option to consider. This membrane forms a barrier against water penetration on the outside of the concrete. Another option is a fluid-applied membrane. In the same manner as a sheet membrane, the fluid-applied membrane forms a barrier on the surface of the concrete to stop water penetration.

In both circumstances, the traditional waterproofing system is providing a barrier to the concrete. However, surface-applied waterproofing membranes have limitations and are at risk to puncture damage and failure. Moving away from the tradition, success has been obtained by replacing the need for an external membrane and replacing it with an internal membrane, thereby making the concrete the waterproofing barrier.

Integral crystalline waterproofing admixture

A permeability-reducing admixture suitable for hydrostatic conditions (PRAH) such as integral crystalline waterproofing (ICW) admixture is included with the concrete mix at batching or directly to the ready-mix truck. Instead of adding the installation of a sheet membrane or the application of a fluid membrane, an ICW eliminates that need by becoming part of the concrete mixture. The ICW admixture is effective in reducing concrete's permeability without costly materials, labor or time required to install the external methods.

The features of an ICW admixture provide many unique benefits to concrete enhancing the durability for the properties of concrete that have historically resulted in poor durability. Through the use of crystalline technology, the ICW admixture reduces the penetration of water and water-borne chemicals through three primary mechanisms:

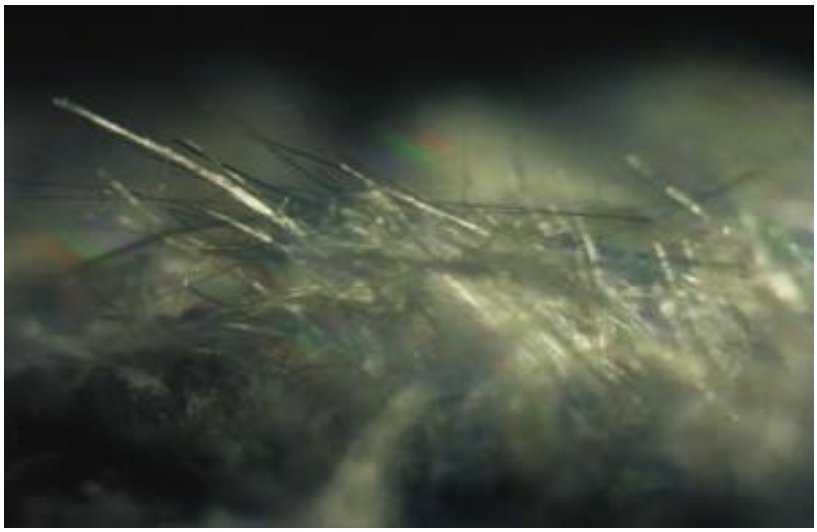


Fig. 5.1.2b Millions of needles like crystals grow to stem the flow of water within reinforced con

A permeability-reducing admixture suitable for hydrostatic conditions (PRAH) such as integral crystalline waterproofing (ICW) admixture is included with the concrete mix at batching or directly to the ready-mix truck. Instead of adding the installation of a sheet membrane or the application of a fluid membrane, an ICW eliminates that need by becoming part of the concrete mixture. The ICW admixture is effective in reducing concrete's permeability without costly materials, labor or time required to install the external methods.

The features of an ICW admixture provide many unique benefits to concrete enhancing the durability for the properties of concrete that have historically resulted in poor durability. Through the use of crystalline technology, the ICW admixture reduces the penetration of water and water-borne chemicals through three primary mechanisms:

1. crystallization and lowering the permeability of the concrete;
2. reducing the size and quantity of cracks in the concrete; and
3. Self-sealing cracks and micro-cracks that form later in the life of a structure.

5.1.3 Sewage treatment is the process of removing contaminants from wastewater and household sewage water.

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 bio solids, 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.

To make wastewater acceptable for reuse or for returning to the environment, the concentration of contaminants must be reduced to a safe level, usually a standard set by the Environment Agency.

Sewage can be treated close to where it is created (in septic tanks and their associated drain fields or sewage treatment plants), or collected and transported via a network of pipes and pump stations to a municipal treatment plant. The former system is gaining popularity for many new ECO towns, as 60% of the cost of mains sewerage is in the pipe work to transport it to a central location and it is not sustainable. It is called 'Decentralization' of sewage treatment systems.

The job of designing and constructing sewage works falls to environmental engineers. They use a variety of engineered and natural systems to meet the required treatment level, using physical, chemical, biological, and sludge treatment methods. The result is cleaned sewage water and sludge, both of which should be suitable for discharge or reuse back into the environment. Sludge, however, is often inadvertently contaminated with many toxic organic and inorganic compounds and diseases and the debate is raging over the safety issues. Some pathogens, for example, 'Prion' diseases (CJD or 'Mad Cow Disease is a Prion disease) cannot be destroyed by the treatment process.

The features of wastewater treatment systems are determined by:

1. The nature of the municipal and industrial wastes that are conveyed to them by the sewers.

2. The amount of treatment required to keep the quality of the receiving streams and rivers.

Discharges from treatment plants are usually diluted in rivers, lakes, or estuaries. They also may, after sterilisation, be used for certain types of irrigation (such as golf courses), transported to lagoons where they are evaporated, or discharged through underground outfalls into the sea.

However, sewage water outflows from treatment works must meet effluent standards set by the Environment Agency to avoid polluting the waters that receive them.

Sewage treatment plant processes fall into two basic types:

Anaerobic Sewage Treatment

Sewage is partly decomposed by anaerobic bacteria in a tank without the introduction of air, containing oxygen. This leads to a reduction of Organic Matter into Methane, Hydrogen Supplied, and Carbon Dioxide etc. It is widely used to treat wastewater sludge and organic waste because it provides volume and mass reduction of the input material to a large extent.

The methane produced by large-scale municipal anaerobic sludge treatment is currently being examined for use in homes and industry, for heating purposes. Septic tanks are an example of an anaerobic process, but the amount of methane produced by a septic tank (it is only the SLUDGE at the bottom that produces methane) serving less than 100 people is miniscule. In addition to this, septic tank effluent still contains about 70% of the original pollutants and the process smells very badly, due to the Hydrogen Sulphide, if not vented correctly. The effluent produced by this process is highly polluting and cannot be discharged to any watercourse. It must be discharged into the Aerobic layer of the soil (within the top metre of the ground) for the aerobic soil bacteria to continue the sewage treatment via the aerobic process below.

Aerobic Sewage Treatment

In this process, aerobic bacteria digest the pollutants. To establish an aerobic bacterial colony you must provide air for the bacteria to breathe. In a sewage treatment plant, air is continuously supplied to the Bio zone either by direct Surface Aeration using Impellers propelled by pumps which whisk the surface of the liquid with air, or by Submerged Diffused Aeration using blowers for air supply through bubble diffusers at the bottom of the tank. (The most modern aerobic sewage systems use natural air currents and do not require electricity, though these are only used for small scale sewage systems at the moment. Once again, the general public leads the way!) Aerobic conditions lead to an aerobic bacterial colony being established. These achieve almost complete oxidation and digestion of organic matter and organic pollutants to Carbon Dioxide, Water and Nitrogen, thus eliminating the odour and pollution problem above. The effluent produced by this process is non-polluting and can be discharged to a watercourse

Conventional sewage water treatment involves either two or three stages, called primary, secondary and tertiary treatment. Before these treatments, preliminary removal of rags, cloths, sanitary items, etc. is also carried out at municipal sewage works.

Primary Treatment

This is usually anaerobic. First, the solids are separated from the sewage. They settle out at the base of a primary settlement tank. The sludge is continuously being reduced in volume by the anaerobic process, resulting in a vastly reduced total mass when compared to the original volume entering the system. The primary settlement tank has the sludge removed when it is about 30% of the tank volume.

Secondary Treatment

This is Aerobic the liquid from the Primary treatment contains dissolved and particulate biological matter. This is progressively converted into clean water by using indigenous, water-borne aerobic micro-organisms and bacteria which digest the pollutants. In most cases, this effluent is clean enough for discharge directly to rivers.

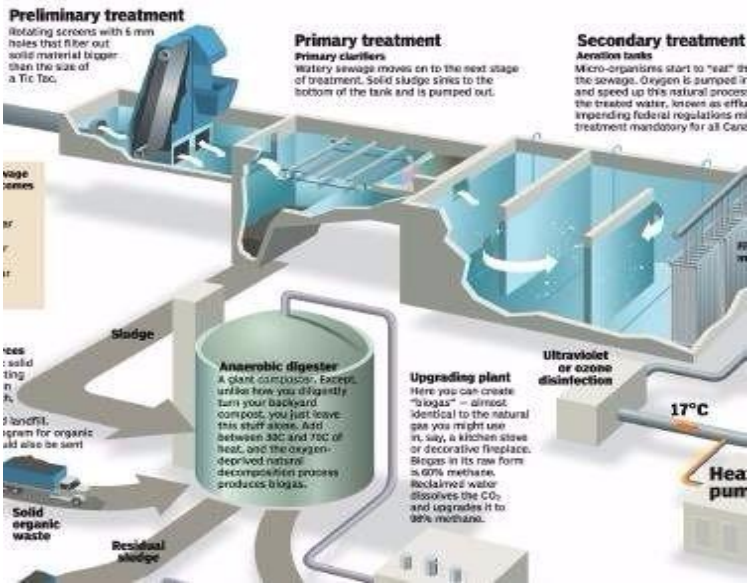


Fig. 5.1.3a Sewage Treatment plant

Tertiary Treatment

In some cases, the effluent resulting from secondary treatment is not clean enough for discharge. This may be because the stream it is being discharged into is very sensitive, has rare plants and animals or is already polluted by someone's septic tank. The Environment Agency may then require a very high standard of treatment with a view to the new discharge being CLEANER than the water in the stream and to, in effect, 'Clean it up a bit'. It is usually either Phosphorous or Ammonia Cal Nitrogen or both that the E.A. want reduced. Tertiary treatment involves this process. If Phosphorous is the culprit, then a continuous dosing system to remove it is the tertiary treatment. If Ammonia Cal Nitrogen is the problem, then the sewage treatment plant process must involve a nitrifying and then de-nitrification stage to convert the ammonia Cal nitrogen to Nitrogen gas that harmlessly enters the atmosphere.

5.1.4 Sustainable sanitation

The first principle of Sustainable Sanitation is to recognize that excreta and wastewater are not wastes, but resources that are valuable and can be reused and recycled. The main objective of sanitation is to provide a healthy and clean environment and breaking the cycle of disease.

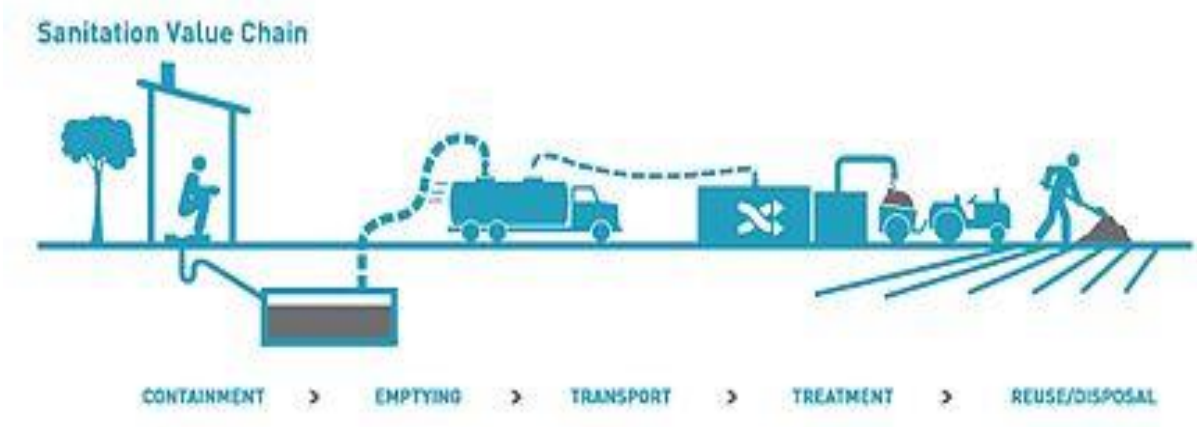


Fig. no.5.1.4a Sustainable Sanitation chain

Sustainable Sanitation is not a technology, but an approach having certain principles. The first principle of Sustainable Sanitation is to recognize that excreta and wastewater are not wastes, but resources that are valuable and can be reused and recycled. The main objective of sanitation is to provide a healthy and clean environment and breaking the cycle of disease. Now-a-days sustainable sanitation is identified as a key-driver for economic development and sustainable development in general. Recently this has become more and more popular around the globe and

had led the UN General Assembly to declare the year 2008 as the "International Year of Sanitation (IYS)". In the last few centuries the basic concept of collecting domestic liquid waste from sewer systems, treating the wastewater in centralized treatment plants and discharging the effluent to surface water bodies has become the accepted, conventional approach to sanitation. These conventional sewer systems have improved with time in those countries that can afford to install and operate them properly. In countries like India where there is insufficient access to adequate sanitation it becomes a problem. Despite the vastness and the large population, India is working hard and is successful in providing water and sanitation facilities to its people around the country. Under the Indian Constitution sanitation and water supply are the State's responsibility and according to the 73rd and 74th Constitutional Amendments, the State gives the responsibility and powers to Panchayati Raj Institutions (PRIs) and Urban Local Bodies (ULBs).

Through the State's Public Health Engineering Departments or Panchayati Raj Engineering Departments or Rural Development Engineering Departments the States generally design, operate, plan and execute the water supply schemes. However the Centre has through the Five Year Plans guided the investment and improved the financial instruments for implementation of infrastructure in the States. There have been many efforts made by the Government of India to focus on sanitation. Awards like Nirmal Gram Puruskar were created to make the sanitation drive more vigorous by the local self-governments. Sanitation is an essential component in a person's life. In India, there are different legislations and schemes that are involved with sustainable sanitation. The Strategic Plan 2011-2022 of Department of Drinking Water and Sanitation- Rural Drinking Water's "Ensuring Drinking Water Security in Rural India" ensures that every rural person has enough safe water for drinking, cooking, and for other domestic needs, as well as livestock throughout the year including times of natural calamities. It states that, waste water treatment and recycling should be an integral part of every water supply plan or project. Management of liquid and solid waste should be promoted together with recycling and reuse of grey water for agriculture and groundwater recharge and pollution control. The Total Sanitation Campaign Guidelines, 2011 is another scheme involved with sustainable sanitation. It aims to improve the general quality of life in rural areas and by 2017 it aims to make toilets accessible to all and popularize sanitation in rural areas. Another aim is by promoting sustainable sanitation facilities through awareness creation and health education by motivating communities and Panchayati Raj Institution. It also aims to encourage cost effective and appropriate technologies for ecologically safe and sustainable sanitation and along with developing environmental sanitation systems by focusing on solid and liquid waste management.

5.1.5 Transport Infrastructure in India

Introduction:

The Finance Minister introduced the Infrastructure portion of her budget primarily by referring to the National Infrastructure Pipeline (NIP) which has a five year vision with an investment of Rs. 102.51 trillion. Of this, the transport infrastructure investments consist of Rs. 19.64 lakh cr. for roads, Rs. 13.69 lakh cr. for railways sector, Rs. 1.43 lakhs cr. For airports, Rs. 1.01 lakh cr. for ports, and parts of urban and housing (metro, public transport and Electric Vehicles), rural infrastructure (rural roads) and agriculture (storage infrastructure and refrigerated transportation)

Fig. 5.1.5a transport infrastructure in India

Key highlights about the investments in transport sector:

Among roads, railways, airports and ports, the share of investment is 36%. If we include the other investments, it is likely to exceed 40%. In an overall sense, the transport infrastructure is the most significant investment in the NIP.

About 20% (Rs. 19.5 lakh crore) of the total NIP investment is expected to take place during 2020-21. Towards this, the central budget has allocated Rs. 1.7 lakh crore for the transport ministries and Rs. 0.4 lakh crore for urban transport (Rs. 0.2 lakh crore) and rural roads (Rs. 0,2 lakh crore).The balance would come from internal accruals, borrowings, state funding and private funding.

To ensure that such a funds flow happens, it is important that the policy direction is sustainable, and the use of funds is efficient. In the roads sector, the policy thrust is on increased categorization of national highways (from the current 1.3 lakh kms to 2.0 lakh kms), building expressways, increased use of electronic tolling and advanced technologies for traffic control.

The Delhi-Mumbai expressway is getting immediate attention as also another 13,000 kms of up gradation of highways. This sector has experimented with different forms of PPPs, including Build Operate Transfer (BOT), Hybrid Annuity Model (HAM) and Toll Operate Transfer (TOT), enabling more projects to be undertaken.

However, the roads sector is still affected by land acquisition and environmental clearances causing significant holdups and time over runs.

Rise of non-performing assets through projects:

Many of the projects have turned into non-performing assets for lending institutions. Safety; which is a crucial outcome parameter for the road user, has still not been addressed comprehensively.

On the matter of climate impact, the direction seems to be one of getting away from petrol and diesel and moving towards electric vehicles (EVs), though the pace of adoption is still open.

In the rail sector, there has been some push towards reforms in the recent past. The idea of involving private sector participation in passenger trains is a welcome move. This was a reform that should have happened much earlier. The parallels in the other transport sectors like road, air and water where services have traditionally been in the private sector was

waiting to be adopted. Over the years, there has been a thrust on improving technology and capacity in the railways. The outcome of these is projects related to the Dedicated Freight Corridor (DFC) and High-Speed Rail (HSR).

There are also proposals for Semi High Speed Rail Corridors, though there is a debate on their real efficacy on existing corridors. The Western and the Eastern DFCs are under construction with parts of them already operational. The corridors are expected to be fully operational by 2022. This is expected to give a boost to freight movement on railways on the high demand routes and consequentially improve passenger train capacity on the conventional parallel routes.

Challenges:

There are concerns about pricing and track access charges, and how it can be best leveraged to ramp up traffic on the DFCs. Another concern is the availability of rolling stock to utilize the DFC standards.

While such rolling stock would be useful for pure DFC movement, there would be a difficulty for moving on the conventional railway lines. Depending on the experience of the DFCs, new dedicated corridors (which are already conceptualized) would be taken up. The HSR as a dedicated corridor is under construction between Ahmedabad and Mumbai.

This would run the Japanese style bullet trains at a maximum speed of 320 kmph, bringing the best train time between these two cities from six hours to two hours. The subsequent corridors are being conceptualized, the experience of the first corridor would influence the way forward.

India is expected to the fallback option, though with concerns from AAI regarding managing many loss-making airports. There could even be a question as to whether so many airports are required and if some of the intended locations can be served from neighboring locations by road transport connectivity.

Capacity additions through new locations may not be a need, unless it is for captive purpose. PPPs have made reasonable inroads into the Central government driven major ports, and more as private ports driven by State governments. In fact, there could possibly be a situation of excess capacity in the container domain.

It could also be the ease for coal as the power sector moves away from coal to renewables. Some of the earlier PPPs are not able to do their best due to restrictive concession agreements. The restructuring of the regulatory regime which has been under discussion for a long time needs to be hastened. Connectivity issues on the land side, especially by rail, should improve both with the DFCs and the formation of the Indian Port Rail Corporation Limited (IPRCL). IPRCL was formed in 2015 to improve rail port coordination.

The rural road infrastructure has improved significantly over the past two decades. Continuing allocations for this are a good budgetary policy. While rural roads are developing, the opportunities in agri-supply chain are yet to be fully exploited. The focus on cold chains including the announcement of the ‘Kisan Rail’ is a welcome move. Rail based reefer movement with multimodal connectivity can enhance the market reach of agricultural products including for exports. While the budget has appropriate announcements, as usual, execution needs attention. Else, we will be making similar announcements as has been done in the past.

Way forward:

The current budget proposes a project preparation facility, actively involving students and faculty from Universities. Such an involvement is easier said and done. We need to find mechanisms to prepare and create awareness for the initiative. Structural solutions for focus like Sagarmala and coordination like Indian Port Rail and Ropeway Corporation Ltd. (IPRCL) could be used in appropriate contexts. Concession agreements and contracts need a lot more attention, both for

sharpness and flexibility. The role of regulators becomes important, since the need is for 'light-touch' regulation with maturity.

5.1.6 Vertical Farming

Vertical farming is the practice of growing crops in vertically stacked layers. It often incorporates controlled-environment agriculture, which aims to optimize plant growth, and soilless farming techniques such as hydroponics, aquaponics, and geoponics.

India is one of the largest producers of vegetables, fruits, and many other agricultural commodities. In India, vertical farming has been introduced in 2019. ICAR experts are working on the concept of 'vertical farming' in soil-less conditions, in which food crops can be grown even on multistoried buildings in metros like New Delhi, Mumbai, Kolkata, and Chennai without using soil or pesticides.

Vertical farming is the practice of growing crops in vertically stacked layers. The concept of vertical farming was proposed in 1999 by Dickson Despoiler, a professor of Public and Environmental Health at Columbia University.

The most special feature of Vertical Farming is that its goal is to supply optimal growing conditions throughout the whole life of the plants. The closed environment gives protection from outdoor influences and provides more ways to regulate the various uncertainties that can't be controlled when growing crops outdoor. Modern vertical farming facilities can regulate lighting, humidity, temperature, and nutrients with sophisticated sensors and climate control systems.

Vertical farming projects in India

Scientists are continuously working on this concept and have already had initial success in working on vertical farming hydroponically on a small scale. Small-scale adaptations of vertical farming have been seen in Nadia, West Bengal, and in Punjab.

1. Bidhan Chandra Krishi Vishwavidhalaya in Nadia has found initial success in growing brinjal and tomato.
2. Punjab also has succeeded in producing potato tubers through vertical farming.
3. Idea farms, an Indian design-in-tech company are producing vertical farming products and are preferred because their food is organic, of high quality and the supply is predictable.
4. A Bengaluru based startup Greenopiais selling kits with smart self-watering pots, enriched soil, and the right seeds. The sensor-embedded pots replenish moisture in the soil on a need basis and notify you when you need to refill water externally.
5. A Mumbai-based start-up firm U-Farm Technologies is using a hydroponic gardening technique to customize modular farms for an individual apartment complex or for a supermarket.
6. More and more start-ups in vertical farming are coming up in India.

Scope of vertical farming:

Vertical farming has a great scope in India, but there are challenges like acceptance of vertical farming by the Indian farming community.

Vertical farming is definitely a solution to critical problems in Indian agriculture like lack of supply or oversupply of farm produce, over-use of pesticides, over-use of fertilizers, deteriorating soils, and even the employability.

Indian farmers are facing various problems like lack of electricity supply throughout the day, assurance of minimum support prices, no control over market glut, water scarcity, etc. The initial huge cost of infrastructure for a large-scale farm is a major hurdle for implementing vertical farming in India.

Vertical farming in India has to face other challenges like public awareness, inclusiveness of the farming community, technical know-how, cost incurred in managing and mainlining the vertical farm systems, and also its economic viability.

Vertical farming cost in India:

India is a viable market due to population growth which is growing at a very fast rate so it is the right time to produce hydroponically grown food within India. This customer market includes retail and hotel, and fast-food chains, railway catering, foreign food service companies, NGOs, and defense establishments. Hydroponics is a lucrative opportunity to deploy in India. These are the following estimated cost of purchasing a vertical farm in India:

If the land is already owned for setting-up a vertical farm, then capital costs per acre every 5 years are Rs 30.5 lakhs.

Operational costs, for example, tomatoes as the example crop, in 1 acre per year are Rs 9 lakhs but the revenue can be on an average around 33.5 lakhs.

If the land is independently owned the profit potential of 15 lakhs per year is slightly less than if it were leased, averaging around 16.5 lakhs per year.

But it is important to note that in the first year, 80% depreciation is available under the Indian Income Tax Act to the buyer. 75% of bank financing is available through agriculture loans and a 20% subsidy from the National Horticulture Board (NHB).

Fig. no. 5.1.6a Vertical farming concept

Purpose of vertical farming:

Vertical farming in India has the potential for success in proper conditions. It simultaneously helps to reduce poverty, adds to food safety, and increases contextual sustainability and human being. Their goal is to create a hydroponics model cultivating farm-fresh unaffected by weather or soil /conditions. They will be grown in a protected greenhouse environment.

Only an expert gardener knows how difficult it can be to grow plants and how much extra care it takes with special attention to soil, fertilizer, and light. One can't get the process right and expect good yields without getting his/her hands dirty. But to make their work a lot easy and convenient, many startups in India are working on hydroponics farming. Hydroponics or growing nutrient solutions in a water solvent.

Additionally, this indoor farming technique induces plant growth, making the process 50% faster than growth in soil and the method is cost-effective. Mineral nutrient solutions are used to feed plants in water. G plants in water or sand, rather than soil, is done using mine.

5.1.7 Soil Liquefaction

What is Soil Liquefaction?

Soil liquefaction is the phenomenon in which the stiffness and the strength of the soil are lost under the action of earthquake force or due to rapid loading conditions. Soil liquefaction occurs in a fully saturated soil.

Principle and Causes of Liquefaction

The soil in normal condition is closely packed to each other. The soil particles are closely packed due to the contact forces of each particle. This tight packing contributes to the soil strength.

When the soil is in the saturated condition, the pores and the soil are fully filled with water. These water molecules present in the soil exerts pressure on the neighbouring particles. The water pressure exerted by these water molecules increases with rapid load action or earthquake forces. During liquefaction, the water pressures become high enough to counteract the gravitational pull on the soil particles. This is explained in figure-1 and figure-2 below.

The figure-1(a) shows the soil particles present in the unexcited state. The blue column in the right shows the magnitude of pore water pressure in the soil sample.

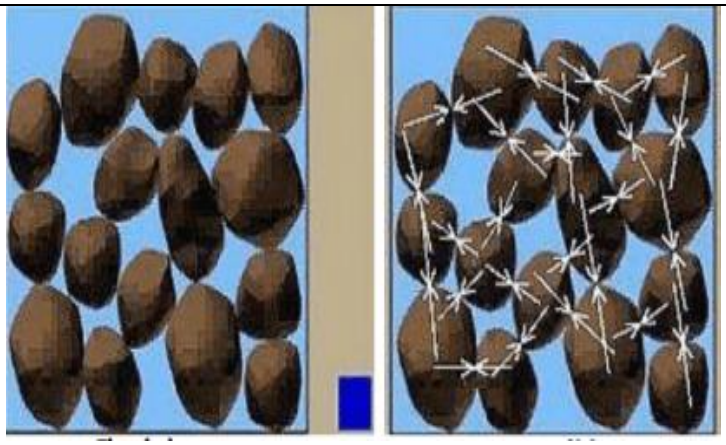


Fig.5.1.7a the Soil Grain Condition in Unexcited State

Fig. 5.1.7b Soil Grain Condition at Fully Saturated Condition

The figure (b) shows the forces that are created between the soil particles during their interaction.

The figure shows the soil condition at an elevated water pressure. Here, the soil is said to be in a completely saturated condition where the increased water pressure makes the soil grains to “float” as shown in figure-2. This floating activity decreases the interaction between the soil grains. This promotes the properties of liquefaction.

The occurrence of liquefaction is the result of rapid load application and break down of the loose, saturated sand and the loosely-packed individual soil particles. Under the action of earthquake force or rapid loading condition, there is no time to completely squeeze out the pore water within the soil. Instead of being squeezed out, the soil particles are prevented from moving closer to each other.

This increases the water pressure within the soil system. This water pressure created is very high compared to the contact forces within the soil particles. This softens and weakens the soil deposit.

Other than the earthquake and large load actions, the liquefaction of soil can be happened due to construction practices like blasting, vibroflotation, and dynamic compaction.

Effects of Liquefaction

Liquefaction phenomenon can result in many effects in the soil and the structures. They are:

1. Sand Boiling
2. Damage to offshore structures
3. Failure of Dams and Retaining Walls
4. Surface Landslides
5. Failure of Structures under Earthquake

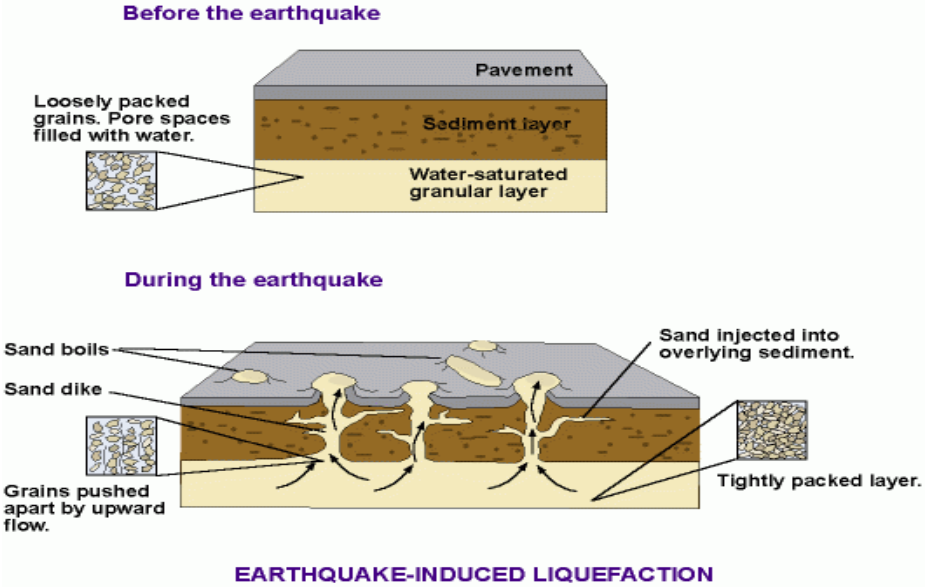


Fig. 5.1.7c Earthquake-induced liquefaction

Importance of Soil Liquefaction

After Liquefaction, the soil no longer behaves as an inactive grid of particles. The strength and stiffness of the liquefied soil are significantly decreased, often resulting in a variety of structural failures.H ence, a liquefied ground is no longer considered stable and fit for construction of structures. It has neither ability to take even its self-weight nor weight of structures above. The building structures constructed over such a deposit type lean and fall as shown in figure below.

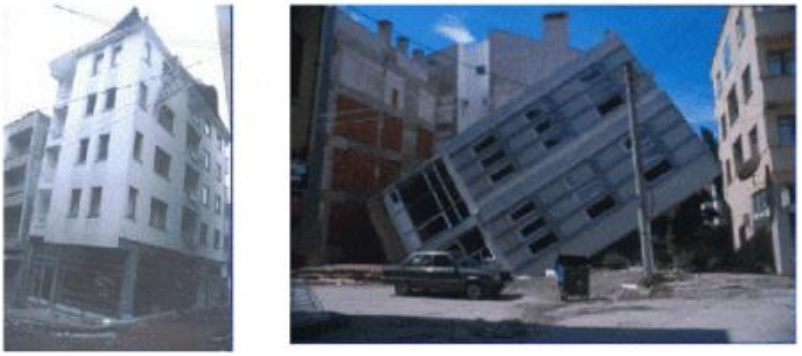


Fig. 5.1.7d Failure of Building Structure Due to Soil Liquefaction, Liquifaction in Izmit, Turkey

Hence it is very necessary to know the importance of the study of liquefaction so that adequate precaution is taken before construction. Understanding the liquefaction chances of the soil helps to decide what treatment method is to be chosen to make the soil liquefaction free. This hence helps to have stronger and safer construction of the structure.

When the soil is in the saturated condition, the pores and the soil are fully filled with water. These water molecules present in the soil exerts pressure on the neighboring particles. The water pressure exerted by these water molecules increases with rapid load action or earthquake forces. During liquefaction, the water pressures become high enough to counteract the gravitational pull on the soil particles. This is explained in figure-1 and figure-2 below.

Methods of Reducing Soil Liquefaction Hazards

There are basically three methods of reducing liquefaction hazards:

1. By Avoiding Liquefaction Susceptible Soils
2. Build Liquefaction Resistant Structures
3. Improve the Soil

5.2 Concept(Electrical)

5.2.1 Electrical parameter measurement

The standard units of electrical measurement used for the expression of voltage, current and resistance are the Volt [V], Ampere [A] and Ohm [Ω] respectively.

These electrical units of measurement are based on the International (metric) System, also known as the SI System with other commonly used electrical units being derived from SI base units.

Sometimes in electrical or electronic circuits and systems it is necessary to use multiples or sub-multiples (fractions) of these standard electrical measuring units when the quantities being measured are very large or very small.

The following table gives a list of some of the standard electrical units of measure used in electrical formulas and component values.

Table 5.2.1a Standard Electrical Units of Measure

Electrical Parameter	Measuring Unit	Symbol	Description
Voltage	Volt	V or E	Unit of Electrical Potential **V = I × R**
Current	Ampere	I or i	Unit of Electrical Current **I = V ÷ R**
Resistance	Ohm	R or Ω	Unit of DC Resistance **R = V ÷ I**
Conductance	Siemen	G or ʊ	Reciprocal of Resistance **G = 1 ÷ R**
Capacitance	Farad	C	Unit of Capacitance **C = Q ÷ V**
Charge	Coulomb	Q	Unit of Electrical Charge **Q = C × V**
Inductance	Henry	L or H	Unit of Inductance V_L **= -L(di/dt)**
Power	Watts	W	Unit of Power **P = V × I** or $I^2 \times R$
Impedance	Ohm	Z	Unit of AC Resistance $Z^2 = R^2 + X^2$
Frequency	Hertz	Hz	Unit of Frequency $f = 1 \div T$

Multiples and Sub-multiples

There is a huge range of values encountered in electrical and electronic engineering between a maximum value and a minimum value of a standard electrical unit. For example, resistance can be lower than 0.01Ω or higher than 1,000,000Ω. By using multiples and submultiple's of the

standard unit we can avoid having to write too many zero's to define the position of the decimal point. The table below gives their names and abbreviations.

Table 5.2.1b standard multiples and prefix

Prefix	Symbol	Multiplier	Power of Ten
Terra	T	10,00,00,00,00,000	1012
Giga	G	1,00,00,00,000	109
Mega	M	10,00,000	106
kilo	k	1,000	103
none	none	1	100
centi	c	1/100	10-Feb
milli	m	1/1,000	10-Mar
micro	µ	1/1,000,000	10-Jun
nano	n	1/1,000,000,000	10-Sep
pico	p	1/1,000,000,000,000	10-Dec

So to display the units or multiples of units for either Resistance, Current or Voltage we would use as an example:

- 1kV = 1 kilo-volt – which is equal to 1,000 Volts.
- 1mA = 1 mill-amp – which is equal to one thousandths (1/1000) of an Ampere.
- 47kΩ = 47 kilo-ohms – which is equal to 47 thousand Ohms.
- 100uF = 100 micro-farads – which is equal to 100 millionths (100/1,000,000) of a Farad.
- 1kW = 1 kilo-watt – which is equal to 1,000 Watts.
- 1MHz = 1 mega-hertz – which is equal to one million Hertz.

To convert from one prefix to another it is necessary to either multiply or divide by the difference between the two values. For example, convert 1MHz into kHz.

Well we know from above that 1MHz is equal to one million (1,000,000) hertz and that 1kHz is equal to one thousand (1,000) hertz, so one 1MHz is one thousand times bigger than 1kHz. Then to convert Mega-hertz into Kilo-hertz we need to multiply mega-hertz by one thousand, as 1MHz is equal to 1000 kHz.

Likewise, if we needed to convert kilo-hertz into mega-hertz we would need to divide by one thousand. A much simpler and quicker method would be to move the decimal point either left or right depending upon whether you need to multiply or divide.

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

Wh – **The Watt-Hour,** The amount of electrical energy consumed by a circuit over a period of time. E.g., a light bulb consumes one hundred watts of electrical power for one hour. It is commonly used in the form of: Wh (watt-hours), kWh (Kilowatt-hour) which is 1,000 watt-hours or MWh (Megawatt-hour) which is 1,000,000 watt-hours.

dB – **The Decibel**, The decibel is a one tenth unit of the Bel (symbol B) and is used to represent gain either in voltage, current or power. It is a logarithmic unit expressed in dB and is commonly used to represent the ratio of input to output in amplifier, audio circuits or loudspeaker systems.

For example, the dB ratio of an input voltage (VIN) to an output voltage (VOUT) is expressed as 20log10 (Vout/Vin). The value in dB can be either positive (20dB) representing gain or negative (-20dB) representing loss with unity, i.e. input = output expressed as 0dB.

θ – **Phase Angle,** The Phase Angle is the difference in degrees between the voltage waveform and the current waveform having the same periodic time. It is a time difference or time shift and depending upon the circuit element can have a "leading" or "lagging" value. The phase angle of a waveform is measured in degrees or radians.

ω – **Angular Frequency**, Another unit which is mainly used in a.c. circuits to represent the Phasor Relationship between two or more waveforms is called Angular Frequency, symbol ω. This is a rotational unit of angular frequency $2\pi f$ with units in radians per second, rads/s. The complete revolution of one cycle is 360 degrees or 2π, therefore, half a revolution is given as 180 degrees or π rad.

τ – **Time Constant**, The Time Constant of an impedance circuit or linear first-order system is the time it takes for the output to reach 63.7% of its maximum or minimum output value when subjected to a Step Response input. It is a measure of reaction time.

5.2.2 Home automation system

Home automation gives you access to control devices in your home from a mobile device anywhere in the world. The term may be used for isolated programmable devices, like thermostats and sprinkler systems, but home automation more accurately describes homes in which nearly everything lights, appliances, electrical outlets, heating and cooling systems are hooked up to a remotely controllable network.

From a home security perspective, this also includes your alarm system, and all of the doors, windows, locks, smoke detectors, surveillance cameras and any other sensors that are linked to it.

Home automation developments

Until fairly recently, automated central control of building-wide systems was found only in larger commercial buildings and expensive homes. Typically involving only lighting, heating and cooling systems, building automation rarely provided more than basic control, monitoring and scheduling functions and was accessible only from specific control points within the building itself.

Home automation is a step toward what is referred to as the "Internet of Things," in which everything has an assigned IP address, and can be monitored and accessed remotely.

Fig. 5.2.2a lutron caseta wireless smart lighting

The first and most obvious beneficiaries of this approach are "smart" devices and appliances that can be connected to a local area network, via Ethernet or Wi-Fi.

However, electrical systems and even individual points, like light switches and electrical outlets, were also integrated into home automation networks, and businesses have even explored the potential of IP-based inventory tracking.

Although the day is still far off when you'll be able to use your mobile browser to track down a lost sock, home networks are capable of including an increasing number of devices and systems.

Automation

Automation is, unsurprisingly, one of the two main characteristics of home automation. Automation refers to the ability to program and schedule events for the devices on the network.

The programming may include time-related commands, such as having your lights turn on or off at specific times each day. It can also include non-scheduled events, such as turning on all the lights in your home when your security system alarm is triggered.

Once you start to understand the possibilities of home automation scheduling, you can come up with any number of useful and creative solutions to make your life better.

Is that west-facing window letting in too much light? Plug your motorized blinds into a "smart" outlet and program it to close at noon each day. Do you Program your home automation system to unlock the front door for them, and lock it up again when they're done.

Fig. 5.2.2b Philips Hue LED smart Button starter K

Remote control

The other main characteristic of cutting-edge home automation is remote monitoring and access. While a limited amount of one-way remote monitoring has been possible for some time, it's only since the rise in smartphones and tablets that we've had the ability to truly connect to our home networks while we're away.

With the right home automation system, you can use any Internet-connected device to view and control the system itself and any attached devices.

Monitoring apps can provide a wealth of information about your home, from the status of the current moment to a detailed history of what has happened up to now. You can check your security system's status, whether the lights are on, whether the doors are locked, what the current temperature of your home is and much more.

With cameras as part of your home automation system, you can even pull up real-time video feeds and literally see what's going on in your home while you're away.

Even simple notifications can be used to perform many important tasks. You can program your system to send you a text message or email whenever your security system registers a potential problem, from severe weather alerts to motion detector warnings to fire alarms.

You can also get notified for more mundane events, such as programming your "smart" front door lock to let you know when your child returns home from school.

The real hands-on control comes in when you start interacting with the home automation system from your remote app. In addition to arming and disarming your security system, you can reprogram the scheduling, lock and unlock doors, reset the thermostat and adjust the lights all from your phone, from anywhere in the world.

As manufacturers are creating more and more "smart" devices and appliances all the time, the possibilities for home automation are virtually limitless.

Home automation components

What kinds of things can be part of a home automation system? Ideally, anything that can be connected to a network can be automated and controlled remotely. In the real world (outside of research labs and the homes of the rich and famous), home automation most commonly connects simple binary devices. This includes "on and off" devices such as lights, power outlets and electronic locks, but also devices such as security sensors which have only two states, open and closed.

Where home automation becomes truly "smart" is in the Internet-enabled devices that attach to this network and control it. The classic control unit is the home computer, for which many of the earlier home automation systems were designed.

Today's home automation systems are more likely to distribute programming and monitoring control between a dedicated device in the home, like the control panel of a security system, and a user-friendly app interface that can be accessed via an Internet-enabled PC, Smartphone or tablet.

Manufacturers have produced a wide variety of "smart" devices, many of which are full of innovative features but few of which offer the kind of integration needed to be part of a complete home automation system. Much of the problem has been that each manufacturer has a different idea of how these devices should be connected and controlled.

So while you may have a "smart" TV, washing machine, refrigerator, thermostat, coffee maker or any of the other Internet-ready household devices on the market, the end result is usually a separate control scheme for each device.

In the near future, home automation may be standardized to let us truly take advantage of all of these additional possibilities. For the time being, the home security providers that specialize in home automation have focused on the most critical and useful parts of a connected home.

At a basic level, this means the doors and windows and environmental devices (thermostat, smoke detectors, temperature, humidity, fire and carbon dioxide sensors) that keep you safe and comfortable.

For additional real-time security, convenience and control, home automation systems from security providers should also include options for video cameras. With the best systems, you'll also be able to include lights and individual electrical outlets into your home automation package.

Energy Efficiency

One clear advantage of home automation is the unmatched potential for energy savings, and therefore cost savings. Your thermostat is already "smart" in the sense that it uses a temperature threshold to govern the home's heating and cooling system.

In most cases, thermostats can also be programmed with different target temperatures in order to keep energy usage at a minimum during the hours when you're least likely to benefit from the heating and cooling.

At the most basic level, home automation extends that scheduled programmability to lighting, so that you can suit your energy usage to your usual daily schedule. With more flexible home automation systems, electrical outlets or even individual devices can also be automatically powered down during hours of the day when they're not needed.

As with isolated devices like thermostats and sprinkler systems, the scheduling can be further broken down to distinguish between weekends and even seasons of the year, in some cases.

In the near future, home automation may be standardized to let us truly take advantage of all of these additional possibilities. For the time being, the home security providers that specialize in home automation have focused on the most critical and useful parts of a connected home.

Set schedules are helpful, but many of us keep different hours from day to day. Energy costs can be even further reduced by programming "macros" into the system and controlling it remotely whenever needed. In other words, you could set up a "coming home" event that turns on lights and heating as you're driving home after work, for example, and activate it all with one tap on your smartphone.

An opposite "leaving home" event could save you from wasting energy on forgotten lights and appliances once you've left for the day.

Putting It All Together

We are all busy and home automation may be able to help make things a bit easier for you. Two of the leading home automation security providers are ADT and Vivint, both of which offer different features that can save you time and money.

5.2.3 Programmable load shading

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-day segment display.

Hardware Specifications

- 8051 Microcontroller
- 7 Segment Display
- Crystal Oscillator
- Resistors
- Capacitors
- Transistors
- Cables and Connectors
- Diodes

- PCB and Breadboards
- LED
- Transformer/Adapter
- Push Buttons
- Switch
- IC
- IC Sockets
- Load

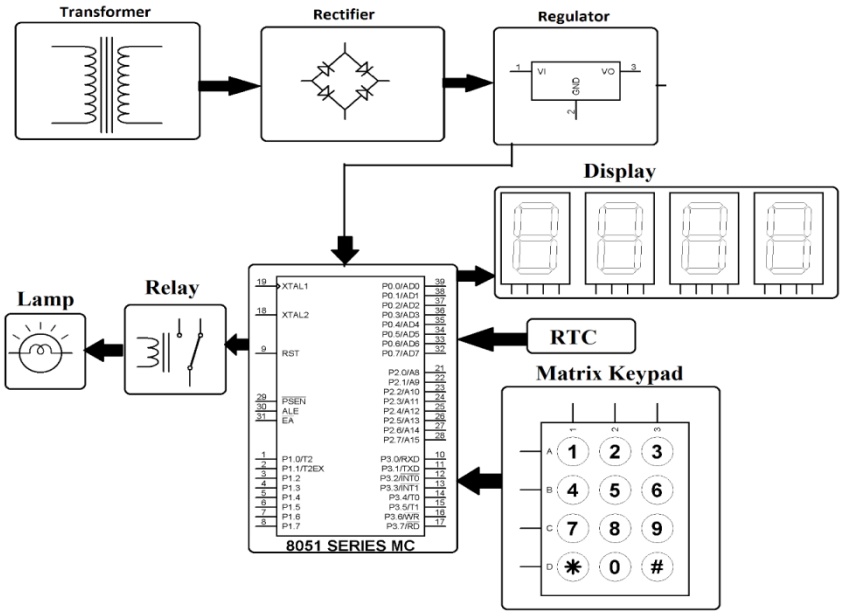


Fig.5.2.4a Block diagram of programmable load shading

Software Specifications

- Keil µVision IDE
- MC Programming Language: Embedded C

5.2.4 Railway security system Using IoT

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

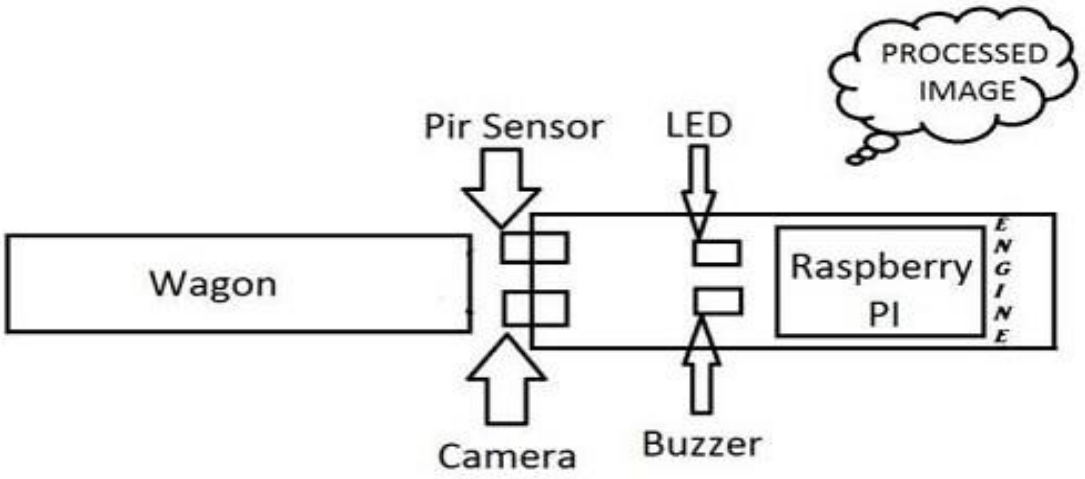


Fig. 5.2.4a Conceptual diagram

Related works

Design and development of an integrated and heterogeneous network was proposed by Sandra Chiocchio et aland which concentrates on board communication through an 868 MHz Wireless Sensor Network component, data communications across a mobile network through M2M (Machine- to-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 et al. 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 et althea 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.

Bethan et al 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.

5.2.5 Soil moisture monitoring

Soil Moisture Monitoring (SMM) devices provide information about the water status of soil. This information can be used to help you achieve top yields and maximize productivity from your water by being better able to plan when to irrigate and apply the right amount of water. SMM devices provide an objective measure and can be a very useful learning tool.

SMM technologies can provide soil moisture information from different soil depths and locations around the farm. They can provide information relating to:

Planning of future irrigation events,

- Reserves of plant available water,
- Changes in the rate of plant water uptake – which can indicate plant moisture stress,
- Root activity patterns and development in the soil profile,
- Depth and amount of irrigation water applied,
- Impact of rainfall on soil moisture reserves,
- Impact of cutting hay or grazing on plant water use,
- Potential waterlogging,
- Water movement beyond the root zone,
- Water table depth, and
- Record of past irrigations that can be used to review scheduling practices

The two main types of commercially available soil moisture sensors are: suction based and volumetric based systems.

Suction based sensors measure how tight water is held in the soil. The measurement relates directly to how hard the plant has to work to extract water and is therefore consistent across different soil types. Types of suction based tools that are commonly used are densitometers and gypsum blocks.

Fig. 5.2.5a Tensiometer uninstalled (left), GDot (right)

Volumetric SMM systems measure the total amount of water in the soil. To estimate how much of this water is "readily available" to plants, the soil type needs to be known. In practice, volumetric moisture monitoring tools can be used to guide not only when to irrigate, but how much water to apply.

Fig. 5.2.5b Volumetric moisture probe waiting to be installed

SMM systems commonly consist of a moisture sensor which is placed in the soil, and a visual display unit. The visual display unit can be 'manual-read' where you observe readings directly from the device in the field, or it can be 'screen-read'. With screen-read systems, soil moisture data is automatically transmitted wirelessly to your computer, mobile phone or tablet and it can be viewed in a graph format that makes it easier to compare and interpret the data. With manual-read devices, there is often more labor involved but there is usually a lower up-front cost.

Fig. 5.2.5c Example of 'screen-read' information from a soil moisture probe. For 'manual-read' see GDot in Figure 1

A manual-read device such as a tensiometer or a "GDot" typically costs a few hundred dollars whereas screen-read systems range in price from hundreds of dollars to thousands of dollars, depending on the equipment and number of moisture sensors involved. Screen-read systems normally have an annual data transmission and storage fee in the low to mid hundreds of dollars. SMM is an aid for irrigation decision making and should not be used in isolation, preferably being used in conjunction with other scheduling tools and methods already used on farm. It should not replace farmer's intuitive estimates of when to water, but instead enable more informed decision making by reducing the subjectivity and guesswork involved.

5.2.6 PC based electrical load control

Since the advent of the global system for Mobile Communication (GSM) Device, its usefulness and relevance has continued to blossom in the society. The sophistication of the phone has also evolved in such a way that video and other multimedia data can now be transferred wirelessly. This paper is based on the design of one of such devices that utilizes the GSM network's communication channel for its operation and control. Electrical loads are mostly controlled with mechanical switches. This switch will determine the state of the load, either it turns off or on. In this paper, the signals from a GSM phone are used to control electromagnetic switches which will in turn be used to control the electrical loads.

Various load control technology such as the power line carrier, telephone modem, WIFI, infrared based technology, frequency modulation (FM), amplitude modulation (AM), Bluetooth and Sigsbee were established to facilitate comfort for humans.

While the infra-red is reputed to be cheap and easy to assemble, it in itself has some limitations. The major limitation of the infrared is that it has to be line of sight operated.

Another method used in the remote control of electrical appliances is the Radio Frequency (RF) technology. RF eliminates the lie of sight problem of the infrared and is mostly used in many remote-control installations. However, RF is limited by range as it is only effective within just a few meters.

Hence, the desire to control an electrical appliance using remote, where the appliance can be as far away as possible, while still making the whole system reliable, cheap and robust and using an everyday utilized electronic, is desired. This circuit is able to control multiple loads from any location in the world and its compatibility is assured. In this paper, we will be concentrating on the use of the GSM wireless network to control the electrical loads.

Dual tone multiple frequency DTMF is a feature utilized by keypads to generate sounds when a key on the keypad is pressed. It is a method of Multi Frequency Shift Keying data transmission. Each button on the keypad represents alphanumeric digits or characters and each of them outputs a unique sound as they are depressed corresponding to specific frequencies or combination of frequencies hence the term "multiple frequency". For example, the sound you hear when you

punch “2” on your keypad, is a combination of two unique frequencies (600Hz and 1400Hz). This frequency is so unique that it has been standardized. This means that irrespective of the use of the keypad, either in a GSM phone, a microwave timer machine or in an ATM machine, the sound output when the button ‘2’ is pressed, is always a combination of 600 and 1400 hertz.

In this project, the dual tone multiple frequencies (DTMF) feature will be utilized extensively as the major control of the devices using the GSM is based on it in the world today, innovation in technology is integral in everyday life. Similar projects have been done to control electrical load in the past through the use of radio frequency, power line carrier, telephone modem, internet, WIFI and Bluetooth. In 2013, V. Bhatia and P. Whig presented the modeling and simulation of electrical load control system using RF technology. Moreover, V. Bhatia and P. Whig designed and simulated the smart elevator control system with Security based on Dual Tone Multi Frequency while in 2014, Sarinee Ouitrakul and Sirichai Watanasophon presented Wireless Load Control Device (WLCD) using GSM module. In June 2012, Abah O. Sunday et al presented a paper on Remote Control of Electrical appliances using GSM Network. Makwana R. et al

In the year 2013 presented a Wireless Based Load Control and Power Monitoring System. Finall in 2005, Alkar A.Z et al Presented an Internet Based Wireless Home Automation System for Multifunctional Devices in which the system was designed to be low cost and flexible with the increasing variety of devices to be controlled.

The Design

In this session, the design calculations on the GSM controlled electrical load circuit is discussed, all the mathematical formulae and technical theories that led to the determination and choosing of the components, their rating and operations were also presented. The block diagram, sub circuits diagram and the full diagram of the complete project is also shown.

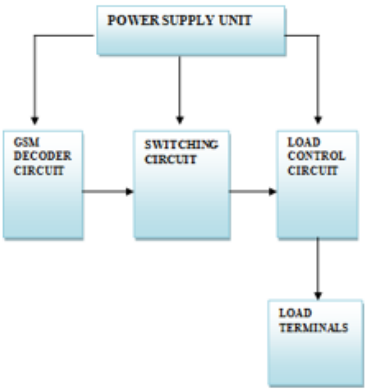


Fig. 5.2.6a Block diagram of GSM controlled Electrical Loads.

As can be seen from the block diagram, the power supply unit supplies power to the whole system, the GSM decoder circuit is the main input signal unit that accepts the GSM signals. When these signals come, according to the value of the input signals, they will be transmitted to the switching circuit that will now send the value of these transmitted signals to the load control, circuit which will in turn control the loads using the load terminals.

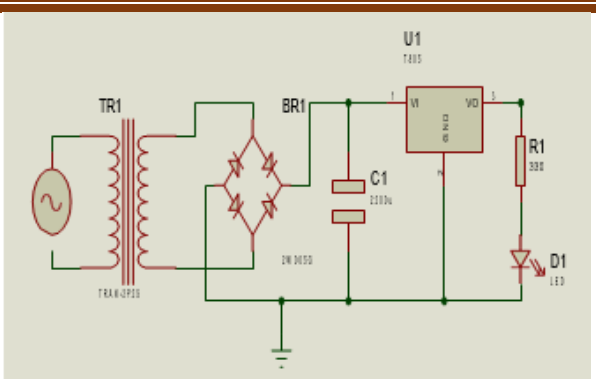


Fig. 5.2.6b The Power Supply Unit

The Power supply unit is a circuit comprising of diodes, capacitor, voltage regulator and power indicator. This supplies two DC voltage level to the whole circuit from an AC source, the circuit diagram is as shown above.

Transformer (TR1)

This is the step-down transformer. A transformer voltage of 12Vac is required. The current is enough to supply the requirement for the circuit.

The transformer (T1) chosen is 12Vac@300mA.

Rectifier Circuit (D1-D4)

These are the rectifier circuit. The diodes chosen have a peak inverse voltage (PIV) that is able to withstand twice the peak voltage (Vp) of the transformers output and a forward current (Dc) of 1.5 times the output current of the transformer.

Vp = √2 Vrms..... 1

Where Vp is the peak voltage of the transformer output.

Vrms is the actual output voltage from the transformer = 12Vac Vp =√2x12

Vp =1.414x12 Vp =16.97Vac

D (piv) = 2 x Vp 2

Where D (piv) is the PIV of the rectifier diode Therefore, D (piv) = 2x16.97

D (piv) = 33.94.

And Dc = 1.5 x 300 x 10-3 Dc = 0.45A

Therefore the required diode is: PIV≥ 33.94V

Dc ≥ 0.45A

From diode catalogue, the IN4007 has the following characteristics:

PIV = 50V DC = 1A

Consequently, the diode chosen is the IN4007 D1-D4 = IN4007

C1: This is the filters capacitor. Electrolytic capacitors come with a capacitance and a voltage rating.

Filtering Circuit

The voltage of the capacitor (Vc) must be able to withstand 150% of the output voltage from the diode.

VC = 150% of VDP 3

Where VDP is the peak output voltage from the diodes But VDP is given as

VDP = Vp - VD.....4

Where Vp is the peak voltage of the transformer VD is the voltage drop of the diodes (0.7 × 2) VDP = 16.97 – 1.4

VDP = 15.57V

∴ Vc=1.5xVDP..... 5

Vc is the voltage rating of the capacitor Vc = 1.5 x 15.57

Vc = 23.6V

The capacitance of the capacitor must be such that it could reduce the ripple voltage (VR) to about 30% of the output peak voltage from the diodes.

VR = 30% of VDP 6

From eqn 3, VDP is given as 15.57

VR= 30/100 x 15.57
VR = 4.67v

From the ripple voltage equation, we could get the capacitance

VR = Imax/2*f*c1……7

Where VR is the ripple voltage

Imax is the maximum current from the diodes/ transformers (300mA)

f is the frequency of supply (50Hz)

C is the capacitance of the capacitor in Farads.

VR = 4.67V

∴VR (2FC) = Imax

C1 = Imax/Vr*2*f…….8
Substituting values gives
C1 = 6.42 x 10-4 F
Converting to µF
C1 == 642.4µF

This value cannot be obtained in the market and due to the high ripple rejection factor of the voltage regulator, a lower capacitance is chosen. Therefore the capacitance chosen is:

C1 = 470µF @35V

U1: This is the voltage regulator. Regulator specifications:

- Maximum input voltage = 30V
- Maximum output voltage = 5.5V
- Operating temperature = 0%- 150%

For effective Voltage regulation, the minimum input voltage is: V min =V out + V ref 9

V min – Minimum input voltage

V out – required output voltage: 5V

V ref – Datasheet Stipulated reference voltage; 3V V min = 5 + 3

V min = 8V

The output voltage after the capacitor is 15.57 volts. This is enough to supply the minimum input voltage (8 volts), therefore, the voltage regulator is comfortably used. The regulator chosen is

U1 = 7805

C2 is a transient capacitor. The rating is stipulated in the 7805 voltage regulator’s data sheet as 0.1uF

Hence, C2=0.1uF

This capacitor helps for smoothening of the output from the voltage regulator. It is also to prevent spikes in the DC output voltage waveform in the event of transient disturbances. It is known as a buffer capacitor whose value is gotten from the data sheet of the regulator.

Current limiting resistor calculation:

R1= (Vs-Vd)/ Id 10

R1 = (5-2)/10×10-3 R1 = 300Ω

This value of resistor is not in the available, so the appropriate value to use is R1=330Ω

Light emitting diode characteristics:

Forward current of….. 10×10-3A to 10×10-3A

Voltage drop of……. 2V

The GSM Decoder Circuit

This is the circuit that takes the signal from the connected GSM phone, decodes it and converts it into readable format for the other integrated circuit to utilize. The circuit diagram is as shown fig. 3

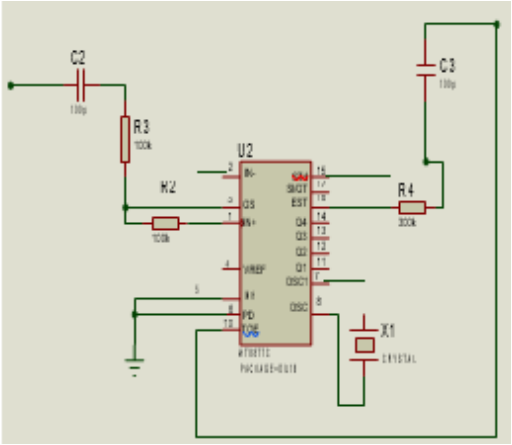


Fig. 5.2.6c The GSM decoder circuit

The heart of the circuit is based on the integrated circuit, MT8870. The datasheet of this integrated circuit stipulates the exact way it is biased. To this effect, the external components used for this block is lifted off directly from the datasheet circuit diagram.

The Switching Circuit

This is the circuit that switches on and off the electrical loads connected to the circuit. The circuit diagram is as shown in fig. 4.

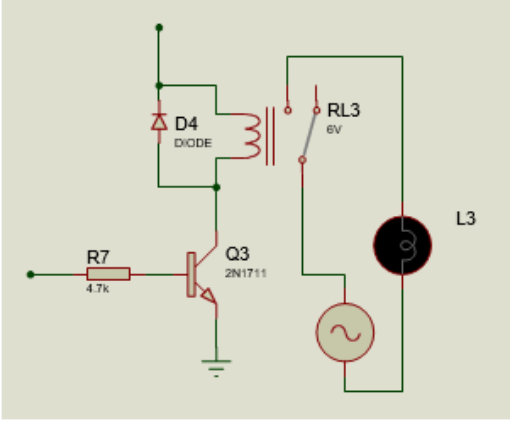


Fig.4: The Switching Circuit

Fig. 5.2.6d Switching Circuit

RL3: is a switching relay. The parameters of the relays are given as:

- ✓ DC volts: 6V
- ✓ Contact AC current 10A
- ✓ DC Coil resistance: 400Ω

@ An ac voltage of 220volts, the contact of the relay has a power of:

P = IV

P = 10 x 220 P = 2.2KW

Any electrical device rated within this power works with the circuit

R7 this is the base resistor for the transistor

For effective switching, the collector current is about 10 times the base current.

IC = 10 x IB

Consequently, the resistors relationship is

∴ RB = 10 x RC
The resistance of the relay is given as 400Ω Thus
RC = 400Ω
From the transistor switch equation, RB = 10Rc
RB = 10Ω x 4000Ω RB = 4000Ω
4.7kΩ is chosen for R7

Table 5.2.6a data showing the operation of 3 loads when a certainkeypad is pressed.

Keypad pressed	Load A	Load B	Load C
0	OFF	OFF	OFF
1	OFF	OFF	ON
2	OFF	ON	OFF
3	OFF	ON	ON
4	ON	OFF	OFF
5	ON	OFF	ON
6	ON	ON	OFF
7	ON	ON	ON
8	OFF	OFF	OFF

Mode of Operation

The GSM based control for electrical loads is powered by a 5volts dc power supply gotten from a 220 volts ac supply. This power is stepped down by a transformer, rectified by rectifier diodes, filtered by a filter capacitor and regulated by a voltage regulator to produce the required 5 volt D.C. supply.

The heart of the circuit is the dual tone multi frequency. This integrated circuit utilizes the keypad tones (DTMF), of a phone and converts it into binary. With the external biasing components, this binary is outputted into terminals. Relays via transistors are connected to its output terminals and turn on and off the electrical loads depending on the number that is pressed on the resident phone.

The lights are connected to the normally open of the relay and when the relay turns on, the light turn's on too. The output signal latch therefore, even when the phone is off or the call is ended, the light still remains on (or off).

RESULTS

The operation of turning on and off the electrical loads from a remote location using the mobile phone is described thus: We have bulbs A, B and C arranged from the left-hand side to the right-hand side acting as loads. The phone connected to the circuit, which has auto-answer feature on is called from the remote location using another mobile phone which has keypads 0 to 8...

Immediately the auto-answer feature enables the former to pick up the call, the other which initiated the call from a remote location now starts the operation of turning on and off the loads using its keypads. The result of the operation is shown in table

5.2.7 Power management and energy harvesting

In the last few years, there has been considerable effort by various companies to make "perpetually powered" and battery-free systems which operate from ambient energy. The key integrated circuits (ICs) needed to develop such a system are ultra-low-power microprocessors, radios, and power-management ICs (PMICs).

While considerable progress has been made in the field of low-power microprocessors and radios, only recently have PMICs suited for energy harvesting applications started appearing in the market. This article provides a quick introduction to some of the ambient energy sources available followed by a detailed discussion of factors to be considered when choosing a PMIC for these energy sources.

Ambient energy sources can be broadly divided into direct current (DC) sources and alternating current (AC) sources. DC sources include harvesting energy from sources that vary very slowly with time, such as light intensity and thermal gradients using solar panels and thermoelectric generators respectively. The output voltage of these harvesters does not have to be rectified.

AC harvesters include energy harvesting from vibrations and radio frequency power using piezoelectric materials, electromagnetic generators and rectifying antennae. The output of these energy harvesters must be rectified to a DC voltage before it can be used to power a system.In this article, only DC energy harvesters are considered as energy harvesters using these sources are easier to obtain in high volume quantities as opposed to AC harvesters

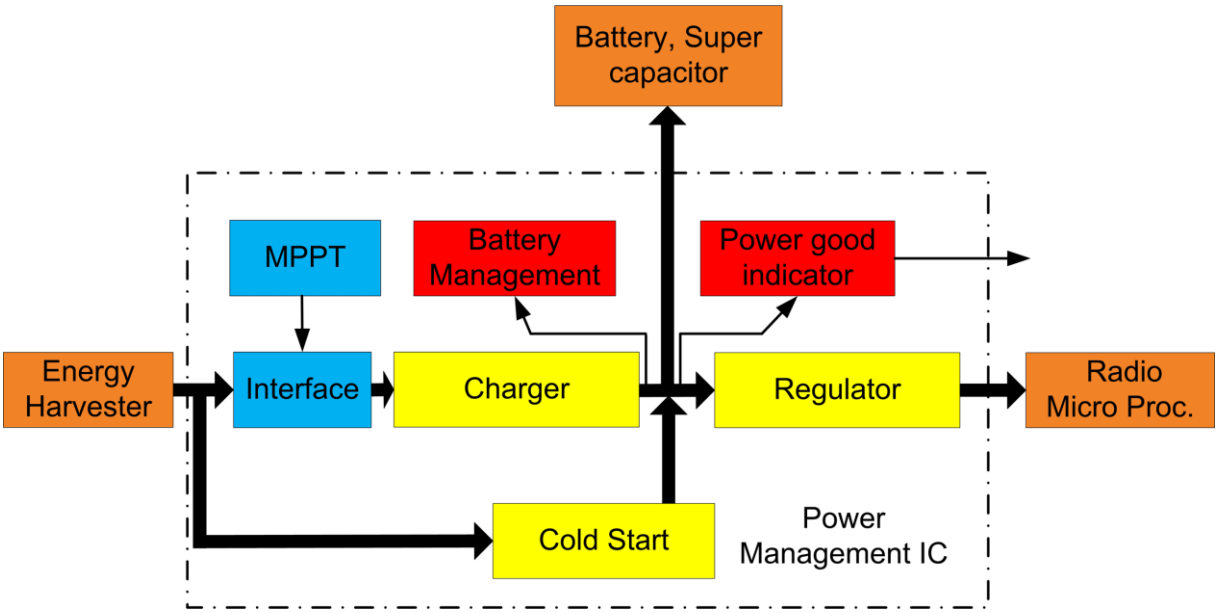


Fig.5.2.7a Block diagram of generalized energy-harvesting system.

Figure 1 show a generic architecture of an energy-harvesting system. The overall system consists of the ambient energy source, energy buffer (super capacitor/battery), the PMIC, and the system load. Since the energy available from the energy source is dependent on time-varying ambient conditions, the energy from the source is extracted when available and stored on the energy buffer.

The system load is powered from the energy buffer. This allows the system to work, even if there is no ambient energy available. The power management unit itself consists of a DC/DC power converter with an optimized interface to the energy harvester, battery management circuitry, output regulator, and cold start unit. The function and design considerations for each of these blocks is discussed next.

Charger

The function of the charger is to extract the maximum possible energy from the solar panel or TEG and transfer the energy to the storage element. The primary factors to be considered for the charger include topology, efficiency, maximum power extraction network and complexity. The common charger topologies include linear dropout (LDO) regulators, buck converters, boost converters and buck-boost converters.

For a solar panel, the topology is primarily dependent on the output voltage of the solar panel stack. Typically, the output of a single cell solar panel is 0.5V. Therefore, for systems with single cell and two cell solar panels, a boost converter topology is required, as battery voltages are typically greater than 1.2V for NiMH and 3V for Li-Ion batteries.

For a higher number of series-connected cells, other converters such as a diode rectifier, buck regulator, or an LDO can be used. For the thermoelectric generator (TEG), the output voltage ranges from 10mV to 500mV. Therefore, for a TEG, a boost converter is the primary topology of choice. It is possible to stack a number of TEGs in series to obtain a higher voltage so that an LDO or buck regulator can be used. The disadvantage of such a scheme, however, is the large series impedance of the TEG stack.

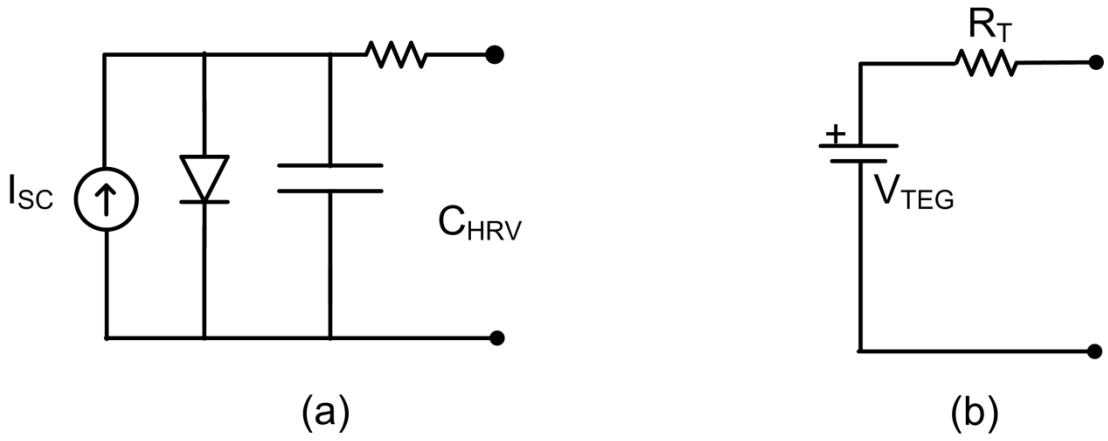


Fig. 5.2.7b: a) Model of solar panel and b) thermoelectric generator.

To extract the maximum power from a solar panel or thermoelectric generator, the panel or TEG must be operated at its maximum power point. To understand the need to operate the energy harvester at its maximum power point, consider the solar panel and TEG model shown in Figure 2a and Figure 2b, respectively.

A solar panel can be modeled as a reverse-biased diode that delivers current in parallel with a parasitic capacitance (CHRV). The current output of the diode is proportional to the light intensity. The model of a thermoelectric generator consists of a voltage source in series with a resistor. The resistor models and the internal impedance of the TEG are dependent on the material properties and dimensions of the TEG.

For a typical solar panel and TEG, the current versus voltage and power versus voltage is shown in Figure 3 and 4, respectively. You can see that for a solar panel, the maximum power is obtained at approximately 80 percent of the open circuit voltage (OCV). Similarly, for the TEG, the maximum power point is obtained at 50 percent of the OCV.

Based on the curves presented in Figure 3, it is clear that an interface circuit is needed to extract the maximum power available. The maximum power extraction circuit dynamically adjusts the input impedance of the power converter to extract the maximum power. For solar-energy harvesting, maximum power extraction is done using simple techniques such as input-voltage regulation at a fixed fraction of the open-circuit voltage, input-current regulation at a fixed fraction of the short-circuit current, or using complex microprocessor-based techniques.

Some of the techniques for extracting maximum power from TEGs include dynamically changing the switching frequency of a DC/DC converter and regulating the input voltage of a DC/DC converter at 50 percent of the open circuit voltage. In all these converters, the output voltage is determined by the energy buffer.

Note that the choice of converter topology is a tradeoff between design complexity, component count, and efficiency. Switching converters typically provide better efficiency than linear regulators, but at the cost of increased components, design complexity and board space.

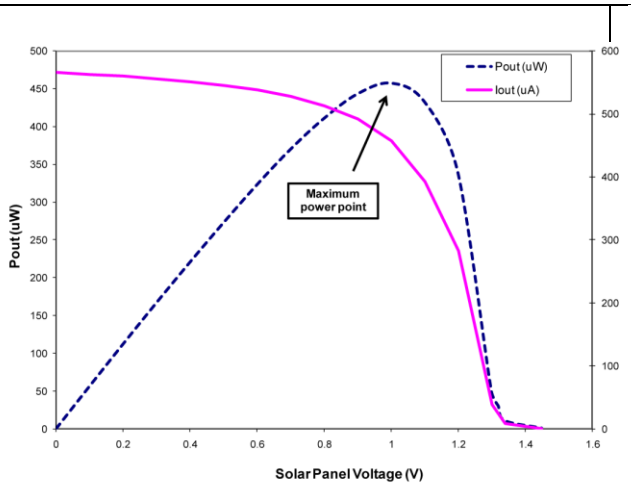


Fig. 5.2.7c: Voltage versus current, and voltage versus power, of a solar panel.

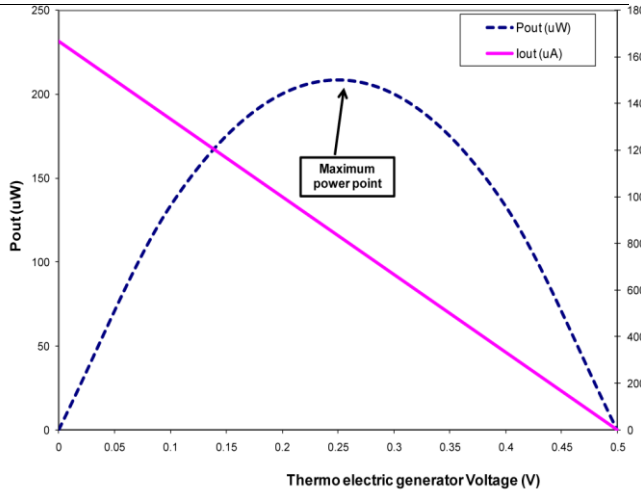


Fig. 5.2.7d: Voltage versus current, and voltage versus power, of a thermoelectric generator.

Battery-management circuitry

In energy-harvesting systems, an energy buffer is used to store the intermittently energy available from the energy harvester. The stored energy is then used to power the system. This architecture allows the overall system to operate continuously, even though the energy available is intermittent.

The commonly used energy buffers include rechargeable batteries of different chemistries, as well as super capacitors. The battery-management circuitry has two main functions:

First, it monitors the voltage across the energy buffer and ensures that the voltage is within the safe operating region determined by the under voltage (UV) and overvoltage (OV) thresholds.

Second, it monitors the capacity of the energy buffer and provides an indication to the load regarding the availability of energy to do useful work.

The capacity measurement can be performed using simple techniques such as monitoring the voltage across the energy buffer or using fuel gauging techniques, which measure the voltage and current sourced and sunk by the battery. In cases when a simple voltage-based technique is used to provide an indication of the capacity left in the energy buffer, a user-programmable intermediate-voltage level known as the power-good level can be implemented.

The design considerations of the battery-management section are dependent on the energy buffer used. For rechargeable batteries, the OV and UV thresholds are based on the cell chemistry. For super capacitors, the OV and UV thresholds are determined by the lower value of the absolute max ratings of the IC and the capacitor. Using the optimal settings for the energy buffer maximizes the life time of the system.

Another consideration in the design of the battery-management section is the quiescent current consumed by the battery-management section. The circuitry in the battery-management block includes building blocks such as references, comparators, and digital logic. The current consumed by these circuits must be minimized. This is because any energy used by the battery-management section drains the battery and the energy is not being supplied to the external load.

Cold start

The cold-start unit is an optional block that may or may not be present in a typical energy-harvesting PMIC. The function of the cold-start unit is to boot strap the system when there is insufficient energy stored in the storage element.

The design of the cold-start unit is application dependent. For solar applications, an input-powered (as opposed to a battery-powered) oscillator can be used to drive the switches of a temporary low efficiency switching converter. Once sufficient energy has been built up in the energy buffer, the highly efficient switching converter can take over.

For thermoelectric generators, the cold start units can be implemented using transformer coupled oscillator topologies or by using mechanical motion of the system (References 2 and 3). The design considerations for this block are minimum startup voltage, startup power, peak inrush-current, and time needed for startup.

Regulator

The function of the regulator is to provide a regulated voltage from the battery. The topology of this block is dependent on the battery, system-load requirements, and quiescent current.

Chapter 6: Swatchh Bharat Abhiyan (Clean India)

Swachh Bharat Mission (SBM), Swachh Bharat Abhiyan, or Clean India Mission is a country-wide campaign initiated by the Government of India in 2014 to eliminate open defecation and improve solid waste management. Phase 1 of the mission lasted till October 2019. Phase 2 will be implemented between 2020–21 and 2024-25

Initiated by the Government of India, the mission aimed to achieve an "open-defecation free" (ODF) India by 2 October 2019, the 150th anniversary of the birth of Mahatma Gandhi. The objectives of the first phase of the mission also included eradication of manual scavenging, generating awareness and bringing about a behavior change regarding sanitation practices, and augmentation of capacity at the local level. The second phase of the mission aims to sustain the open defecation free status and improve the management of solid and liquid waste. The mission is aimed at progressing towards target 6.2 of the Sustainable Development Goals Number 6 established by the United Nations in 2015.

The campaign's official name is in Hindi. In English, it translates to "Clean India Mission". The campaign was officially launched on 2 October 2014 at Rajghat, New Delhi by Prime Minister Narendra Modi. It is India's largest cleanliness drive to date with three million government employees and students from all parts of India participating in 4,043 cities, towns, and rural communities. At a rally in Champaran, the Prime minister called the campaign Satyagrah se Swachhagrah in reference to Gandhi's Champaran Satyagraha launched on 10 April 1916.

The mission was split into two: rural and urban. In rural areas "SBM - Gramin" was financed and monitored through the Ministry of Drinking Water and Sanitation; whereas "SBM - urban" was overseen by the Ministry of Housing and Urban Affairs.

As part of the campaign, volunteers, known as Swachhagrahis, or "Ambassadors of cleanliness", promoted indoor plumbing and community approaches to sanitation (CAS) at the village level. Other activities included national real-time monitoring and updates from non-governmental organizations such as The Ugly Indian, Waste Warriors, and SWACHH Pune (Solid Waste Collection and Handling).
The government provided subsidy for construction of nearly 110 million toilets between 2014 and 2019m although some Indians especially in rural areas choose to not use them. The campaign was criticized for using coercive approaches to force people to use toilets. Some people were stopped from defecating in open and threatened with withdrawal from government benefits.

6.1 Swachhta needed in Meghpar Zala Village-Existing Situation with Photograph

Fig. no.6.1a current situation of cleanness

We have done one survey on existing condition of village regarding swachhta. The people are maintaining cleanliness of the village but in some streets there is no swachhata because there are animal and their waste, mud, etc. Other than these there are clean streets, main road and approach

6.2 Guidelines - Implementation in allocated village with Photograph

According to Talati, Sarpanch and villagers, the people are cleaning their nearby area regularly and collect that waste and dispose it to out of the village and burn it. No daily basis waste collection is there in the Meghpar Zala village.

Fig. no. 6.2a guideline implementation in meghpar zala

According to Talati, Sarpanch and villagers, the people are cleaning their nearby area regularly and collect that waste and dispose it to out of the village and burn it. No daily basis waste collection is there in the Meghpar Zala village.

6.3 Activities Done by Students for allocated village with Photograph

Fig 6.3a Cleanness Of Meghpar Zala

Firstly we took a permission from village Talati and Sarpanch for doing one Swachhta awareness camp and then we have done one activity of swachhta awareness in the village and we have done an interaction with villagers and aware them about the importance of swachhta in our life and told them to keep the village and infrastructure clean and safe. We have also done a cleaning of Village Street. We have suggested them for not dumping the waste in village streets and dispose it at right place.

Chapter 7: Village condition due to Covid-19

With respect to COVID 19 pandemic, Ministry of Panchayati Raj, Government of India in close collaboration with State Governments has taken various initiatives. Close consultation and guidance of the State as well as District authorities is being maintained to ensure that lock down conditions are not violated and norms of social distancing are scrupulously followed to contain the spread of the disease. India has overtaken Brazil and become the second-worst affected country in the world by the coronavirus pandemic, with more than 4 million cases. COVID-19 had mostly remained in India's cities, but the disease is now spreading to rural India – an area with over 850 million people and far worse healthcare. The reason for this shift appears to be migrant workers who have been returning to their villages since lockdown was eased at the end of June. The medical response to stop the spread and treat those infected has been inadequate, according to media reports. With one trained doctor for every 1,497 people, against the World Health Organization recommended one per 1,000, and public health expenditure for 2018 at just 1.3% of GDP, India faces an uphill struggle in dealing with the pandemic. While two-thirds of India's population lives in rural areas, there are almost four times as many health workers per person in cities. Most rural communities rely on untrained health workers. Over two-thirds of these rural health providers have no formal medical training, but remain the only option of medical support for most of the rural population.

7.1 Taken step

During interaction with the Talati, he told us that quarantine place and home quarantine facility were implemented during the lockdown. According to Talati, Sarpanch and villagers; in the Meghpar Zala village the sanitization process was done during the lockdown period when first case of COVID-19 came in the village.

7.2 Activity Done by students

Fig 7.2a activity s done by students

We have taken permission from Talati and Sarpanch for doing one awareness regarding covid 19 in the Meghpar Zala village and then we did awareness camp regarding COVID-19. In that awareness camp we have distributed some face masks, sanitizers to the villagers for the protection against COVID-19 and told them to take precautionary measures like wear a mask perfectly, wash hands regularly, maintain social distancing in public and avoid crowd area & firstly make yourself home quarantined if you fill any COVID-19 symptom in your body.

7.3 Any other steps taken

During interaction with the Talati, he told us that quarantine place and home quarantine facility were implemented during the lockdown. In the COVID-19 situation cleaning, fogging and sanitization were done in the village.

Chapter 8: Proposing designs for Future Development of the Village for the PART-I Design((Scenario/Existing Situation/ Proposed Design in AutoCAD/ Recapitulation Sheet/ Measurement Sheet/ Abstract Sheet / Sustainability of Proposal/ Any other software)

8.1 Design Proposal

8.1.1 Smart village design: Government grocery shop:

A proper government grocery shop can help in proper distribution of groceries to each and every indusial in the village. Groceries like wheat, rice, lentils, vegetable oil, kerosene, etc. can be sold and distributed here in a proper manner. The proposed design consists of a shop area where shelves can be added, a store room for storing the goods and a general toilet.

Fig. no. 8.1.1a grocery shop plan

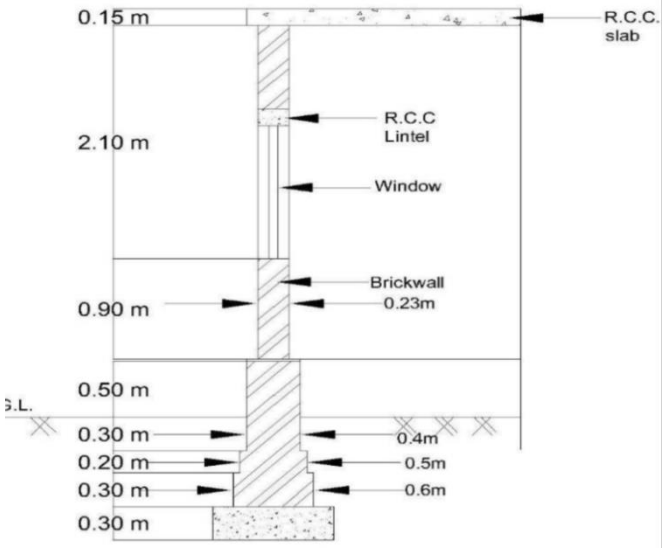


Fig. 8.1.1b Section grocery shop wall footing

Table 8.1.1a. Grocery shop Measurement sheet

Item NO.	Item description	Nos.	Length (m)	Width (m)	Height (m)	Quantity
1.	Excavation in foundation	1	26.96	0.9	1.1	26.69m3
2.	P.C.C. (1:4:8)	1	26.96	0.9	0.3	7.28 m3
3.	Brick masonry in foundation and					
	plinth in C.M. (1:6)					
	Step-1	1	27.56	0.6	0.3	4.96 m3
	Step-2	1	27.76	0.5	0.2	2.78 m3
	Step-3 (up to plinth)	1	27.96	0.4	0.775	8.67 m3
				Total Quantity = 16.41m3		
4.	Sand filling in foundation	1		Total Quantity= 8.32 m3		
5.	Brickwork in superstructure	1	28.3	0.23	3	19.53m3
6.	Deduction for Door and Window					
	D1	1	1	0.23	2.1	0.483m3
	D2	1	0.75	0.23	2.1	0.362m3
	W	1	1	0.23	1.2	0.276m3
	V	1	0.6	0.23	0.6	0.083m3
	Shutter	1	3.02	0.23	3	2.084
	Deduction for lintels above door & windows with 15 cm bearing at each side				Deduction = 3.288m3	

Table no. 8.1.1b. Abstract sheet

1. Earthwork in excavation up to 1.5m depth					
Nos.	Particular	Quantity/Number	RateRs.	Per	Amount Rs.
1.	Labour				
	Male Coolie	4	200	Day	800
	Female Coolie	2	180	Day	360
	Sundries				20
				Total cost Rs.1180	
2. Sand filling in foundation and plinth					
Nos.	Particular	Quantity/Number	RateRs.	Per	Amount Rs.
1.	Materials				
	Sand	8.32 m3	800	m3	6656
	Sundries				20
				Material cost Rs.6676	
2.	Labour				
	Male coolie	2	200	Day	400
	Female coolie	1	180	Day	180
	Bhistie	0.5	200	Day	100
	Sundries				20
			Labour cost Rs.700		
			Total cost Rs.7376		
3. P.C.C. (1:4:8) in Foundation					
Nos.	Particular	Quantity/Number	RateRs.	Per	Amount Rs.
1.	Materials				
	Cement	25	280	Bag	7000

	Sand	3.40	800	m3	2720
	Aggregate	10.21	1000	m3	10210
	Sundries				50
			Material cost Rs.19980		
2.	Labour				
	Mistry	0.5	400	Day	200
	Mason	1	300	Day	300
	Male coolie	7	200	Day	1400
	Female coolie	11	180	Day	1980
	Bhistie	2.5	200	Day	500
	Sundries				50
			Labour cost Rs.4430		
			Total cost Rs.24410		
4. Brick masonry in foundation					
Nos.	Particular	Quantity/Number	RateRs.	Per	Amount Rs.
1.	Materials				
	Brick(19cmx9cmx9cm)	8205 Nos.	4000	1000 Nos.	32820
	Cement	22	280	Bag	6160
	Sand	4.64	800	m3	3712
	Sundries				50
				Material cost Rs.42742	
2.	Labour				
	Mason	2	300	Day	600
	Male coolie	3	200	Day	600
	Female coolie	2	180	Day	360
	Bhistie	1	200	Day	200
	Sundries				50
			Labour cost Rs.1810		
			Total cost Rs.444552		
5. Brickwork in superstructure (1:6)					
Nos.	Particular	Quantity/Number	RateRs.	Per	Amount Rs.
1.	Materials				
	Brick(19cmx9cmx9cm)	8045 Nos.	4000	1000 Nos.	32180
	Cement	22	280	Bag	6160
	Sand	4.55	800	m3	3640
	Sundries				50
			Material cost Rs.42030		
2.	Labor				
	Mistry	0.5	400	Day	200
	Mason	7	300	Day	2100
	Male coolie	7	200	Day	1460
	Female coolie	7	180	Day	1260
	Bitsie	2	200	Day	400
	Sundries				50
			Labour cost Rs.5410		
			Total cost Rs.47440		
6. 12 mm thick cement plaster in C.M. 1:4					
Nos.	Particular	Quantity/Number.	Rate Rs.	Per	Amount Rs.

1.	Materials				
	Cement	13	280	Bag	3640
	Sand	1.776	800	m3	1420
	Sundries				50
				Material cost Rs.5110	
2.	Labor				
	Mistry	0.25	400	Day	100
	Mason	10	300	Day	3000
	Male coolie	10	200	Day	2000
	Female coolie	10	180	Day	1800
	Bitsie	2	200	Day	400
	Sundries				50
			Labor cost Rs.7350		
			Total cost Rs.12460		

7. 20 mm thick plaster in C.M. 1:3

Nos.	Particular	Quantity/Number.	Rate Rs.	Per	Amount Rs.
1.	Materials				
	Cement	14	280	Bag	3920
	Sand	1.46	800	m3	1168
	Sundries				50
			Material cost Rs.5138		
2.	Labor				
	Mistry	0.25	400	Day	100
	Mason	10	300	Day	3000
	Male coolie	10	200	Day	2000
	Female coolie	10	180	Day	1800
	Bitsie	2	200	Day	400
	Sundries				50
			Labor cost Rs.7350		
			Total cost Rs.12488		

8. R.C.C. work for slab and lintel (1:1.5:3)

Nos.	Particular	Quantity/Number.	Rate Rs.	Per	Amount Rs.
1.	Materials				
	Cement	38 bags	280	Bag	10640
	Sand	1.96 m3	800	m3	1568
	Aggregate	3.93 m3	1000	m3	3930
	Steel (1%)	565 kg	45	Kg	25425
	Binding wire	6 kg	50	Kg	300
	Sundries				50
			Material cost Rs.41913		
2.	Labor for mixing, transporting and placing concrete including curing Cost of hiring mixture and vibrator	7.20 m3	300	m3	2160
	Labor for bending, cutting and placing reinforcement steel	565 kg	5	Kg	2825
	Labor for centering and shuttering sundries			L.S.	50
			Labor cost Rs.9035		
			Total cost Rs.50948		
		Total cost Rs.1,95,854			

		1.5% water charges 2937 RS.
		10% contractor's profit 19585 RS.
		Total cost of Shop= 2,18,376 RS.

8.1.2 Heritage design(Civil): Community Hall

A community hall can be helpful in conducting village meetings, various functions, gatherings, etc. Weather conditions like rain, snowfall, etc. would not affect the meeting and the meet can be conducted successfully. It can be cheap and villagers can use it for various purposes. The proposed design consists of a staging area and a gathering area.

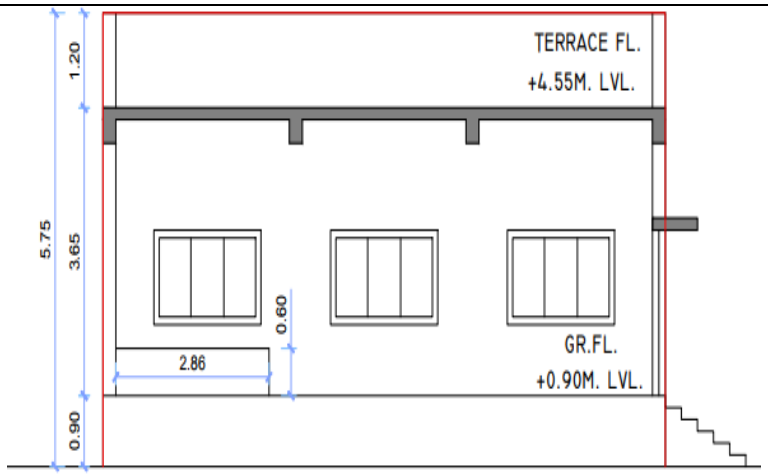


Fig No. 8.1.2a. Reading Hall side

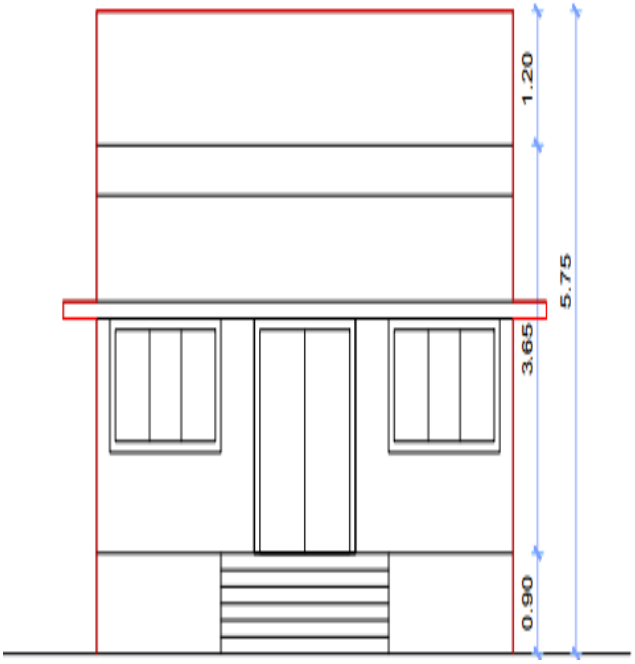


Fig No. 8.1.2b. Reading Hall Front Elevation

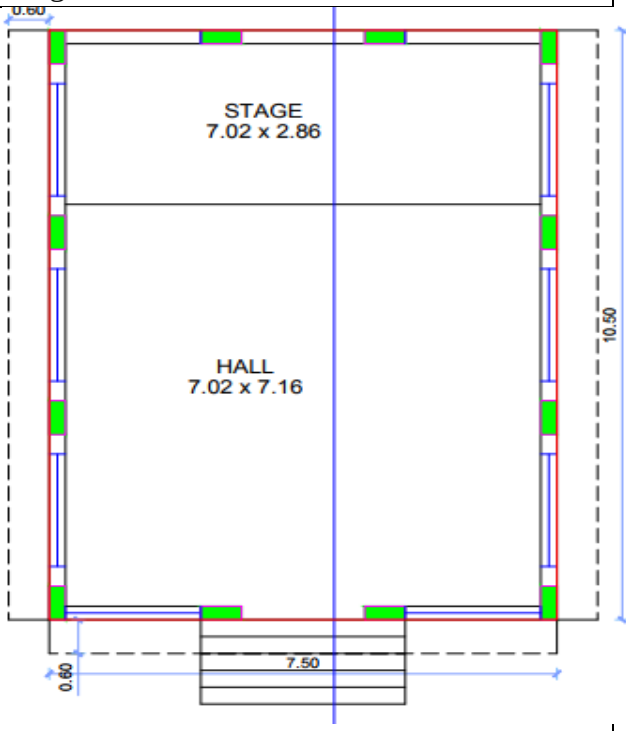


Fig No. 8.1.2c. Reading Hall Back Plan

Measurement sheet

Table No. 8.1.2a Community Hall Measurement Sheet

Item no.	DESCRIPTIONOFITE MS	NO.	LENGTH (m)	WIDTH(m)	DEPTH(m)	QTY.
1.	Excavation for foundation upto3mDepthincluding sorting out and stacking of useful materials and disposing of the excavated stuffupto50meterlead(A) Loose or soft soil as per S.O.Rpno19SRNO 1,Iteam no 4.0.0 A	12	2	2.5	3	150
2.	Providing and laying P.C.C. 1:3:6(1Cement:3Courses and:6handbrokenstone aggregates 40mm nominal size) and curing completeexc luding cost of form working(A) Foundation and plinthasper S.O.Rpno 21 ,SRNO 3,Iteam no 5.3.2	12	2	2.5	0.15	9
3.	Box Footing	12	1.7	2.2	1	44.88
4.	Filling available excavated Earth (excluding rock in trenches Plinth, sides of foundation set. inlayers not exceeding 20 cmindepth, consolidating each layer by ramming and watering. As per S.O.R, pno20 ,SRNO6, Item no 4.12	12	2	2.5	2	120
5.	Filling for plinth from available excavated earth in layer snot exceeding 20cm in-depth, consoledatingeach layer by ramming and watering. As per S.O.R, pno20,SRNO6 ,Item no 4.12	1	7.5	10.5	0.75	59
6.	R.C.C Column	12	0.24	0.6	7.75	13.392
7.	Ground Beam	4	7.5	0.24	0.45	3.24
		4	10.5	0.24	0.45	4.536
						(=)7.76
8.	Slab Beam	4	7.5	0.24	0.45	3.24
		4	10.5	0.24	0.45	4.536
						(=)7.76
9.	R.C.C. Slab	1	7.5	10.5	0.15	11.812
10.	0.24 mm thick masonary work	2	5.82		4.85	56.45
		2	8.1		4.85	78.57
						(+)135.02
	Deduction for Door And Window					
	Door	1	1.82		2.1	3.82
	Window	8	2		1.2	19.2
						(-)23.02
						(=)112
11.	Plastering					
I.	Outside	2	7.5		5.75	8.75
		2	10.5		5.75	120.75
II.	Inside	2	7.02		4.85	68.09

		2	10.02		4.85	97.19
						(+)298.78
	Deduction for Door And Window					
	Door	2	1.82		2.1	7.64
	Window	16	2		1.2	38.4
						(-)46.04
						(=)248.74
12.	Spartec Flooring	1	7.02	10.02		70.34
13.	Door And Window With Frame And Shuttering					
	Door	1	1.82		2.1	3.82
	Window	8	2		1.2	19.2
14.	Lintel	2	10.50	0.24	0.15	0.756
		1	7.5	0.24	0.15	0.27
						(=)1.026
15.	Chajja	2	10.50	0.60	0.15	1.89
		1	7.5	0.60	0.15	0.675
						(=)2.565
16.	Electric Fitting	25				
17.	Color work (Plastering + celling work)					319.08

Abstract sheet:

Table No. 8.1.2b. Reading Hall Abstract Sheet

Sr.No.	Description	Quantity	Rate	Per	Amount
1	Excavation for foundation upto3mDepthincluding sorting out and stacking of useful materials and disposing of the excavated stuff upto 50 meter lead (A) Loose or soft soil as per S.O.Rpno19SRNO 1,Iteam no 4.0.0 A	150	100	Cum	15000
2	Providing and laying P.C. C. 1:3:6(1Cement:3Courses and: 6handbroken stone aggregates 40mm nominal size) and curing completeexc luding cost of form workin(A) Foundation and plinthasper S.O.Rpno 21 ,SRNO 3,Iteam no 5.3.2	9	3000	Cum	27000
3	Box Footing	44.88	3200	Cum	143616
4	Filling available excavated Earth (excluding rock in trenches Plinth, side foundation setc. inlayersnot exceeding 20 cmin depth, con solidating each layer by ramming and watering. As per S.O.R, pno20 ,SRNO6, Item no 4.12	120	80	Cum	9600
5	Filling for plinth from availabl eexcavated earth in layer snot exceeding 20cm indepth, consoledatingeach layer by ramming and watering. As per S.O.R, pno20,SRNO6 ,Item no 4.12	59	950	Cum	56050
6	R.C.C Column	13.392	13000	Cum	174096
7	Ground Beam	7.76	13000	Cum	100880
8	Slab Beam	7.76	13000	Cum	100880
9	R.C.C. Slab	11.82	8800	Cum	103946
10	0.24 mm thick masonary work	112	800	Sqm	89600

11	Plastering	248.74	300	Sqm	74622
12	Spartec Flooring	70.34	800	Sqm	56272
13	Door And Window With Frame And Shuttering			Sqm	
	Door	3.822	1000	Sqm	3822
	Window	19.2	2500	Sqm	48000
14	Lintel	1.026	2500	Sqm	2565
15	Chajja	2.565	3000	Sqm	7695
TOTAL					**10,42,789.00**
2% CONTIGENCY					**20856.00**
3% WORK CHARGES ESTABLISHMENT					**31,284.00**
GRAND TOTAL					**10,94,929.00**

8.1.3 Sustainable (Civil): Common Public Toilet

Providing a Public Toilet in the village helps it in a lot of ways. Cleanliness of the village can be maintained. Sanitation of the village can be done properly. Various diseases like Cholera, Typhoid, Jaundice, etc. Can be controlled from spreading and not harm the villagers. Private toilets are available in the village at individual house but there are no public toilet facilities in the village. The proposed public toilet design consists of separate toilet spaces for men and women. It also has proper ventilation throughout the complex.

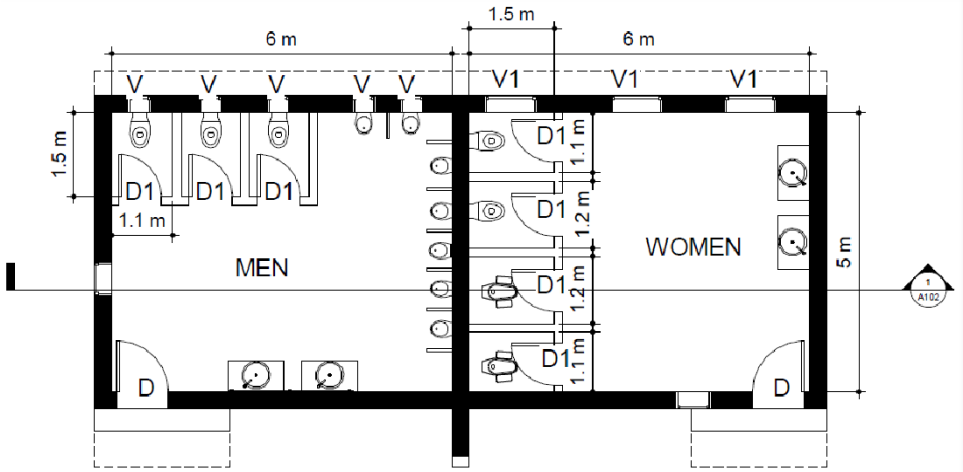


Fig.8.1.3a Floor Plan of Common Public Toilet

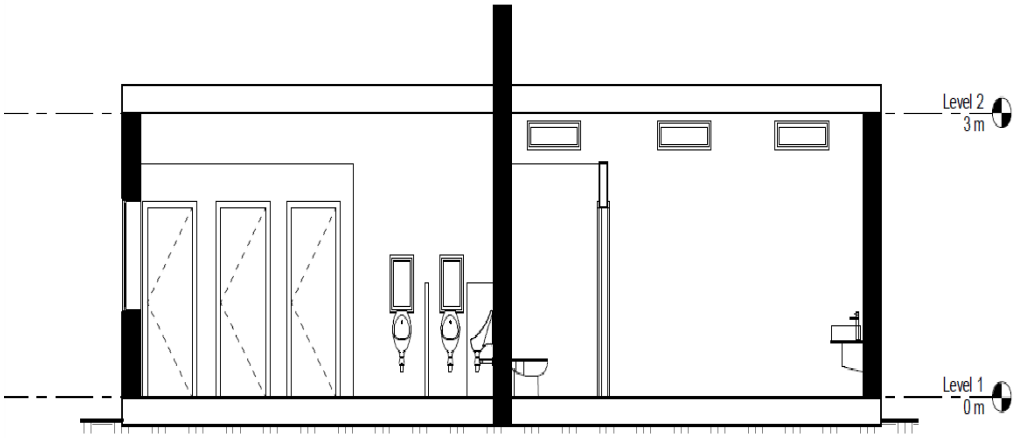


Fig. 8.1.3b Section Plan of Common Public Toilet

Table no.8.1.3a Abstract sheet of public toilet

Sr. No.	Item Description	Qty.	Rate	Per	Amount RS.
1	Excavation in foundation	43.41	85	M3	3689.85
2	Plain cement concrete (P.C.C) in foundation in (1:1.3:6)	10.85	3200	M3	34720
3	First class brick work up to plinth in C.M. (1:6)	28.87	3200	M3	92384
4	Brickwork in super structure in cement mortar 1:4	58.66	3500	M3	205310
5	OPC(1:2:4)	72.24	150	M2	10836
6	Earth filling	33	50	M3	1650
7	Cement concrete for slab (1:1.5:3)	10.86	8800	M3	95568
8	Centering and shuttering for Slab	97	100	M2	9700
9	12 mm dia. Bars	445.96	162.45	Kg	72446.2
10	6 mm dia. Bars	223.72	49.56	Kg	11583.16
11	Labor for cutting, bending and placing steel	679.68	5	Kg	3398.4
13	Smooth plaster on inside walls and ceiling	244.88	150	M2	36732
14	Plaster outside	130.955	140	M2	18373.7
15	Tiles flooring	118.66	500	M2	59330
16	Wood work for door-window shutters	0.22	63000	M3	13860
17	Paint outside	130.955	72.72	M2	9523.04
19	Toilet seat	7	2780	No.	19460
20	Wash basin	4	1200	No.	4800
21	urinal	7	1360	No.	9520
22	Mirror	4	700	No.	2800
23	**TOTAL**		**Rs. 715644.5**		
24	**Add 3% contingencies**		**Rs. 21469.33**		
25	**Add 2% work charge Establishment**		**Rs.14132.89**		
26	**GRAND TOTAL**		**Rs. 751426.72**		

8.1.4 Social design: Prathmic Arogya Kendra

Objectives of Prathmic Arogya Kendra :

A health care centre with proper medicinal and diagnosis facilities is a base requirement for mankind. Having it in the village can help the villagers in maintaining their health. Various medical and para-medical facilities like treatment of diseases, dressing of wounds, pharmacy, etc. can be provided. The proposed design consists of a General Toilet and bath area, Office for the doctor for inspection of the patients, Laboratory for testing, a General Ward area for the patients resting and treatment with beds and a medical store for purchasing medicines. It would help a lot to the villagers and the people nearby and they need not rush to the nearest cities or towns for their treatments.

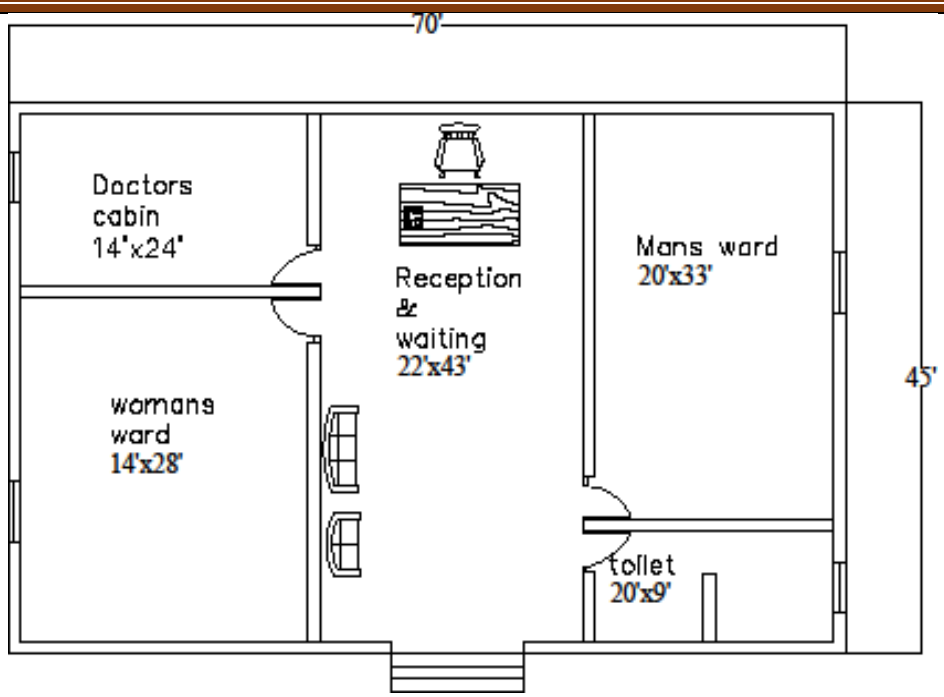


Fig. 8.1.4a Prathmic Arogya Kendra Plan

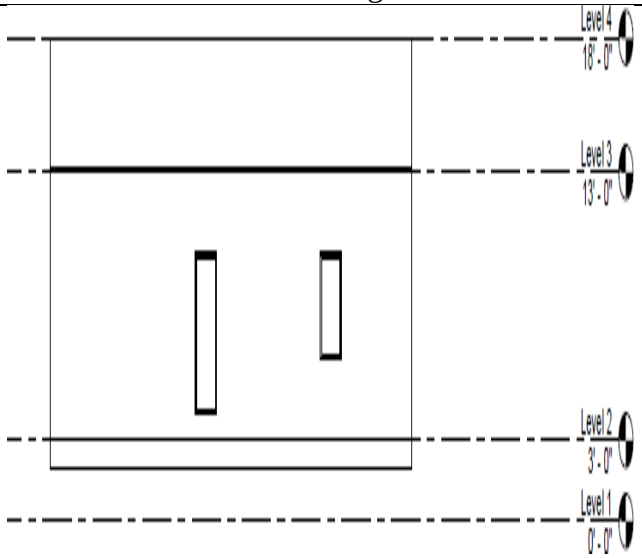


Fig. 8.1.4b. Front Elevation PAK

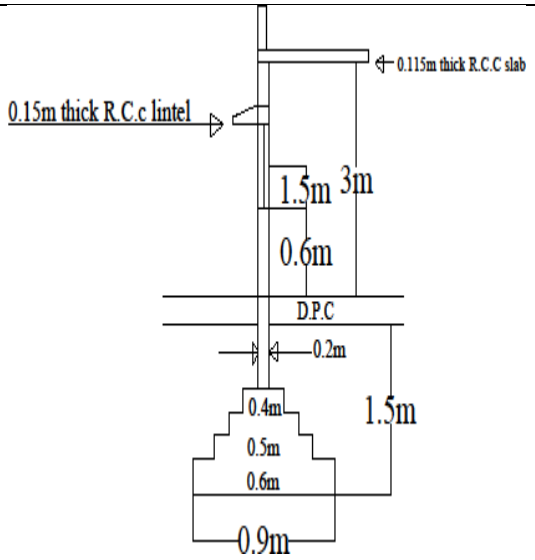


Fig. 8.1.4c. Foundation details

Table No.8.1.4a. Measurement Sheet of Prathmic Arogya Kendra

Item no.	Item description	No.	L(m)	B(m)	H(m)	Qnty.(m^3)
1.	**Excavation infoundation: L=58.4-{(0.9/2)*7}=55.25 m**	1	55.25	0.9	1.1	4.70
2.	**p.c.c. infoundation: L=58.4-{(0.9/2)*7}=55.25 m**	1	55.25	0.90	0.2	9.95
3.	**Brick masonry in foundation:**					
	1st step:L=58.4-{(0.5/2)*7} =56.65 m	1	56.65	0.5	0.3	8.50
	2nd step: L=58.4-{(0.4/2)*7}=57 m	1	57.0	0.4	0.3	6.84
	3rd step:L=58.4-{(0.3/2)*7} =57.35 m	1	57.35	0.3	0.9	15.48
	4th step:L=58.4-{(0.2/2)*7}=57.7 m	1	57.70	0.2	0.65	7.50
	Total Qnty. :					38.32 m^3

4.	**Earth filling in plinth level:** **Gen room:Toilet:** **Lab equipment:Staff area: Waiting area: Computer area:**	1 1 1 1 1 1	3 2 3 2 4 3	3 3 2 3 3 2	0.6 0.6 0.6 0.6 0.6 0.6	5.4 3.6 3.6 3.6 7.2 3.6
		Total Qnty.:				27m^3
5.	**Brick masonry insuperstructure: L=58.4-{(0.2/2)*7} =57.7 m**	1	57.7	0.2	2.70	31.16
6.	**Deduction for door and windows:**					
	D1/D4:	2	1.10	0.3	2.10	1.33
	D2/D3:	2	0.90	0.3	2.10	1.13
	W1/w3/w4/w5/w6:	5	1.20	0.3	1.40	2.53
	W2:	1	1.80	0.3	1.40	0.756\
	V1:	1	0.60	0.3	0.60	0.108
		Total deduction:		5.904 m^3		
		Actual Qnty.:		31.16-5.904 =25.26 m^3		
7.	**Plastering:Outside wall**	4	9.60	-	6.40	245.76 m2

Table No.8.1.4b. Abstract Sheet of Prathmic Arogya Kendra

Item no.	Particulars of item	Quantity	Per	Rate	Amount Rs.
1.	**Excavation infoundation**	**54.70 m3**	**m^3**	**86**	**4704 Rs.**
2.	**Earth filling infoundation**	**27 m3**	**m^3**	**950**	**25,650 Rs.**
3.	**Brick work in1:6 superstructure**	**25.26 m3**	**m^3**	**3530**	**89,167 Rs.**
4.	**Brick masonry work in foundation**	**38.32 m3**	**m^3**	**3162**	**1,21,167 Rs.**
5.	**p.c.c. in foundation**	**9.95 m3**	**m^3**	**3022**	**30,068 Rs.**
7.	**Plastering**	**245.76 m2**	**m^2**	**132**	**32,440 Rs.**
Total : 3,03,196 Rs + 3%contigencies:9095 Rs. + 2%work charged establishment:6094 Rs. GRAND TOTAL :3,18,355 RS.					

8.1.5 Socio-cultural: Design of vegetable market:-

A general Marketplace in the village can be very useful to the villagers. Market can be for anything like for vegetables, goods, agricultural produce, etc. A good and stable trading environment can be provided at the market. Not only the villagers but outsiders and nearby leaving people can also come here to buy and sell goods here. The proposed market design contains A General Toilet, a Security Cabin and various stalls for the vendors. It would help in increasing the trade and commerce in the village and benefit its economy.

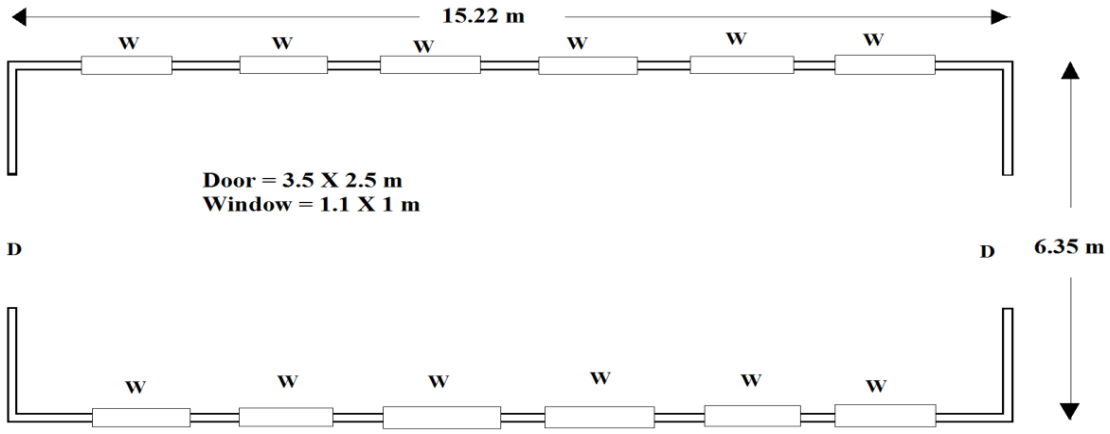


Fig. 8.1.5a Plan of vegetable market

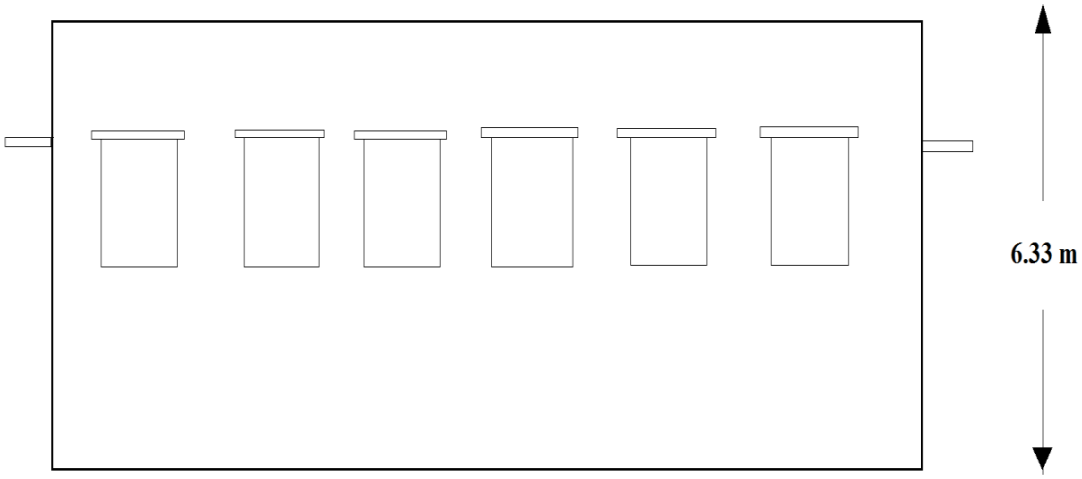


Fig. 8.1.5b Elevation of vegetable market

Table 8.1.5a. Measurement sheet of vegetable market

Sr.No.	Description	No.	L	B	H	Quantity
1	Excavation LW					
	SW	22	16.12	0.9	0.9	26.1144
			5.45	0.9	0.9	8.829
						34.9434m3
2	P.C.C LW SW	2	16.12	0.9	0.3	8.7048
		2	5.45	0.9	0.3	2.943
						11.6478m3
3	Brick work for foundation LW					14.37
	SW					6.53
4	Brick work for superstructure					
	LW SW	2	14.62	0.3	3.33	29.2108
		2	6.92	0.3	3.33	15.2088
						44.4196m3
5	Deduction Door Window	2	3.5	2.5	0.3	5.25
		12	1.1	1	0.3	3.96
						9.21
6	Brickwork for parapet wall LW	2	14.62	0.3	0.33	2.8948
	SW	2	6.92	0.3	0.33	1.3702
7	R.C.C for lintel LW	2	14.62	0.3	0.15	1.3138

	SW	2	6.92	0.3	0.15	0.6228
						1.9386m3
8	R.C.C for chajja Door	2	3.5	0.66	0.15	0.693
	Window Total	6	1.1	0.66	0.15	0.653
						1.346m3
		1	15.22	6.35	0.15	14.4971m3
9	R.C.C for slab					
10	Plastering internal LW	2	15.22	-	6.33	192.685
	SW	2	6.35	-	6.33	80.391
	Roof	1	6.35	-	7	44.31
11	Deduction Door Window	2	3.5	-	2.5	17.5
		12	1.1	-	1	13.2
						30.7
						286.69m2
12	Plastering external LW	2	15.22	-	6.33	192.6852
	SW	2	6.35	-	6.33	80.391
	Roof	1	6.35	-	7	44.31
13	Deduction	2	3.5	-	2.5	17.5
	Door	12	1.1	-	1	13.2
	Window					30.7
						286.69
14	Parapet wall	4	15.22	1	0.33	20.0904
	LW	4	6.35	1	0.33	8.382
	SW					28.4724
						601.8524m2
	Total Plastering	1	15.22	6.35	1	96.647m3
15	Flooring	1	15.22	6.35	1	96.647m^3

Table 8.1.5a. Abstract sheet of vegetable market

Sr. No	Description	Unit	Quantity	Rate	Total cost
1	Excavation for foundation	m^3	34.4434	85	2970.189
2	P.C.C	m^3	11.6478	2700	31449.06
3	Brickwork for foundation	m^3	20.9	3200	66880
4	Brickwork for superstructure	m^3	35.2096	3500	123233.6
5	Brickwork for parapet wall	m^3	4.265	3500	14927.5
6	R.C.C work for lintel	m^3	1.9386	8600	16671.96
7	R.C.C work for chajja	m^3	1.346	8600	11575.6
8	Slab	m^3	14.4971	8800	12774.48
9	Plastering	m^2	601.8524	150	90279.86
	Total cost Water charge 2% Contingencies 3% Total estimated cost				485560.249 9711.205 14566.808 509838.2615

8.1.6 Physical design: Panchayat building

Location:-

The new panchayat building is making where the old clinic which is useless then that is removes and make there a panchayat building.

Advantages:-

All of the panchayat work and panchayat members meet and work in one place and do all files and documents stored in the building.

A Panchayat building in the village is very important in the village for the development and management of the village. Various decisions of the village and the surroundings are taken by the members of the panchayat like sarpanch, talati, etc. Various legal works like drafting certain documents like birth certificates certain registrations for schemes, etc. can be done here. The provided design consists for of a Sarpanch Office, a Talati Office, Waiting Area, General Toilet and Gramsevak Room for the works of the village.

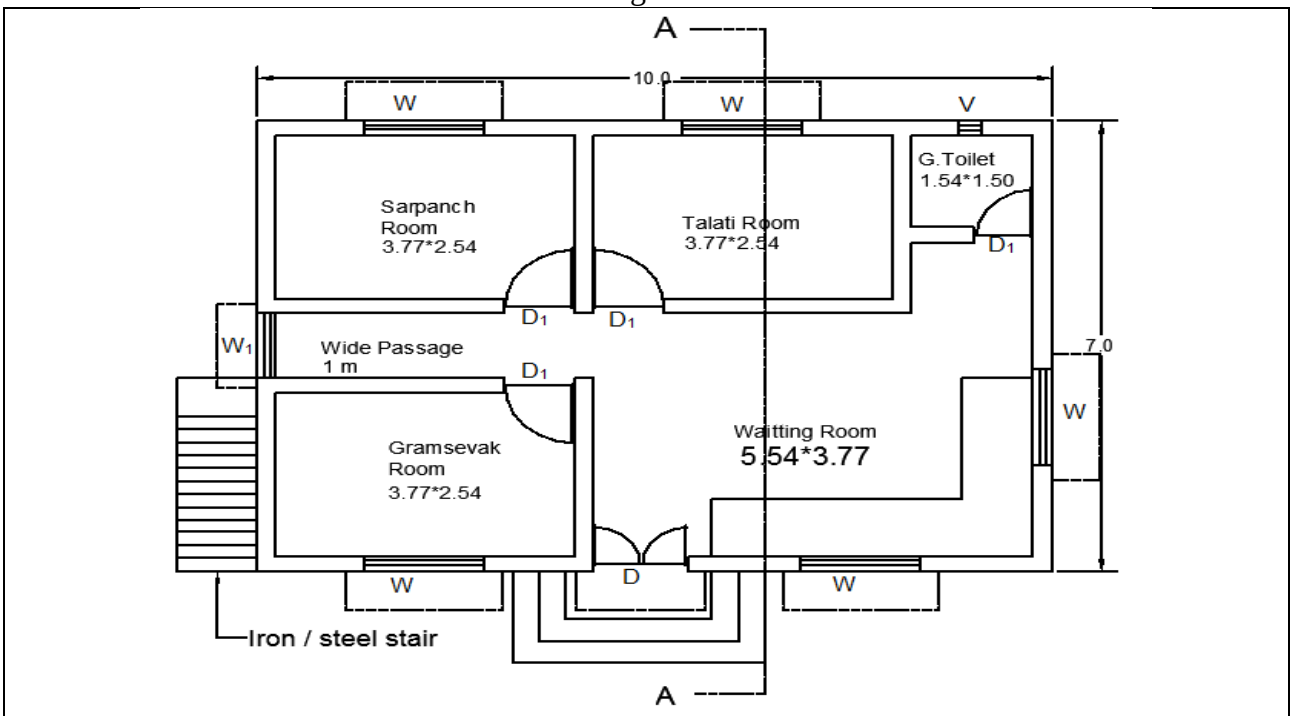


Fig 8.1.6a. plan of panchayat building

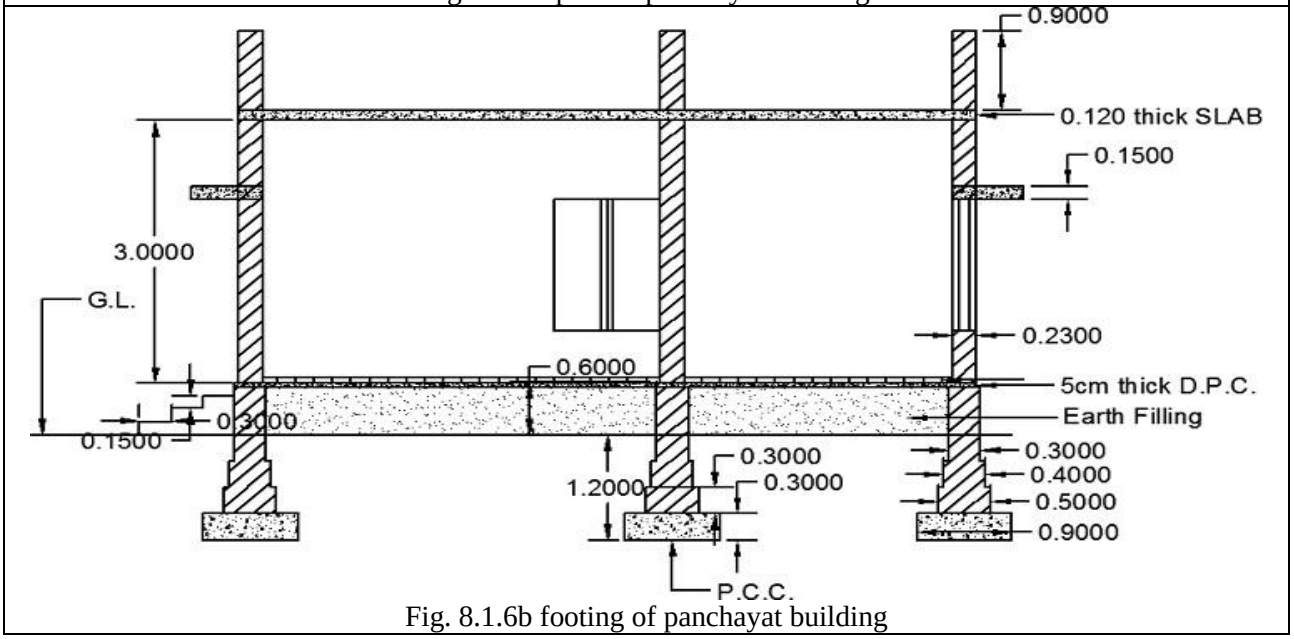


Fig. 8.1.6b footing of panchayat building

Table 8.1.6a Dimension door and window

DOOR D	1.5 * 2.1
DOOR D1	1.0 * 2.1
WINDOW W	1.5 * 1.5
WINDOW W1	1.0 * 1.5
VENTILATION V	0.6 * 0.5

Table 8.1.6a. Measurement sheet of Panchayat Building

DESCRIPTION OF ITEM	**NO**	**L**	**B**	**H**	**QUANTITY**
ITEM NO 1					
					EXCAVATION FOR FOUNDATION:-
Total center line length below plinth L=(2*9.77)+8+4+1.77+(3*6.77)+2.77 = 56.39 m					
no of junction – 10 nos.	1	51.86	0.9	1.2	56.04 m^3
net center line length = 56.9 -1/2*10*0.9 =51.86 m					
Below steps :	1	2.5	1.0	0.1	0.25 m^3
				Total q.	56.29 m^3
					Say 57 m^3
ITEM NO 2					
P.C.C. FOR FOUNDATION :-					
Net center line length =51.86 m	1	51.6	0.9	0.3	14.002 m^3
					Say 14 m^3
ITEM NO 3					
					BRICKS WORK IN FOUNDATION (up to plinth level):-
First step- L= 56.39- 1/2 *10*0.5 = 53.89 m	1	53.89	0.5	0.3	8.08 m^3
Second step- L=56.39- 1/2 *10*0.4 = 54.39 m	1	54.39	0.4	0.3	6.52 m^3
Third step- L= 56.39- 1/2 *10*0.3=54.89 m H= 0.3+0.6-0.05= 0.85 m	1	54.89	0.3	0.85	14.00
					Q1 = 28.6 m^3
STEPS					
Step 1	1	2.3	0.9	0.25	0.517
Step 2	1	2.0	0.6	0.15	0.180
Step 3	1	1.7	0.3	0.15	0.0765
					Q2 = 0.77 m^3
					Total Q= 29.37 m^3
					Say 30 m^3
ITEM NO 4					
					DAMP PROOF COURSE:- (5cm thick)
Net center line length= 56.39 - 1/2 *10*0.20 = 55.39 m	1	55.39	0.20	-	11.078 m^2
					Say 12 m^2
ITEM NO 5					
EARTH FILLING: -					
H=0.6–0.10–0.10 – 0.40m					
Sarpanch room	1	3.77	2.54	0.40	3.83
Talati room	1	3.77	2.54	0.40	3.83
Gramsevak room	1	3.77	2.54	0.40	3.83
1 m wide passage	1	3.77	1.0	0.40	1.51

Waiting room	1	5.54	3.77	0.40	8.354
Toilet	1	1.54	2.54	0.40	1.565
					Q1= 22.92 m^3
					Earth filling in Excavation trenches
Total Excavation for foundation = 55.94 m^3 Brick works up to G.L. = (-) 19.24 m^3 P.C.C. for foundation = (-) 13.92 m^3 22.78 m^3					Q2 =22.78 m^3
					Total Q = 45.7m^3
					Say 46 m3
ITEM NO 6					
					DRY STONE PACKING :- (10 cm thick)
Sarpanch room	1	3.77	2.54	0.10	0.958
Talati room	1	3.77	2.54	0.10	0.958
Gramsevak room	1	3.77	2.54	0.10	0.958
1 m wide passage	1	3.77	1.0	0.10	0.377
Waiting room	1	5.54	3.77	0.10	2.088
Toilet	1	1.54	2.54	0.10	0.391
					Total q = 5.73 m^3
					Say 6 m^3
ITEM NO 7					
FLOORING :- (10 cm thick)					
Sarpanch / talati / gramsevak room	3	3.77	2.54	0.10	2.873
1 m wide passage	1	3.77	1.0	0.10	0.377
Waiting room	1	5.54	3.77	0.10	2.089
Between toilet & waiting room	1	1.54	1.04	0.10	0.160
Toilet	1	1.54	1.50	0.10	0.231
					Total q. = 5.73 m^3
					Say 6 m^3
ITEM NO 8					
					BRICKS WORK (from plinth to parapet wall top):-
Total center line length aboveplinth L=(2*9.77)+8+4+1.77+(2*6.77)+(2*.77) +2.77= 55.16 m					
no of junction – 8 nos.					
Up to slab level L = 55.16 -1/2*8*0.20= 54.36 m	1	54.36	0.20	3.0	32.62 m^3
Length of parapet wallL = (2*10) + (2*6.6) = 33.2 m	1	33.2	0.20	0.9	5.976 m^3
					Total Q=38.60m^3
DEDUCTION					
For door & window					
Door D	1	1.5	0.20	2.1	0.63
Door D1	4	1.0	0.20	2.1	1.68
Window W	5	1.5	0.20	1.5	2.25
Window W1	1	1.0	0.20	1.5	0.30
Ventilation V	1	0.6	0.20	0.5	0.06
					Q1 = (-) 4.92 m^3

For lintels above door & windowwith 15cm bearing at each end					
Door D	1	1.7	0.20	0.15	0.051
Door D1	4	1.2	0.20	0.15	0.144
ITEM NO 9					
INTERIOR PLASTER :-					
WALL					
Sarpanch/talati/gramsevak/room	6	3.77	-	3	6.86
	6	2.54	-	3	45.72
1 m wide passage	2	4.0	-	3	24
	1	1	-	3	3
Waiting room	1	5.54	-	3	16.62
	1	3.37	-	3	11.31
	1	4.0	-	3	12.0
	1	3.0	-	3	9.0
Toilet	2	1.54	-	3	9.24
	2	1.50	-	3	9.0
	2	1.04	-	3	6.24
	1	1.54	-	3	4.62
					Q1 = 218.61 m^2
CEILLING					
Sarpanch/talati/gramsevak room	3	3.77	2.54	-	28.73
1 m wide passage	1	4.0	1.0	-	4.0
Waiting room	1	5.54	3.77	-	20.89
Toilet	1	1.54	1.50	-	2.31
Between toilet & waiting room	1	1.54	1.04	-	1.60
					Q2 = 57.54 m^2
BOTTOM OF CHHAJJA					
Door D	1	1.7	0	-	0.765
Window W	5	1.7	0.45	-	3.825
Window W1	1	1.2	0.45	-	0.54
					Q3 = 5.13 m^2
					Total Q = 281.28 m^2
DEDUCTION					
For door & windows					
Door D	1	1	-	2.1	3.15
Door D1	4	1.0	-	2.1	8.4
Window W	5	1.5	-	1.5	11.25
Window W1	1	1.0	-	1.5	1.5
NOTE-ventilation area isless than 0.50 m2 , there for not deducted					q = (-) 24.3 m^2
					Net quantity =256.98 m^2
					Say 260 m^2
ITEM NO 10					
EXTERIOR PLASTER:-					
UP TO PARAPET LEVEL					
H= 0.6 + 3.0 +0.12+0.9	1	34	-	4.62	157.08 m^2
= 4.62 m					
Length of wall					

= 10 +7+10+7 = 34 m					
Inner side of parapet wall	1	32.4	-	0.9	29.16 m^2
Top of parapet wall 1	1	33.2	0.23	-	7.64 m^2
					Q = 193.88 m^2
DEDUCTION					
For door & window					
Door D	1	1.5	-	2.1	3.15
Window W	5	1.5	-	1.5	11.25
Window W1	1	1.0	-	1.5	1.5
For steps	1	2.0	-	0.45	0.9
					q = (-) 16.8 m^2
					Net quantity =177.08 m^2
					Say 180 m^2
ITEM NO 11					
CERAMIC TILE FLOORING:-					
Sarpanch/ talati/gramsevak room	3	3.77	2.54	-	28.73
1 m wide passage 1	1	3.77	1.0	-	3.77
Waiting room	1	5.54	3.77	-	20.89
Between toilet & waiting room	1	1.54	1.0	-	1.60
Door sills D		1.5	0.23	-	0.345
Door sills D1	4	1.0	0.23	-	0.92
Top of all steps	1	2.3	2.3	-	2.07
Step 3 side	1	2.3	0.15	-	0.345
Step 2 side	1	3.2	0.15	-	0.48
Step 1 side	1	4.1	0.15	-	0.615
					q = 59.76 m^2
7 % for skirting tiles				4.18m^2	
					Total Q = 63.64 m^2
					Say 65 m^2
ITEM NO 12					
TOILET TILES :-					
Toilet bottom	1	1.54	1.50	-	2.31
Toilet side	2	1.50	-	1.0	3.0
	2	1.54	-	1.0	3.08
					Q = 8.39 m^2
DEDUCTION					
Door D1	1	1.0	-	1.0	1.0
					q = (-) 1.0 m2
					Net quantity = 7.39 m^2
					Say 7.5 m^2
ITEM NO 13					
					ECONOMY EMULSION PAINT for interior wall :-
WALL					
Sarpanch/talati/gramsevak room	6	3.77	-	3	67.86
	6	2.54	-	3	45.72
1 m wide passage	2	4.0	-	3	24
	1	1	-	3	3

Waiting room	1	5.54	-	3	16.62
	1	3.77	-	3	11.31
	1	4.0	-	3	12.0
	1	3.0	-	3	9.0
Toilet	2	1.54	-	3	9.24
	2	1.50	-	3	9.0
Between toilet & waiting room	2	1.04	-	3	6.24
	1	1.54	-	3	4.62
					Q1 = 218.61 m^2
BOTTOM OF CHHAJJA					
Door D	1	1.7	0.45	-	0.765
Window W	5	1.7	0.45	-	3.825
Window W1	1	1.2	0.45	-	0.54
					Q3 = 5.13 m^2
					Total Q = 281.28 m^2
DEDUCTION					
For door & windows					
Door D	1	1.5	-	2.1	3.15
Door D1	4	1.0	-	2.1	8.4
Window W	5	1.5	-	1.5	11.25
Window W1	1	1.0	-	1.5	1.5
NOTE- ventilation area is less than 0.50 m2, there for not deducted					q = (-) 24.3 m^2
					Net quantity =256.98 m^2
					Say 260 m^2
ITEM NO 14					
					WATER PROOF CEMENT PAINT for exterior wall :-
UP TO PARAPET LEVELH= 0.6 + 3.0 +0.12+0.9 = 4.62 Length of wall = 10 +7+10+7 = 34 m	1	34	-	4.62	157.08 m^2
Inner side of parapet wall 1	1	32.4	-	0.9	29.16 m^2
Top of parapet wall	1	33.2	0.23	-	7.64 m^2
					Q = 193.88 m^2
DEDUCTION					
For door & window					
Door D	1	1.5	-	2.1	3.15
Window W	5	1.5	-	1.5	11.25
Window W1	1	1.0	-	1.5	1.5
For steps	1	2.0	-	0.45	0.9
					q = (-) 16.8 m^2
					Net quantity = 177.08 m^2
					Say 180 m^2
ITEM NO 15					
					WATER PROOFING AT TERRACE:-
L = 10 m , B = 7 m	1	10	7	-	70 m^2
					Say 70 m^2
ITEM NO 16					
					DOOR , WINDOWS & VENTILATION

Flush Door D	1	1.5	-	2.1	3.15 m^2
Flush Door D1	4	1.0	-	2.1	8.4 m^2
Aluminum windows W	5	1.5	-	1.5	11.25 m^2
Aluminum window W1	1	1.0	-	1.5	1.5 m^2
Ventilation V	1	0.6	-	0.5	0.3 m^2
ITEM NO 17					
STAINLESS STAIRCASE					
Total weight of stair = (approx.)					300 kg

Table no. 8.1.6b. Abstract sheet of panchayat building

Item No.	Description	Quantity	Rate	Per	Amount
1.	**EXCAVATION FORFOUNDATION**:- Excavation for foundation, pits, trenches, compound wall etc. up to 2m depth below existing ground Level in any type of soil except rock. Rate to include dressing the sides and bottom, bailing out of water if encountered, shoring, strutting, backfilling with available excavated earth (in layers 150 mm compacted thickness, including watering, compaction by saturation, earth rammer, hand rammer, all complete after the construction work), and disposal of surplus excavated earth with in/outside HPCL's premises to an unobjectionable place, as directed by the Engineer in Charge including spreading , watering and Compaction, complete.	57 m^3	205	M^3	11,685
	(S.O.R. ITEM NO-4)				
2.	**P.C.C. FOR FOUNDATION** :- Providing and laying PCC 1:4:8 using 40 mm and down size graded stone aggregates including machine mixing, providing formworkif required, placing, compacting by hand ramming , curing etc. Complete	14 m^3	2604	M^3	36,456
	(S.O.R. ITEM NO-16)				
3.	**BRICKS WORK IN FOUNDATION** (up to plinth level):- Providing and constructing 230 mm & above thickness brick masonry in CM 1:5 using bricks having minimum compressive strength 35Kg/cm2 and conforming to IS: 1077- Latest Edition including providing all openings and projections as per the drawing, raking the joints to 1 cm deep, scaffolding, soaking of bricks In water prior to use and curing etc. Complete	30 m^3	3692	M^3	1,10,760
	(S.O.R. ITEM NO-18)				
4.	**DAMP PROOF COURSE**:- (5cm thick) Providing and laying 50 mm thick DPC in	12 m^2	300	M^2	600

	PCC 1:2:4 mix with 6 to 12 mm size HBG aggregate in two layers of 20 mm thick With two coats of hot bitumen (Grade A- 90/S-90 conforming to IS 73) Applied at rate 1.7 Kg per sq. mtr. over each layers as per specifications including cleaning, watering the top surface of walls, centering, shuttering, placing, tamping, curing, sprinkling each layer of dry and sharp sand over the hot bitumen etc. all complete as per drawing, Engineer-in-charge direction.				
	(S.O.R. ITEM NO-19)				
5.	**EARTH FILLING: -** Filling in ground, plinth and surrounding areas with good yellow earth (quality shall be approved by engineer) brought from outside in layers of 15 to 20 cm. Including Watering, consolidating the Same complete asdirected. The filling shall be done strictly in layers and the same shall be compacted and sprinkling of water shall be done	46 m^3	302	M^3	13,892
	Simultaneously to get the compacted surface in Required gradient. The contractor has to get the soil sample approved from the site engineer, And Required testing also shall be done, no extra charges will be given for that.				
	(S.O.R. ITEM NO-13)				
6.	**DRY STONE PACKING :- (**10 cm Thick) Providing rough stone dry packing In trapezoidal shape wastewater / storm water drain in front of Retail outlet. Job includes making earth profile as per Engineer-in charge directions at site, to the natural slope and line, compacting the earth surface with hand rammer, placing of minimum 230 mm thick dry stone with flat surface towards drain face, filling the voids with smaller size packing Stones and merging with spall. The stone used shall be locally available Khondo lite stone withflat Surface making drain.	6 m^3	434	M^3	2604
	(S.O.R. ITEM NO -15)				
7.	**FLOORING :-** Providing and laying PCC 1:3:6 using 40mm/ 20mm and down size graded stone aggregates including machine mixing, providing formworkif required, placing, compacting by hand ramming, Curing etc. Complete.	6 m^3	3103	M^3	18,618
	(S.O.R. ITEM NO-17)				
8.	**BRICKS WORK** (from plinth to parapet wall top):- Providing and constructing 230 mm & above thickness brick masonry in CM 1:5 using bricks having minimum	34 m^3	3321	M^3	1,12,914

	compressive strength 35Kg/cm2 and conforming to IS: 1077- Latest Edition including providing all openings and projections as per the drawing, raking the joints to 1 cm deep, scaffolding, soaking of bricks in water prior to use and curing etc. complete as per specification Above DPC level.				
	(S.O.R. ITEM NO-38)				
9.	**CEMENT CONCREATE FOR LINTEL, SLAB & CHHAJJA :-** Providing, mixing and placing RCC 1:1.5:3	10 m^3	4937	M^3	49,370
	Mix for water tank & building with OPC/ PPC using 20 mm and down size graded crushed aggregate including providing and fixing necessary plywood/ steel shuttering, scaffolding, machine mixing, compacting by vibrators, curing, hacking the surface to receiveplaster etc. complete. Rate shall be exclusive of the cost of steel reinforcement, which will be paid under a separate item. Concrete Conforming to relevant specifications of IS 456Latest Edition.				
	(S.O.R. ITEM NO-25)				
10	**REINFORCEMENT STEEL:-** Supply, fabrication, hoisting and placing in position HYSD reinforcement bars conformingto IS 1786- Latest Edition Grade FE 415 as per detailed drawing and Specifications including cutting, bending and tying with 18 SWG binding wire complete. The rates shall be applicable for all heights and depths. Payment shall be made as per reinforcement drawings and with theoretical weights only including all authorized laps and hooks. Unauthorized chairs, spacers and laps Will not be measured and paid for.	810 kg	54876	1000 kg	44,450
	(S.O.R. ITEM NO-35)				
11	**INTERIOR PLASTER :-** Providing and applying 10 mm thick plaster in CM 1:3 to wall, ceiling and bottom surface of chhajja using screened sand including finishing smooth and providing drip moulds at chhajja edges, scaffolding ,chipping, cleaning the surface, watering and curing etc complete and additional thickness if req. d to achieve perfect line and level without extra cost.	260 m^2	95	M^2	24,700
	(S.O.R. ITEM NO-47)				
12	**EXTERIOR PLASTER:-** Providing and laying average 10 mm thick sand faced cement plaster to salesroom etc as per following procedure :Apply 5 mm thick coat of CM1:4 mixed with CICO / IMPERMO /ACCOPROOF water proofing compound mixed	180 m^2	145	M^2	26,100

	as per manufacturer's specifications as 1st coat and leaving the surface rough. Apply 2nd coat of 5 mm thick of				
	CM 1:4 and finishing the surface by rubbing with sponge till uniform texture isobtained. Rate shall include providing necessary scaffolding, surface cleaning, chipping, watering, finishing, chicken wire mesh at all joints of brick and concrete surfaces, with a minimum overlap of 100mm in all directions and curing complete. No Extra payment shall be made for additional thickness if required to achieve perfect line and level.				
	(S.O.R. ITEM NO-45)				
13	**CERAMIC TILE FLOORING**:- Providing and laying 300mmX300mm matt finish 1st quality Ceramic tiles of 6 mm thick in flooring of approved make and shade and free from cracks, war page, fissures and flakes with straight edges and perfect corner laid at right angle as per design and pattern over a bedding of cement mortar of 30mm to 60mm thick CM 1:5 finishing the joints neatly with white cement mixed with matching color pigment and finish in all respect and all material and labor, curing, line And level etc. All complete.	65 m^2	747	m2	48,555
	(S.O.R. ITEM NO-52)				
14	**TOILET TILES :-** Providing and laying ceramic tiles 6 mm thick in bottom and wall side on 15 mm thick cement plaster 1:3 pointing in white cleaned joined with white cement slurry.	7.5 m^2	100	M^2	750
	(S.O.R. ITEM NO-53)				
15	**ECONOMY EMULSION PAINT** for interior wall :- Providing and applying 2 coats (first coat with brush and final coat with Roller) of ECONOMY EMULSION PAINT of approved make and shade on all surfaces and heights to give an even shade including priming coat and full putty completeof all respect..	260 m	65	M^2	16,900
	(S.O.R. ITEM NO-84)				
16	**WATER PROOF CEMENT PAINT** for exterior wall:-Providing and applying 2 coats of water proof cement paint of SNOWCEM INDIA make and of required shades on all surfaces and heights to give an even shade after thoroughly brushing the surface free from mortar dropping and other foreign matter and also including preparing the surface even and sand papered	180 m^2	49	M^2	8,820

	smooth etc., all material, scaffolding, necessary surface preparation and labor complete as directed by engineer in charge. If additional coats are required to obtain uniform and smooth finish the same shall be carried out at no extra cost.					
(S.O.R. ITEM NO-85)						
17	**WATER PROOFING AT TERRACE:-** Providing and laying integral cement based water proofing of average 100 mm thick in proper slope as per specifications given below: a) Cleaning RCC slab and applying Neat cement slurry mixed with water proofing compound. b) Providing and laying brickbat coba in CM 1:4 mixed with water proofing Compound and curing for a period of 24 hours. c) laying of 25mm thick PCC 1:1.5:3 mix with 6mm and down size coarse aggregate and water proofing compound, finishing smooth, making half round vata at the junction of parapet wall and slab, and curing for 10 days.		70 m^2	474	M^2	33,180
(S.O.R. ITEM NO-77)						
18	**DOOR, WINDOWS, VENTILATION**					
	Flush Door D		1.5*2.1m	3168	Each 0.75*2.1	6336
	Flush Door D1	4 nos.	0.9*2.1m	0.9*2.1	Each 0.9*2.1	15664
	Aluminum windows W		11.25m^2	2600	M^2	29250
	Aluminum window W1		1.5 m^2	2600	m^2	3900
	Ventilation V		0.3 m^2	2600	m^2	780
(S.O.R. ITEM NO-94,96,101,102)						
19	**STAINLESS STAIRCASE** Supply, fabrication and fixing staircase railing with polished stainless steel pipe at two levels of 40mm & 30mm with SS plate balusters with 4 row of 12mm DIA steel tubes + other details as		300 KG	56	KG	16,800
Per Drawing enclosed. Stainless Steel shouldbe have best grade i.e. 304 grade.						Rs.= 6,36,084.00
Say total Rs. = 6,36,100.00						
Add 8 % for water supply and sanitary …….(+) Add 8 % for Electrification… (+)						50,888.00 50,888.00
						Total Rs = 7,37,876.00
Add 2% for contingencies… (+)						14,757.00
Add 2% for work charged establishment..(+)						14,757.00
						GRAND TOTAL COST RS. = 7,67,400.00

8.1.7 Auto sprinkle irrigation using solar energy

Benefits of design

Farmers have always played a significant role in our society as they provide the world's population with food. Farmers can produce energy from the wind, the sun or the biomass and they can use it for their own farm, Solar energy might be one of the easiest ways for farmers to produce energy, Therefore the use of solar energy in agriculture is becoming increasingly popular and the energy produced from this renewable source can be used in the farm in irrigation purpose.

Now in modern day sprinkle irrigation is used instead of surface irrigation.

The Auto irrigation system of this system uses soil moisture sensor to detect the moisture level and 4X4 keypad for various crops control. When the moisture content of the soil is reduced then the sensor sends detected value to the microcontroller. Then the water pump is automatically ON according to the moisture level. The main aim of this paper is to reduce the human intervention for farmers and use solar energy for irrigation purpose. The entire system controlled by the PIC microcontroller.

The proper method is to be implemented for the irrigation system because of lack of rain and scarcity of water in soil. Agricultural field always needs and depends on the water level of the soil. But continuous extraction of water from soil reduces the moisture level of soil to avoid this problem planned irrigation system should be followed. And improper use of water leads to wastage of significant amount of water. For this purpose, automatic plant irrigation system is designed using moisture sensor and solar energy. The proposed system derives power from sunlight through photovoltaic cells. Hence, the system cannot depend on the electricity. In this proposed model by using sunlight energy, power the irrigation pump. The circuit comprises of soil moisture sensor are inserted in the soil to sense whether the soil is wet or dry. A PIC microcontroller is used to control the whole system. When the moisture level of the soil is low then the sensor detects the soil condition and gives condition to the relay unit connected to the switch of the motor. It will ON in dry condition and switch off the motor when the soil is in wet condition. The moisture level of the soil is sensed by the sensor inserted into the soil which gives signal to the microcontroller whether the land needs water or not. The signal from the sensor received through the output of the comparator and it is preceded with instruction from the program stored in the microcontroller. When the soil is dry motor ON and in wet condition motor is OFF. This condition of motor ON and OFF is displayed on a 16X2 LCD.

This System consists of a Solar panel, which is the main source of energy and is given to the charge controller for extracting regulated power from Solar panel at different irradiation and also to maintain correct charging voltage and current in order to charge the battery and increase its life. Water conservation in farm land is controlled using microcontroller with soil moisture sensor.

The proposed system uses the solar energy to ON the water pump. Here the irrigation maintained through the soil moisture sensor and solar energy. There are many plants which required minimum level of moisture. If the required level of water is not provided then the plant will die and results in low production. By irrigate the crop according to the moisture level they need, is provided by the soil moisture sensor. Due to the presence of sensor crops will irrigate properly.

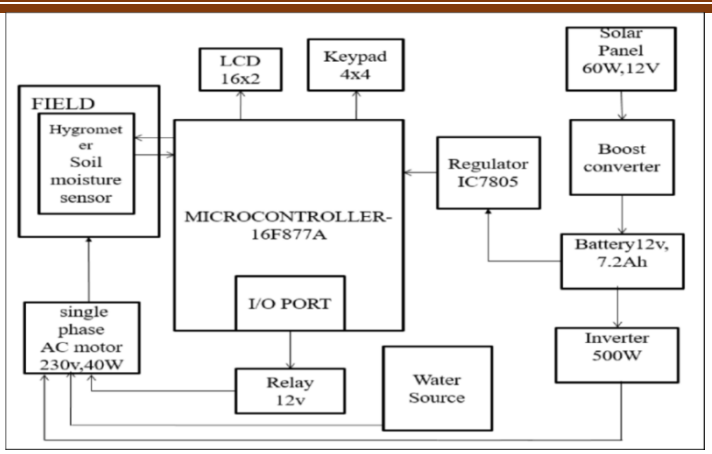


Fig. 8.1.7a Irrigation system diagram

Table 8.1.7a Appliances details

Appliance	Quantity	Watts
Tube light	7	50W
Fan	4	80W
Bulb	2	20W
RO Plant	1	80W
Total		**790W**

The boost converter is used to convert DC to DC power to improve the output power of the solar panel because if solar panel receives less amount of light then boost converter gives higher voltage compared with input voltage. Boost converter is a switch mode power supply contains a diode and a transistor with one energy storage element, capacitor. Filters are used to reduce output voltage ripple.

Proposed system

The proposed system uses Solar power panel to energies the system and soil moisture sensor to sense the water level for crops. Solar power is used only the source of power to control the overall system, supply from the solar panel 12V is given to boost converter circuit. The boost converter circuit has resistance R1, R2 (1kΩ, 330Ω) these are used to control the voltage from solar panel.IN4007

Diode (d1) is act as voltage controlled device, inductance (100µH) are connected series in it. Through MOSFET device PWM pulse is generated to increase the stored voltage in capacitance (1000µF) with respect to T/2 cycle. Constant voltage from boost converter is stored to 12V Battery, 500W inverter are used to convert 12V DC to 230V AC for ac pump. Regulator IC 7805 positive regulator are used to regulate the 12V DC to 5V DC with the help 1000µF and 100µF with current limiting resistor 330Ω. 5V from regulator are used to operate the PIC microcontroller, microcontroller act as a control circuit to control the overall process. It has 40pin IC each pin is connected for respective operation, soil moisture sensor are dipped in the soil to sense the humidity value. Soil humidity value for different crops are selected by 4x4 matrix keypad, programming for crop selection and respective humidity value are programmed in the PIC16F877A microcontroller. Signal from microcontroller to 12V relay are operate to on/off the motor pump. Water flow from the pump are depends upon the signal from PIC microcontroller. The system is controlled by the PIC microcontroller. When the soil moisture sensor sense the low level of the soil moisture then a signal is send to the microcontroller then the controller check for the condition given in program. In program stored in the microcontroller is different for different crops. The humidity level needed to grow the crop is varies from one crop to another. According to the growth of crop water is supplied. The irrigation is automated with Soil moisture sensor and

the relay unit. When soil moisture level is low then a signal send to the relay to switch ON the motor and when the soil is wet then motor is in OFF condition. Relay gives the ON/OFF condition to the motor. The entire system is powered by solar panel energy. When the system uses solar energy then the electricity energy can be conserved. The PIC microcontroller needs 5v supply and motor needs 230v supply. Regulator is connected to the PIC microcontroller to regulate the power supply from the solar panel.

Solar panel

Solar panel refers to a panel designed to absorb the sun's rays as a source of energy for generating electricity or heating. Photovoltaic modules use light energy (photons) from the Sun to generate electricity through the photovoltaic effect. The majority of modules use wafer-based crystalline silicon cells or thin-film cells. The structural (load carrying) member of a module can either be the top layer or the back layer. Cells must also be protected from mechanical damage and moisture.

Fig. 8.1.7b. solar plate

Table no.8.1.7b. Abstract sheet of sprinkle irrigation using solar energy

Equipment's	**cost**
Solar plates	54500
Battery	11650
Inverter	8988
Motor	7695
Wires	200
Pipes	16000
Sprinkles	3700
Tank	----
Labour Work	1000
Total	103733

8.1.8 Solar PV system on the primary school

Step 1: Calculate your total load that you want to run

We know that in our primary school there is following electrical appliances, to consider our future extension we take our total load as 1000w.

Step 2: Size your solar inverter based on electrical load

After we know the total electrical load, the next thing that we have to do is find a solar inverter that can power the load. In this case where our total electrical load is 1000 watts, we should choose an inverter of 1600 watts. It is advisable to oversize the inverter because unfortunately DC to AC conversion that solar inverters do causes loss of energy. It is also good to know that a 1600 watts inverter comes in 24v (v = voltage). Remember this because we are going to use this fact ahead in our calculations.

Step 3: Calculate the total current of your load

Power (in watts) = Voltage x Current

In our case,, the power (watts) is 1000w and we already know the voltage to be 24v. Let‘s insert these figures into our formula.1000 (watts) = 24V x current 1000/24 = 41.66 amps Let‘s round it off to 41 amps. Now our solar system needs to generate at least 41 amps of current to power the connected electrical load.

Step 4: Decide how many hours of battery backup you need – buy battery based on that

The next step in calculating size of solar system in India is to think how many hours of backup you need. Remember, solar PCU/inverter will directly power your electrical load through solar. However, when solar is not available, the solar energy stored in batteries can be used to power load. Let‘s say we need backup of 5 hours. Now there is a very simple formula to calculate size of battery based on our total load and backup time required.

Total load (in watts) x hours of backup needed / 24 why should we divide by 24 because our inverter is 24v. Let‘s put the figures from our example in this formula: 1000 (watts) x 5 hours / 24 = 208 Let‘s round it off to 300AH because it is OK to have extra backup.

Step 5: Calculate size of solar panels based on battery size and current of electrical load

They need to produce enough voltage and current to charge the battery properly and to run electrical load. Time to remember our fundamental formula again: Power = voltage x current Charging Current of Battery = 1/10th of its Total AH. In this case, we have 300ah so if we divide it by 10 we get 30amps. Our solar panels need to make 30 amps of current to feed our battery bank. But what about the electrical load? Let‘s not forget about that. We already calculated that our electrical load will need 41amps to run. We need to add this to the amps that our battery bank is going to take: 30+41 = 71amps. Our solar panels should make 71amps. Fact: On an average, 250 watts solar panels have a voltage of 30v. Now, Power = Volts x Amps

Amps: We calculated in the last step that we need 71amps (30amps to feed the battery bank and 41amps to run the electrical load directly through solar).

Power = 30x71amps = 2130 watts. Let‘s round it off to 2500 watts because you can‘t have 2130 watts panels.

This is our answer: We need to install panels of 2500 watts to feed our battery bank and run electrical load. We can go for 10 panels of 250 watts each.

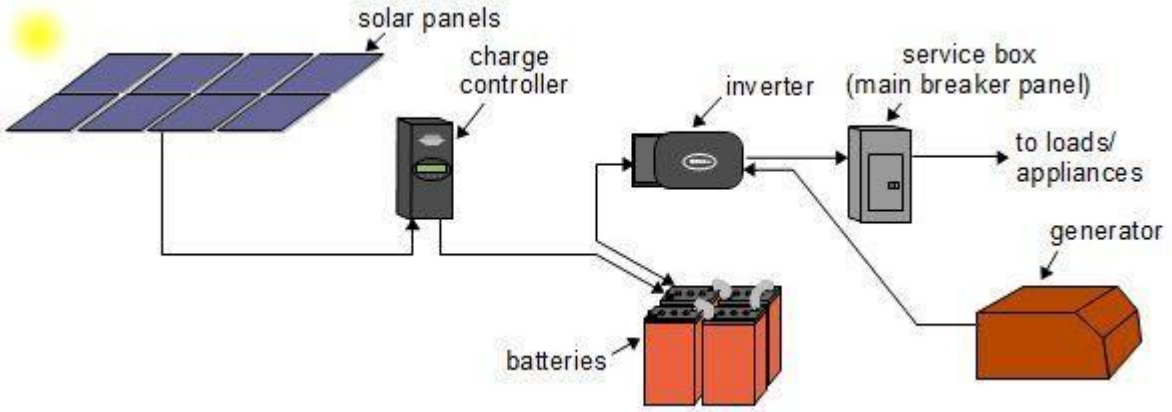


Fig.8.1.8a circuit diagram of solar PV system

Selection of Charge Controller

The most important job of all solar-charge controllers is to properly charge the batteries and to give them as long a life as possible. There are two types of charge controllers:

1) Pulse width modulation (PWM) 2) Maximum power point tracking (MPPT)
The difference between these two types of controllers is that the PWM is not as efficient the MPPT. The MPPT is the most common these days and can gain you up to 30% more power than the PWM controllers. The MPPT controllers also allow the strings of panels to be connected in series for higher voltages, keeping the amperage lower and the wire size smaller, especially for long-wire runs to the PV array.

Table. 8.1.8b abstract sheet of solar PV systems

Equipment	Quantity	Cost
Inverter	1	8000
Battery	2	23,000
solar panel	12	1,09,896
Charge controller	1	4000
	Total	**1,44,896₹**

8.1.9 GSM Based Home Appliances Control System (HACS) for Domestic Power Users

With the increase in the consumption of energy and population, there is a great need to conserve energy in every way possible. The inability to access and control the appliances from remote locations is one of the major reasons for energy wastage. This project presents the development and implementation of a Global System for Mobile Communication (GSM) based remote control system for electrical appliances and lighting that enables complete control of the interface on which it is based. GSM Shield was used for receiving short message service (SMS) from the homeowner's mobile phone that automatically enables an Arduino microcontroller to take the necessary actions like switching OFF and ON electrical appliances such as fan, light, air-conditioner, supply mains and so on. Basically, it reads the SMS and acts according to the message.

INTRODUCTION

Most people inevitably tend to leave their lights, fans and other appliances on when leaving their homes resulting in energy wastages and inefficiencies. It is not always feasible to be physically around the home environment but whatever be the case much should be done to moderate energy

wastage. In Ghana, these wastages are very detrimental to industrial development. Consequently, available technologies need to be widened to eliminate or reduce these wastages in electricity usage. Negligence with regards to leaving lights and other electrical appliances on can lead to outrageous electricity bills, wastage of much needed power (electrical energy) and shorter life span of electrical devices or appliances.

HOME AUTOMATION (HA)

Home automation or Intelligent/Smart home (SH) means automating daily tasks of electrical devices used in homes. Automated homes are equipped with special facilities to enable occupants to control or program an array of electronic devices. For example, a homeowner on vacation can arm a home security system, control temperature gauges, and switch appliances on or off, control lighting, program a home theatre or entertainment system.

SYSTEM ARCHITECTURE

The architecture is flexible and can be actualized in different ways to suite different homes with minimum design changes (Figure 1). The architecture is divided into three components: home

Environment, home gateway and remote environment as shown in figure 1. The home environment consists of sensors and also the appliances that the system will be controlling. The sensor employed is the PIR motion sensor which detects the presence of an intruder and communicates it to the microcontroller. The Home gateway is divided into two parts: GSM network and microcontroller firmware. These two parts fused together allow the capability to send and receive SMS to and from the system. The Configuration, sensor and actuator control layers have been implemented on the Arduino to enable successful communication between remote user and the home gateway. The remote environment consists of the HACS mobile application, the SH environment to be controlled and monitored from a remote location using the mobile application.

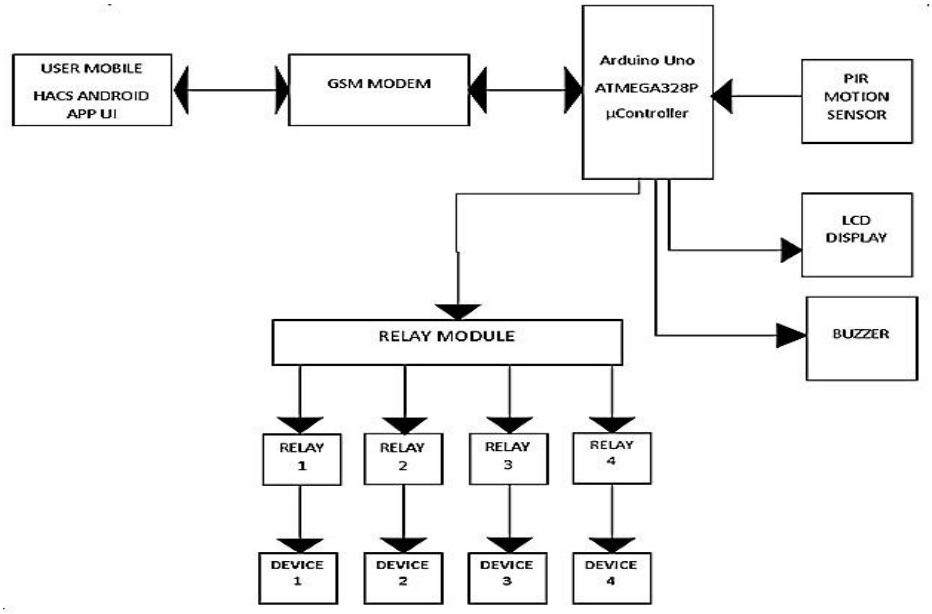


Fig. 8.1.9a GSM and commutations system (mobile telephony)

GSM is a digital mobile telephony system that is widely used around the world. It uses a variation of Time Division Multiple Access (TDMA) and it is the mostly widely used of the three digital wireless telephony technologies (TDMA, GSM and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. In telecommunication, telephony encompasses the general use of equipment to provide voice communication over distances, specifically by connecting telephones to each other. The term mobile telephony is derived from original telephony to denote the communication that facilitates mobility using wireless technology. Mobile telephony offers

services like voice and data transfer. Data transfer is done using SMS and some other enhanced data rate services like GPRS and EDGE. This project harnesses the SMS data transfer service of the GSM.

REMOTE HOME APPLIANCE CONTROL SYSTEM (HACS)

The design proposes an appliance control system through a mobile device via a mobile app which enables the user to control home appliances remotely. The system is based on serial data transmission using SMS over GSM Network in order to facilitate the appliances control in a global network environment. The system ensures a secured exchange of data on GSM communication. A mobile application enables the mobile phone to offer system connection and control utilities.

IMPLEMENTATION

The whole project and testing was coded in C programming language using the Arduino Sketch IDE software specifically designed for programming the Arduino micro-controller board and its peripherals. To develop the system, the sensor to be deployed, the GSM Shield and the buzzer were independently tested to ensure they all work perfectly before integration. Table 1 presents the system's cost analysis. NB: Refer to Appendix for the codes of the system.

Estimation Cost Analysis

Table no. 8.1.9a abstract sheet of HACS

Sr. No.	COMPONET	QUANTIY	PRICE
1	Adriano Uno	1	75
2	SIM900 GSM Shield	1	200
3	PIR Sensor	1	15
4	Relay Module	4	32
5	Jumper Cables	6	10
6	Buzzer	1	12
7	LCD Screen	1	45
8	AC Adapter	1	20
	Total		**RS. 410/-**

8.2 Reason for Students Recommending this Design

Panchayat Building - Development and management of the village.
General Market – To promote trade
Common Public Toilet – Provide basic satiation
Prathmic arogya Kendra – provide basic health facilies
Government Grocery Shop - distribution of groceries to each and every individuals in the village.
Community Hall - conducting village meetings, various functions, gatherings, etc.
Auto sprinkle irrigation using solar energy – Conservation of water
Solar PV system on the primary school – To provide electrical energy free of cost.
GSM Based Home Appliances Control System (HACS) for Domestic Power Users – to provide
home automation

8.3 About designs Suggestions / Benefit of villagers

Panchayat Building – for management of village

General Market – will bring money to traders

Common Public Toilet – provide sanitation

Prathmic arogya Kendra – get basic health aid

Government Grocery Shop – to get grocery at low cost

Community Hall - Conducting village meetings, various functions, gatherings, etc.

Auto sprinkle irrigation using solar energy – Conservation of water

Solar PV system on the primary school – To provide electrical energy free of cost.

GSM Based Home Appliances Control System (HACS) for Domestic Power Users - to provide home automation.

8.4 Maintenance

Maintenance plays a very important role in public amenities. If things are poorly maintained, its life will be reduced. Common tasks include:

- Exterior painting and plastering.
- Landscaping and gardening.
- Debris/rubbish removal and clearance.
- Jet washing with chemical cleaning agents to remove fungal stain or mound.
- Gutter clearance and repair.
- Lighting repairs.
- Re-plastering and plaster repairs.
- Tiling.
- Carpeting and flooring.
- Plumbing.
- Repairing cracking or leaning walls.

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

Physical Design: Avedo
It will help for drinking water for animals.

Sustainable Design: Ground water recharge by vertical shaft
To improve ground water level of village

Physical Design: Post Office
It will help village's people for post their letter to their relatives in other village easily.

Socio-cultural Design: Library
It will help village's student for reading purpose in study

Social Design: Police station
It is need for safety and security of people of village, so it is recommendation to have the police station in the village.

Social Design: Medical Store
To meet medicine's requirements in village

Electrical Design 1: IoT based Smart Irrigation System
Aims smart irrigation system for farmers to save water. System is based on IoT (Internet of things). As results, automatic water distribution in fertile land for farmers.

Electrical Design 2: Solar street light system
To provide illumination in streets

Electrical Design 3: Solar cleaning system
To make cleaning of system in streets

9.1 Physical design: Avedo

Table. No.9.1a Estimation & Costing

Sr No	Description of items	No	Length (inches)	Breadth (inches)	Height (inches)	Quantity (inches)	Total Quantity
	CL=(26'6"+ 8'+8'6")		1014"				
	N.CL=101 4"-		984"				
1	**Earthwork in**	1	984"	30"	36"	1062720 "	17.42 m^3
2	**P.C.C in Foundation**	1	984"	30"	6"	177120"	2.91 m^3
3	**Brickwork upto plinth**						
	Step-1=1014-	1	1000"	14"	7"	98000"	1.61 m^3
	(0.5*2*14)						
	Step-2=1014-	1	1005"	9"	23"	208035"	3.41 m^3
							Total = 5.02 m^3
4	**Brickwork in super structure**						
	CL=	1	804"	9"	30"	217080"	3.56 m^3
	25"+25"+717"+36"						
	For Food Zone	1	96"	102"	6"	58752"	0.97 m^3
							Total = 4.53 m^3
5	**Plaster**						
	External wall 1	2	318"	-	30"	19080"	12.31 m^2
	External wall 2	2	102"	-	30"	6120"	3.95 m^2
	For internal wall						
	Wall 1	2	300"	-	30"	18000"	11.62 m^2
	Wall 2	2	84"	-	30"	5040"	3.26 m^2
	Flooring Plaster	1	84"	300"	-	25200"	16.26 m^2
							Total = 47.4 m^2

Table. No. 9.1b Abstract sheet of avedo

Sr. no.	Particular items	Quantity	Rate (Rs.)	Per	Amount (Rs.)
1.	Excavation for foundation	17.42	85	Cu.m	1481
2.	P.C.C work in foundation	2.91	3200	Cu.m	9312
3.	Brickwork in foundation up to plinth	5.02	3200	Cu.m	16064
4.	Brickwork for super structure	4.53	3500	Cu.m	16555
5.	Plaster	47.4	150	Sq. m	7110
					Total = 50522/- Rs.

9.2 Socio-cultural design: Library

Table.no.9.2a Estimation and costing library

Sr No	Description of items	No	Length (inches)	Breadth (inches)	Height (inches)	Quantity (inches)	Total Quantity
	CL=(16+0.45+0.45)*2		55'6"				
1	**Earthwork in**	1	660"	36"	36"	855360"	14.01 m^3
2	**P.C.C in Foundation**	1	660"	36"	6"	142560"	2.33 m^3
3	**Brickwork upto plinth**						
	Step-1	1	660"	23"	7"	106260"	1.74 m^3
	Step-2	1	660"	18"	7"	83160"	1.36 m^3
	Step-3	1	660"	14"	7"	64680"	1.05 m^3
	Step-4	1	660"	9"	21"	124740"	2.04 m^3
							Total = 6.19 m^3
4	**Brickwork in super structure**						
	For outer wall	1	660"	9"	120"	712800"	11.68 m^3
	For parapet wall	1	660"	4"	30"	79200"	1.29 m^3

							Total = 12.97 m^3
	Deduction						
	D	1	36”	9”	84”	27216”	0.44 m^3
	W	5	36”	9”	36”	58320”	0.95 m^3
							Total = 1.39 **m^3**
							Total = 12.97-1.39 = 11.58 m^3
5	**R.C.C**						
	Slab	1	210”	138”	6”	173880”	2.84 m^3
	Coping below plinth	1	660”	9”	5”	29700”	0.49 m^3
	Chajja	4	48”	27”	6”	31104”	0.51 m^3
	Lintel						
	D	1	42”	9”	6”	2268”	0.04 m^3
	W	5	42”	9”	6”	11340”	0.19 m^3
							Total = 4.07 m^3
6	**Plastering**						
	Internal wall 1	2	120”	-	120”	28800”	18.58 m^2
	Internal wall 2	2	192”	-	120”	46080”	29.73 m^2
	External wall 1	2	210”	-	156”	65520”	42.28 m^2
	External wall 2	2	138”	-	156”	43056”	27.78 m^2
							Total = 118.37 **m^2**
	Deduction						
	D	2	36”	-	84”	6048”	3.91 m^2
	W	10	36”	-	36”	12960”	8.36 m^2
							Total = 12.27 **m^2**
							Total = 118.37-12.27 = 106.1 m^2
7	**Flooring**	1	192”	120”	-	23040”	14.87 m^2
8	**Paint**	As pla	Asper plaster	Asper plaster	Asper plaste		106.1 m^2
9	**Steel Calculation**						

	For 8 mmØ @ 150 mm c/c spacing						
	L = 3.50+2*9*0.08-2*0.02 =3.604 m						
	Span = 5.33-2*0.02 = 5.29 m						
	No of bar = 5.29/0.15+1 = 37 No						
	Extra length of bent up bars length = 0.45*x =0.135-2*0.02-0.08 =0.087 m						
	L = 3.604 + 0.45x = 3.604 +0.45*0.087 = 3.643 m	37	144”	@	0.395 kg/m		53.25 kg
	For 8mmØ @ 220 mm c/c spacing Bars at bottom: Hook length = 9d = 9*0.08 = 0.072 L= 5.33+2*0.075-2*0.02 =5.44 m Width of slab= 3.50-2*0.02 = 3.46 m So,No ofbars =3.46/0.22+1 =17nos						
	Bars at top: Width of slab at one end for bent up at top =0.23+0.45-0.087-0.02						

	So,No of bar at one end = (0.573/0.22)+1 = 4 nos						
	So,No of bar at both end = 2*4 = 8 nos	25	214”	@	0.395 kg/m		53.72 kg
	Total no of bars = 8 + 17 = 25						

Table no. 9.2b Abstract Sheet of library

Sr. no.	Particular items	Quantity	Rate (Rs.)	Per	Amount (Rs.)
1.	Excavation for foundation	14.01	85	Cu.m	1191
2.	P.C.C work in foundation	2.33	3200	Cu.m	7456
3.	Brickwork in foundation up to plinth	6.19	3200	Cu.m	19808
4.	Brickwork for super structure	11.58	3500	Cu.m	40530
5.	R.C.C work	4.07	8800	Cu.m	35816
6.	Plaster	106.1	150	Sq. m	15915
7.	Flooring	14.87	500	Sq. m	7435
8.	Paint	106.1	120	Sq. m	12732
9.	Steel bars	106.97	45	kg	4814
					Total = 145,697/- Rs.

9.3 Physical Design: Post office

Table no. 9.3a post office Estimation & Costing

Sr No	Description of items	No	Length (inche)	Breadh(inche)	Height (inche)	Quatity (inches)	Total Quantity
	CL=(15+0.45+0.45)* 2 +(12+0.45+0.45)* 2		684”				
1	**Earthwork in foundation**	1	684”	36”	36”	886464”	14.53 m^3
2	**P.C.C in Foundation**	1	684”	36”	6”	187744”	3.08 m^3
	Brickwork		684”				
	upto plinth						
	Step-1	1	684”	23”	7”	110124”	1.81 m^3
	Step-2	1	684”	18”	7”	86184”	1.41 m^3
	Step-3	1	684”	14”	7”	67032”	1.10 m^3
	Step-4	1	684”	9”	21”	129276”	2.12 m^3
							Total = 6.44 m^3
4	**Brickwork in**						
	Outer wall	1	684”	9”	120”	738720”	12.11 m^3
	Inner wall	1	130”	4”	120”	62400”	1.03 m^3
	Parapet wall	1	684”	4”	30”	82080”	1.35 m^3
							Total = 14.49 **m^3**
	Deduction						
	D	1	48”	9”	84”	36288”	0.60 m^3
	D1	2	24”	9”	84”	36288”	0.60 m^3
	W1	5	24”	9”	30”	32400”	0.53 m^3
							Total = 1.73 **m^3**
							Total = 14.49-1.73 = 12.76 m^3
5	**R.C.C**						
	Slab	1	198”	162”	6”	192456”	3.15 m^3
	Coping below plinth	2	684”	9”	5”	61560”	1.01 m^3
	Chajja	5	36”	15”	6”	16200”	0.27 m^3

	Lintel						
	D	1	60”	4”	6”	1440”	0.03 m^3
	D1	2	36”	9”	6”	3888”	0.07 m^3
	W	5	36”	9”	6”	9720”	0.16 m^3
							Total = 4.69 m^3
6	**Plaster**						
	External wall 1	2	198”	-	156”	61776”	39.86 m^2
	External wall 2	2	162”	-	156”	50544”	32.61 m^2
	Internal wall 1	2	180”	-	120”	43200”	27.88 m^2
	Internal wall 2	2	144”	-	120”	34560”	22.30 m^2
	Cabin internal wall1	2	148”	-	120”	35520”	22.92 m^2
	Cabin internal wall2	1	60”	-	120”	7200”	4.65 m^2
	Cabin external wall1	4	70”	-	120”	3360”	2.17 m^2
	Cabin external wall2	2	52”	-	120”	12480”	8.06 m^2
							Total = 160.45 m^2
	Deduction						
	D	2	48”	-	84”	8064”	5.21 m^2
	D1	4	24”	-	84”	8064”	5.21 m^2
	W	10	24”	-	30”	7200”	4.65 m^2
							Total = 15.07 m^2
							Total = 145.38 m^2
7	**Flooring**	1	180”	144”	-	25920”	16.73 m^2
8	**Paint**	As per Plaster	As per Plaster	As per Plaster	As per Plaster		145.38 m^2
9	**Steel**	37	168”	@	0.39 kg/m		62.16 kg

Table no. 9.3b Post office Abstract Sheet

no.	Particular ites	Quantity	Rate (Rs.)	Per	Amount (Rs.)
1.	Excavation for foundation	14.53	85	Cu.m	1235
2.	P.C.C work in foundation	3.08	3200	Cu.m	9856

3.	Brickwork in foundation up to plinth	6.44	3200	Cu.m	20608
4.	Brickwork for super structure	12.76	3500	Cu.m	44660
5.	R.C.C work	4.69	8800	Cu.m	41272
6.	Plaster	145.38	150	Sq. m	21807
7.	Flooring	16.73	500	Sq. m	8365
8.	Paint	145.38	120	Sq. m	17446
9.	Steel bars	114.95	45	kg	5173
					Total = 170,442 Rs

9.4 Sustainable Design: Ground water recharge by vertical shaft

Main source of water in village is ground water. Due to excessive use and Population expansion ground water level is depleting. To maintain round water Level and conserve it for future generation Ground water recharge is necessary. In an Artificial groundwater recharge we will use vertical recharge shaft method.

In this shaft the top portion we use PVC ball & Rubber lip which is help in whenever River water level gone up & rubble lip will automatically open fill with water. The diameter of shaft is 0.45 M .depth of PVC pipe is 15 M. It should end in more Permeable strata below the top impermeable strata. It may not touch water table.

To begin within PVC pipe on top portion provide rubber valve. Below it 0.20 Inches diameter screen is placed to remove rags, paper and plastic to prevent Damage. In PVC pipe 10 M deep filtration bucket is connected with bolt. In which there are three layers of fine, gravel and coarse material placed. At bottom there is one extra screen provided which is prevent filter material to the Ground In PVC pipe provide hole to spread water in to confined aquifer.

Table 9.4a ABSTRACT SHEET

SR. No.	Particulars	Amount (Rs.)
1	PVC Pipe	230
2	Geo Net (Screen)	1500
3	Rubber Valve	3000
4	Bolt	100
5	Iron Plate	10000
6	Bucket	11000
7	Sand	50
8	Gravel	40
9	Coarse Aggregate	80
10	Labour	15000
11	Excavation Equipment rent (Per Month)	3000
	Sub Total	**44000/-**

9.5 Social design: Police station

Table no.9.5a Measurement sheet for police station

Sr. no	**DISCRIPTION**	**No**	L	B	D	**Quantity**	**Total Quantity**
1	Excavation in foundation L= 64.8 - 8×0.45 =	1	61.2	0.9	1	55.08	55.08 cu.m
2	PCC work in foundation	1	61.2	0.9	0.2	11.02	11.02 cu.m
3	Masonry work						
	Upto Plinth						
	0.6m wide L= 64.8 – 8×0.3= 62.4m	1	62.4	0.6	0.15	5.62	
	0.5m wide L= 64.8- 8×0.25= 62.8m	1	62.8	0.5	0.15	4.71	
	0.4m wide L= 64.8 -8×0.20= 63.2m	1	63.2	0.4	0.15	3.79	
	0.3m wide L= 64.8-8×0.15 = 63.6m	1	63.6	0.3	0.35	6.68	
	Superstructure L= 63.6m	1	63.6	0.3	4.5	85.86cu.m	
	Steps						
	0.15h	1	3.6	0.3	0.1	0.16	
	0.30h	1	3.6	0.3	0.3	0.32	
	Total					107.14 cu.m	
	Deduction						
	G= 1.5×2.2m	1	1.5	2.2	0.3	0.99	
	D= 0.9×2.2m	3	0.9	2.2	0.3	1.78	
	W= 1.0×1.4m	3	1.0	0.3	1.4	1.26	
						4.03 cu.m	
	Total masonry work						103.11 cu.m
4	RCC work						
	Lintel with chhaja	3	1.3	0.135		0.53	
	Main lintel	1	4.0	0.20		0.78	
	Door lintel	3	1.2	0.15	2.2	1.18	
	Slab	1	12.7	7.9	0.1	15.05	
	Total RCC						17.55 cu.m
5	Plaster work						
	Inside	4	4.5	3.3		59.4	
		3	3.5	3.3		34.65	
		4	4.0	3.3		52.8	
		4	3.5	3.3		46.2	
		2	3.0	3.3		19.8	
		2	7.3	3.3		48.18	
	Celling					261.03	
	Outside plaster	2	12.7	4.64		118.11	
		2	7.9	4.65		73.47	
	Parapet wall	1	1.2	12.8		15.40	

						558.61 sq.m	
	Deduction						
	W	3	1	1.4		4.2	
	D	3	0.9		2.2	5.94	
	G	0.5	1.5		2.2	1.65	
	Jail grill	0.5	3		3.3	4.95	
						31.55	
	Total net plaster work						527.06 sq.m
6	Colour work	Same of plaster area					527.06sq.m
7	Flooring work						59.5 sq.m

Table 9.5b Abstract sheet for police station

N	Discription	Quantity	Rate	Per	Total
1	Excavation of Foundation in Hard Murrum including lifting and laying in 90 mtr. lead area.	55.08	103.5	Cu.m	5700
2	Foundation filling with CC work in proportion of 1:4:8 including Raming, Curing etc.	11.02	3197	Cu.m	35,230
3	Brick Masonry work in Cement Mortar 1:6	103.11	4200	Cu.m	4,33,062
4	Smooth Cement Plaster 12 mm thick using Cement Mortar in proportion 1:3 with Finishing curing, etc. complete	527.06	182	Sq.m	95,925
5	White Wash Work	527.06	11	Sq.m	5798
6	Plastic Imulsion Paint (Two coats) (Asian Paint, ICI, Dulux, Nerolac, Berger etc. of approved type	527.06	91	Sq.m	47,962
7	DPC of bituminous	63.6	70	Rn.m	4452
8	Supply & Fixing of Glazed tiles (1st Quality) of required size in Cement Roga and joints to be filled with white cement after 12mm rough plaster in proportion of 1:3.	59.5	426	Sq.m	25,347
				Cost	6,53,476 RS
	Adding 1.5% water charges				9802
	Adding 5% contingency charges				32674
	Adding 10% contractor's profit				65348
	Adding 4% of total for drainage works				26140
	Adding 4% of total for water supply works				26140
	Adding 6% of total for electrification works				39210
	Adding 2% of total for doors & windows				13070
				Total cost	8,65,860 RS

9.6 Social design: Medical store

The need for medical has arisen because the people of the village are backward and poor people go to the cities to cure that illnesses and because of this poor class their care is not correct and so the health of the people of the village is eight risk and the disease is transformed into a major illness show people become victims of the disease and some need for medical. Thus government conducts surveys in the village through civil engineering students through the Vishwakarma scheme and has medical and deigned medical needs.

Table no. 9.6a Measurement Sheet of medical store

Sr	Description of Work	No	Length	Width	Depth/ Height	Quantity	
	TOTAL CENTRE LINE		**54.7**				
1	**Excavation for Foundation**	1	47.95	0.9	1.1	47.4705	m3
2	**P.C.C.**	1	47.95	0.9	0.3	12.9465	m3
3	**BRICK MASONARY UP TO**						
i	First step	1	48.4	0.6	0.3	8.712	m3
ii	Second step	1	47.6	0.5	0.2	4.76	m3
ii	Third step	1	47.05	0.4	0.8	15.056	m3
		T				28.528	m3
4	**BRICK WORK UP TO**						
		1	48.85	0.3	3	43.965	m3
A	**Deduction Door/Window**						
i	D1	1	1.1	0.3	2.1	0.693	m3
ii	D2	1	0.9	0.3	2.1	0.567	m3
ii	W	3	1.8	0.3	1.4	2.268	m3
i	D	1	7.3	0.3	2.5	5.475	m3
		T				9.003	m3
B	**15 Cm brick deduction for**						
i	D1	1	2.4	0.3	0.15	0.108	m3
ii	D2	1	1.3	0.3	0.15	0.0585	m3
ii	D3	3	2.1	0.3	0.15	0.2835	m3
i	D	1	7.6	0.3	0.15	0.342	m3
		T				0.792	m3
5	**Silling Plaster**						

i	ROOM	1	4	8.3	1	33.2	m3
ii	ROOM	1	5	1.2	1	6	m3
iii	STORE ROOM	1	4	1.2	1	4.8	m3
		T				44	m3
A	**DEDUCTION**						
I	D	0.	7.3		2.5	9.125	m3
II	D2	0.	1.1		2.1	1.155	m3
III	D3	0.	0.8		2.1	0.84	m3
IV	W	1.	1.8		1.4	3.78	m3
		T				14.9	m3
6	2CM THICK MARBLE						
	ROOM	1	4	8.3		33.2	m3
	ROOM1	1	5	4		20	m3
	STORE ROOM	1	4	4		16	m3
		T				69.2	m3
B	**DOOR SILL**						
I	D1	2	1.1	0.3		0.66	m3
II	D2	3	0.9	0.3		0.81	m3
III	D	1	8	0.3		2.4	m3
		T				3.87	m3
7	**WALL PLASTER**						
i	ROOM	2	8.3		3	49.8	m3
ii		2	4		3	24	m3
iii	ROOM1	2	4		3	24	m3
		2	5		3	30	m3
IV	STORE ROOM	4	4		3	48	m3
		T				175.8	m3
8	EARTH FILLING IN PLINTH						
i	WC.	1	1.2	1.2	0.38	0.5472	m3
ii	BATH	1	1.2	1.2	0.38	0.5472	m3
iii	DRINKING WATER	1	4	1.2	0.38	1.824	m3
iv	PASSAGE	1	2	7.6	0.38	5.776	m3
v	READING HALL	1	6	6	0.38	13.68	m3
vi	PASSAGE	1	8.3	1.3	0.38	4.1002	m3
		TOTAL				26.4746	m3
8	R.C.C SLAB	1	8.8	8.9		78.32	m3
9	R.C.C. CHAJJA	1	8.8	8.9	0.15	11.748	m3

Table no. 9.6b abstract sheet of medical store

Item no.	Particulers of item	Quntity	Per	Rate	Amount
1	Excavation in foundation	47.95	M3	90	4315.5
2	Pcc in foundation (1:3:6)	47.95	M3	2500	119875
3	Brick work upto plinth level	28.598	M3	3200	91513.6
4	Brick work upto super structure	34.16	M3	3200	109312
5	Plastering work (inner wall and silling)	29.1	M3	300	8730
6	Wall plaster	175.8	M3	150	26370
7	Marble flooring	69.2	M3	750	51900
8	Earth filling	26.47	M3	70	1852.9
9	Doors,window				6000
10	Rcc slab and rcc chajja	12.072	M3	7000	84504
			Total		504373

9.7 Electrical design 1: Solar cleaning system

So here we use the 433 Mhzics which is basically a 2 IC set. One is transmitter and other is receiver. And with that we have used HT12E/HT12D IC which is basically a encoder decoder IC respectively. Along with that I have used the relay module to connect 4 load to the circuit and So we have a receiver module and in other hand we have transmitter module.

So first I connect the decoder IC with transmitter to make the transmitter module which is known as remote control. It transmit the radio frequency signal to the receiver module

Then I have connected the encoder IC with receiver IC and make a receiver module which receive the signal given from the transmitter module

In receiver module there is a relay module which have 4 load to connect, we can connect 4 loads to the receiver module and make them wirelessly remote controlled by a transmitter module. So now I can make a robot and a cleaning mechanism which is controlled by this circuit wirelessly

Table no. 9.7a abstract sheet of solar cleaning system

Component	**No. Of comp.**	**Cost**
12v Geared DC motor	6×200	1200
Plastic Pipe	7 feet	150
Wires	5 meters	100
433Mhz Reciever And Transmitter	1	200
IC – Nodemcu- wifi module	1	350
HT12E-HT12D(Encoder-	1	150
Relay module	1	500

Variable resistor	1	30
Cleaning brush	1	360
Sweeper	1	120
Wheels	6×10	60
Battery(12V,6A)	2	1500
Total Cost		**4800**

9.8 Electrical design 2: IoT based smart irrigation system

Water requirement for agriculture is large. Due to inadequate rainfall, water requirement is not be able to meet.

Under conventional irrigation system, irrigated land is either under irrigated or over irrigated resulting in adverse effect on crop growth and wastage of water.

The System which is based on internet of things, logs the sensor data to the cloud and the farmer can monitor and control all the water pumps remotely over using Android application.

This project presents an automated irrigation system providing precision agriculture and thus preventing water wastage.

Table no. 9.8a Abstract sheet of Smart irrigation system

Component	No. Of comp.	Cost
Wires	5 meters	100
Printed circuit board	1	70
Soil moisture sensor	1	150
Nodemcu-ESP 8266 BORD	1	350
DHT 22 temp sensor	1	220
Relay module	1	500
Variable resistor	1	30
Batteries	2	1500
Total Cost		**2920**

9.9 Electrical design 3: Solar street light system

In our project, we have proposed a solution, which is to replace all of the conventional lamps with solar powered LED lamps in AUS street lighting and then control them using motion sensors and further develop a mobile application, using which we can control the switching ON/OFF of the led and at the same time check for defected units. Smart Led Street Lighting System (SLSLS) with mobile application has been currently implemented in different areas of U.A.E such as on flyover just before Ajman City Centre and also in Abu Dhabi. Our project will be focusing on how can we implement SLSL in AUS and how much will be the upgrade cost from conventional street lamps to LEDs and the cost of each of them as well as how much is the saving for long time operation.

Table no. 9.9a Abstract sheet of solar street light system

Part list	**Quantity**	**Price**
Solar panel	1	1000
Arduino	1	400
Capacitor box	1	70
Rechargeable box	1	1000
Zener diode	1	5
Lm317t regulator	1	10
Potentiometer	1	20
Diode(1n4007)	2	5
Leds(small,big)	10	40
Rtc(real time clock)	1	20
Crystal	1	10
Resistor box	1	50
Transistor	2	5
Heat sink	3	5
Male to female wire	6	30
Total cost		2670/street light

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

We discussed with the village authorities and village dweller after that we filled the different types of survey and analysis form. In the techno economic survey conclude about Introduction of village, Geographical details, Demographical detail, and occupational detail and different types of Infrastructure facilities like about sanitation , transportation, road network, drainage line, water supply, education viability, irrigation etc. And smart village survey concludes about % value of Education; %Health and % Cleanliness of village. And we find about which smart facilities can be subjected as per requirement of village dweller and village authorities.

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.

Smart Villages access to sustainable energy services acts as a catalyst for development – enabling the provision of good education and healthcare, access to clean water, sanitation and nutrition, the growth of productive enterprises to boost incomes, and enhanced security, gender equality and democratic engagement. It can be help to develop the other village as increase basic amenities and after that smart amenities on any country with the help Smart (Ideal) Village visit and solid and liquid waste water management system Survey and Analysis. And it’s also help to increase GDP Of state And Also increase country image in front of world as Good infrastructure; Good Economic Profile and Good Employment Solution; Good (Ideal Example) Smart Example of New infrastructure with Uses Of renewable energy Solution Country.

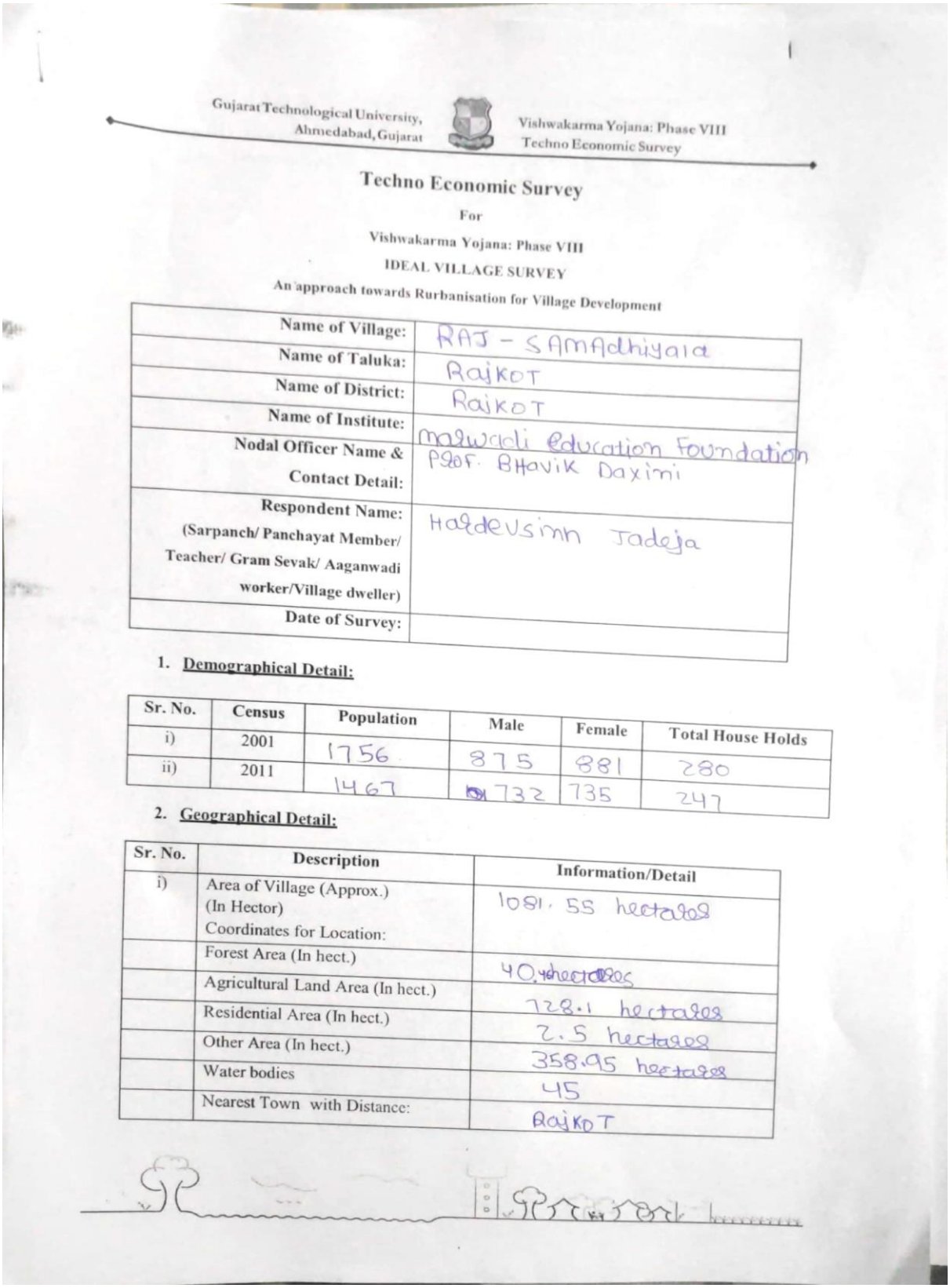
As per directives of vishwakarma yojana which provides a platform to design sustainable facilities which are not available in rural area. The village people migrate to urban areas due to lack of basic amenities which are easily available in urban areas. Based on observation, main reason to migrate rural to urban is qualitative education facility which not available in rural area.

Chapter 11 References refereed for this project

- **http://www.vyojana.gtu.ac.in/**
- **http://www.google.com**
- **http://www.vyojana.gtu.ac.in/**
- **https://www.onefivenine.com/**
- **https://www.researchgate.net/**
- **https://www.scribd.com/**
- **https://scholar.google.com/**

Chapter 12: Annexure attachment

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



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

Name of Village:	RAJ - SAMADHIYALA
Name of Taluka:	Rajkot
Name of District:	Rajkot
Name of Institute:	Marwadi Education Foundation
Nodal Officer Name & Contact Detail:	Prof. Bhavik Daxini
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Hardevsinh Jadeja
Date of Survey:	

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	1756	875	881	280
ii)	2011	1467	732	735	247

2. **Geographical Detail:**

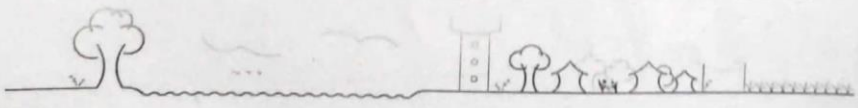
Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	1081.55 hectares
	Forest Area (In hect.)	40 hectares
	Agricultural Land Area (In hect.)	728.1 hectares
	Residential Area (In hect.)	2.5 hectares
	Other Area (In hect.)	358.95 hectares
	Water bodies	45
	Nearest Town with Distance:	Rajkot

3. **Occupational Details:**

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

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		✓ ✓ ✓ ✓	 ✓ ✓ 	
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:		✓	
	Underground Sump	Capacity:		✓	
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	yes	✓		
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open	Open	✓		
	If Open than Pucca / Kutchcha	Pucca	✓		
	Whether drain water is discharged directly in to Water bodies/ Sewer plants	In to water bodies	✓		
Suggestions if any:					

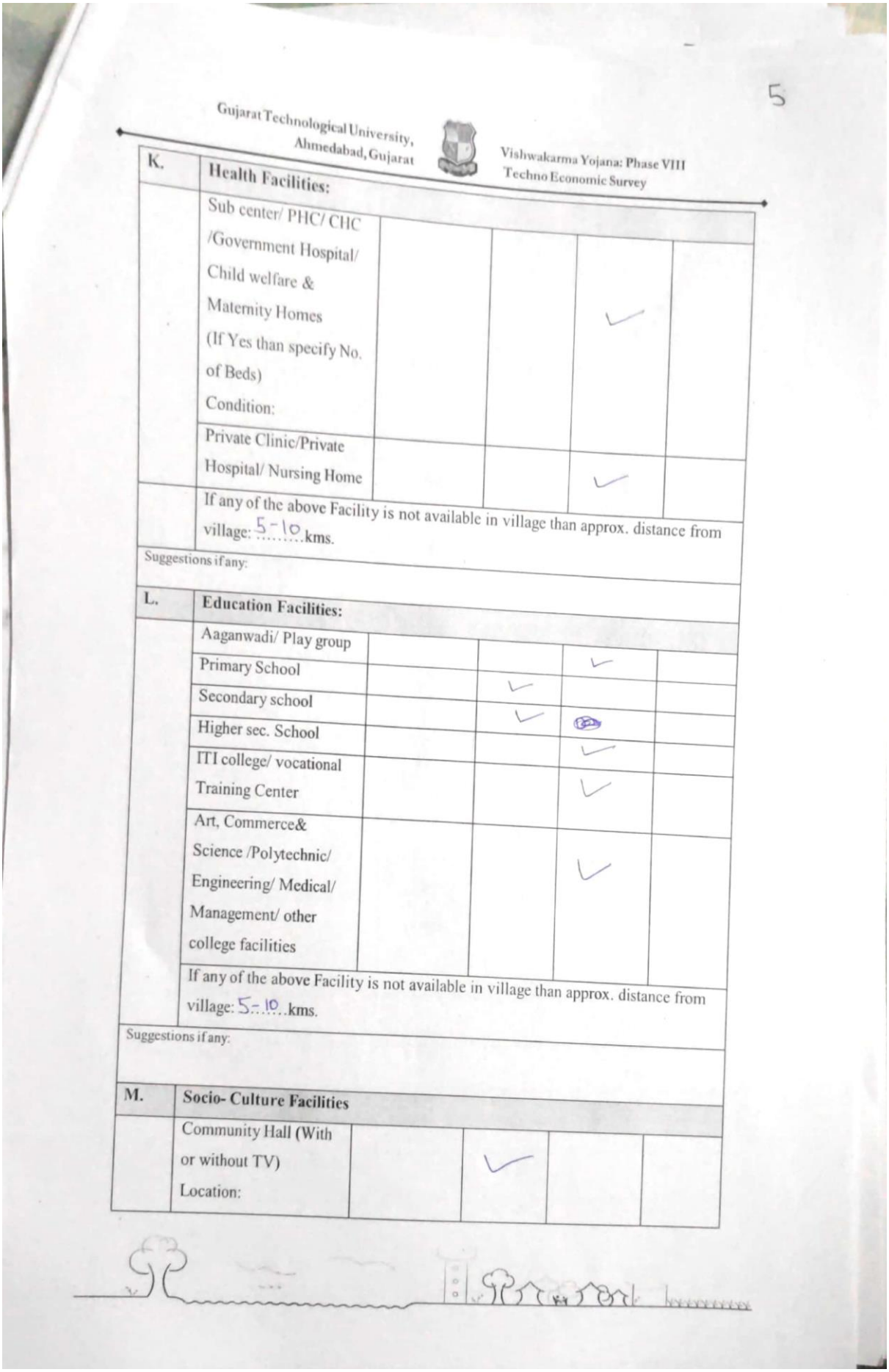


E.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	all weather road	✓		
	Main road	C.C road	✓		
	Internal streets	C.C road	✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.	0 KM S.H RAJKOT BHAVNAGAR Highway	✓		
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	N 25 KM		✓	
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	y	✓		
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	y	✓		
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	y more than 6 hrs	✓		
	Power supply for Domestic Use	24 hrs	✓		
	Power supply for Agricultural Use	8 hrs	✓		
	Power supply for Commercial Use	24 hrs	✓		
	Road/ Street Lights		✓		

	Electrification in Government Buildings/ Schools/ Hospitals	yes	✓		
	Renewable Energy Source Facilities (Y/ N)	yes	✓		
	LED Facilities	yes	✓		
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	6	✓		
	Location Condition	3		✓	
	Community Toilet (With bath/ without bath facilities)	yes	✓		
	Solid & liquid waste Disposal system available	yes	✓		
	Any facility for Waste collection from road	yes	✓		
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Both Well and River	✓		
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	2:98	✓		

5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks



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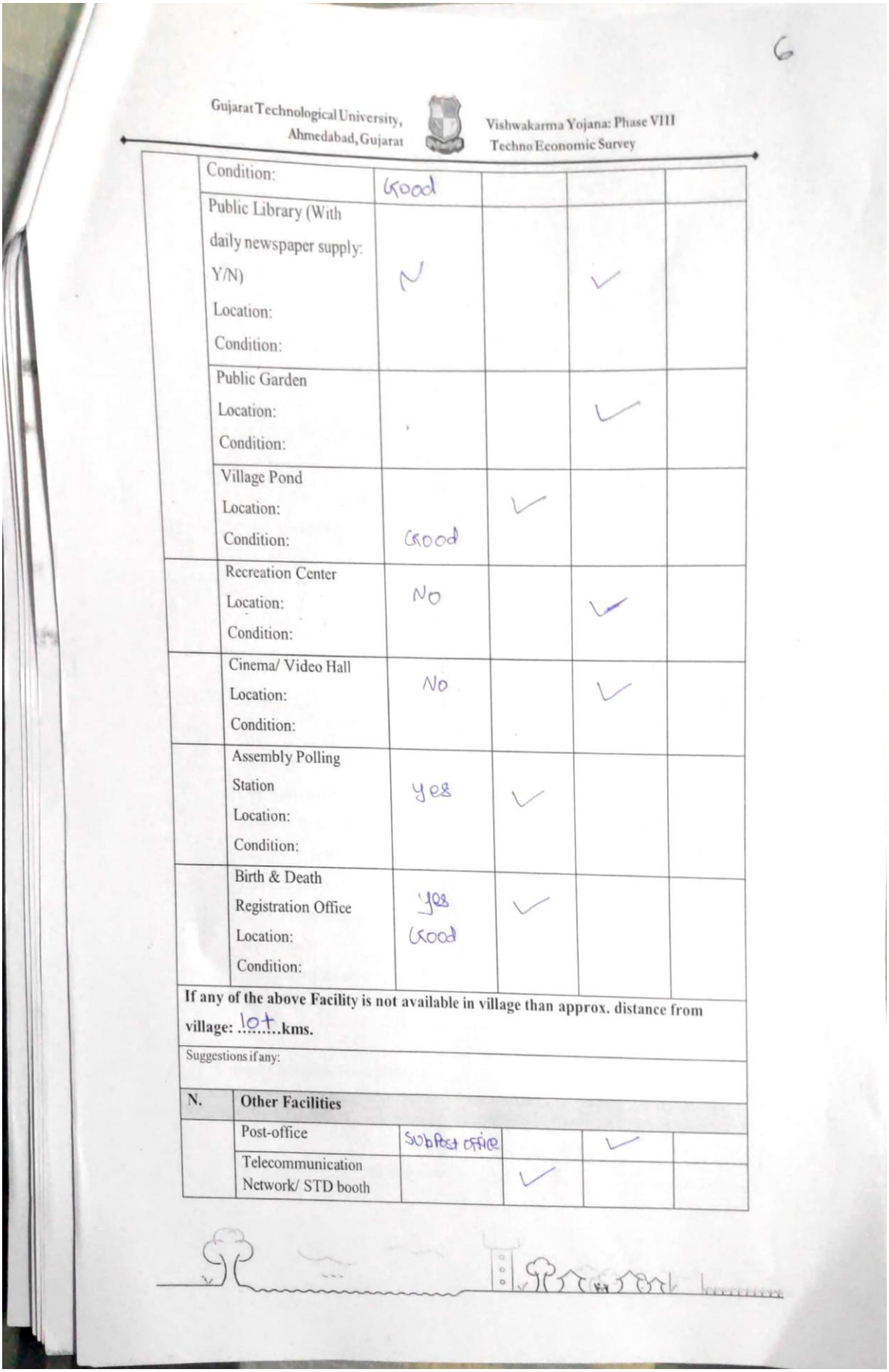
K.	Health Facilities:				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:			✓	
	Private Clinic/Private Hospital/ Nursing Home			✓	
	If any of the above Facility is not available in village than approx. distance from village: 5-10 kms.				
Suggestions if any:					

L.	Education Facilities:				
	Aaganwadi/ Play group			✓	
	Primary School		✓		
	Secondary school		✓	✓	
	Higher sec. School			✓	
	ITI college/ vocational Training Center			✓	
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities			✓	
	If any of the above Facility is not available in village than approx. distance from village: 5-10 kms.				
Suggestions if any:					

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



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

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

8. Additional Information/ Requirement:

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

9. Smart Village Proposal Design

Sr. No.	Descriptions	Information/ Detail	Remarks
1.			

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

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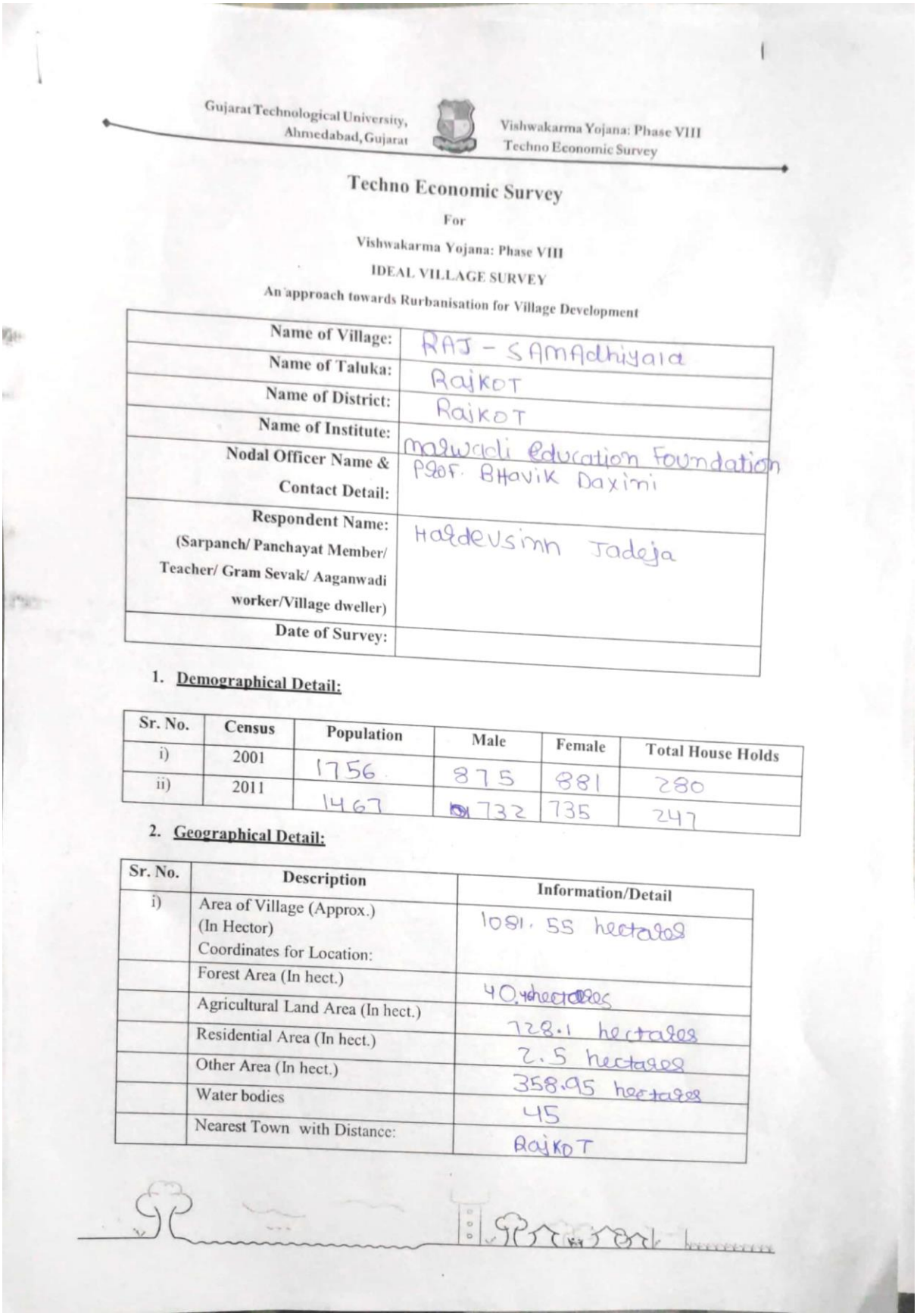
12.2 Survey form of smart village Village Scanned copy attachment in the report for Part-I



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For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

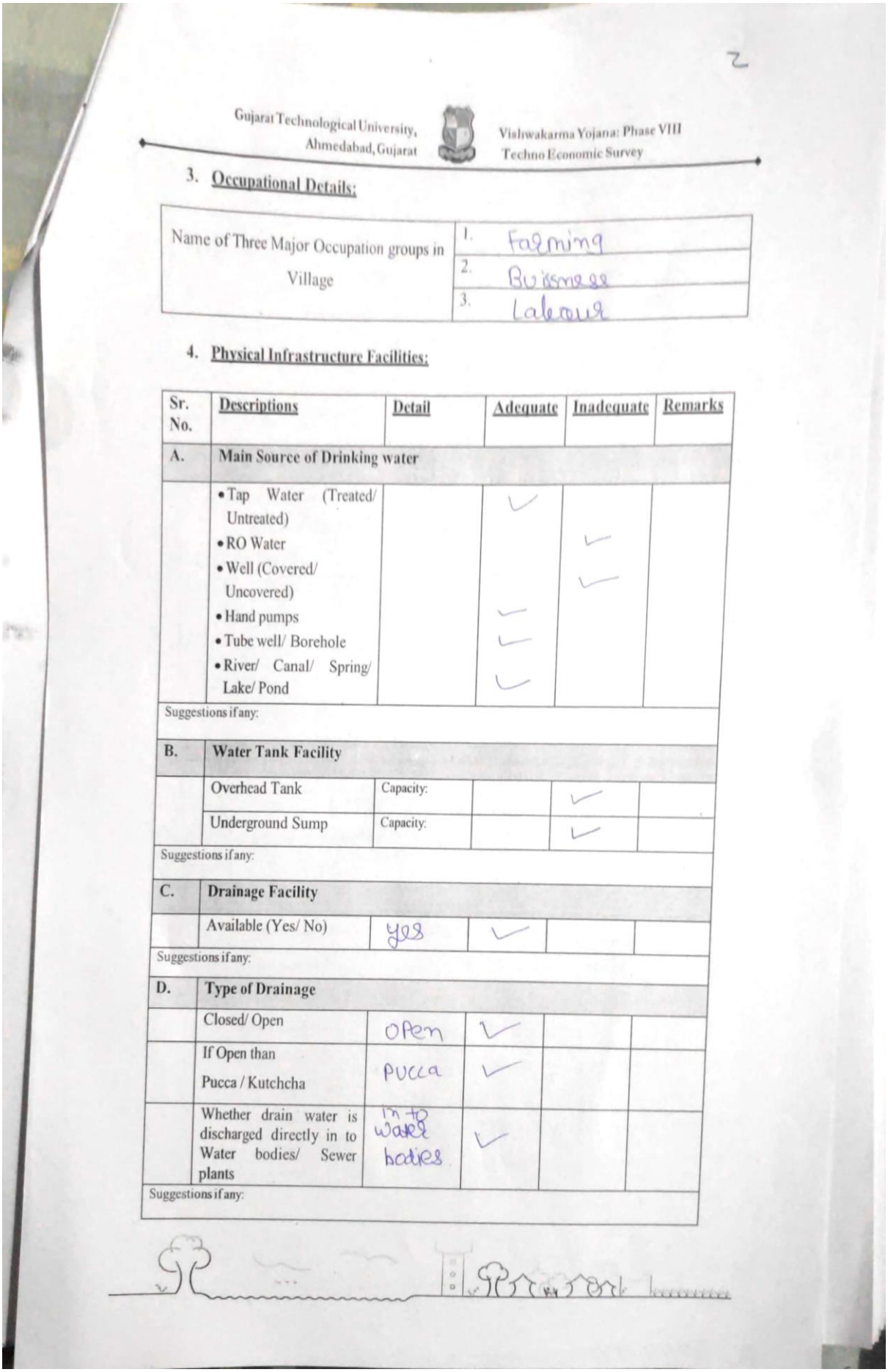
Name of Village:	RAJ - SAMADHIYALA
Name of Taluka:	RAJKOT
Name of District:	RAJKOT
Name of Institute:	Marwadi Education Foundation
Nodal Officer Name & Contact Detail:	Prof. Bhavik Daxini
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Hardevsinh Jadeja
Date of Survey:	

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	1756	875	881	280
ii)	2011	1467	732	735	247

2. **Geographical Detail:**

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	1081.55 hectares
	Forest Area (In hect.)	40 hectares
	Agricultural Land Area (In hect.)	728.1 hectares
	Residential Area (In hect.)	2.5 hectares
	Other Area (In hect.)	358.95 hectares
	Water bodies	45
	Nearest Town with Distance:	RAJKOT



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3. **Occupational Details:**

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

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		✓ ✓ ✓ ✓	 ✓ ✓ 	
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:		✓	
	Underground Sump	Capacity:		✓	
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	yes	✓		
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open	Open	✓		
	If Open than Pucca / Kutchcha	Pucca	✓		
	Whether drain water is discharged directly in to Water bodies/ Sewer plants	In to water bodies	✓		
Suggestions if any:					

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E.	Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM				
	Village approach road	all weather road	✓		
	Main road	C.C road	✓		
	Internal streets	C.C road	✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.	0 KM S.H RAJKOT BHAVNAGAR Highway	✓		
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	N 25 KM		✓	
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	y	✓		
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	y	✓		
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	y more than 6 hrs	✓		
	Power supply for Domestic Use	24 hrs	✓		
	Power supply for Agricultural Use	8 hrs	✓		
	Power supply for Commercial Use	24 hrs	✓		
	Road/ Street Lights		✓		

	Electrification in Government Buildings/ Schools/ Hospitals	yes	✓		
	Renewable Energy Source Facilities (Y/ N)	yes	✓		
	LED Facilities	yes	✓		
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	6	✓		
	Location Condition	3		✓	
	Community Toilet (With bath/ without bath facilities)	yes	✓		
	Solid & liquid waste Disposal system available	yes	✓		
	Any facility for Waste collection from road	yes	✓		
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Both Well and River	✓		
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	2:98	✓		

5. **Social Infrastructural Facilities:**

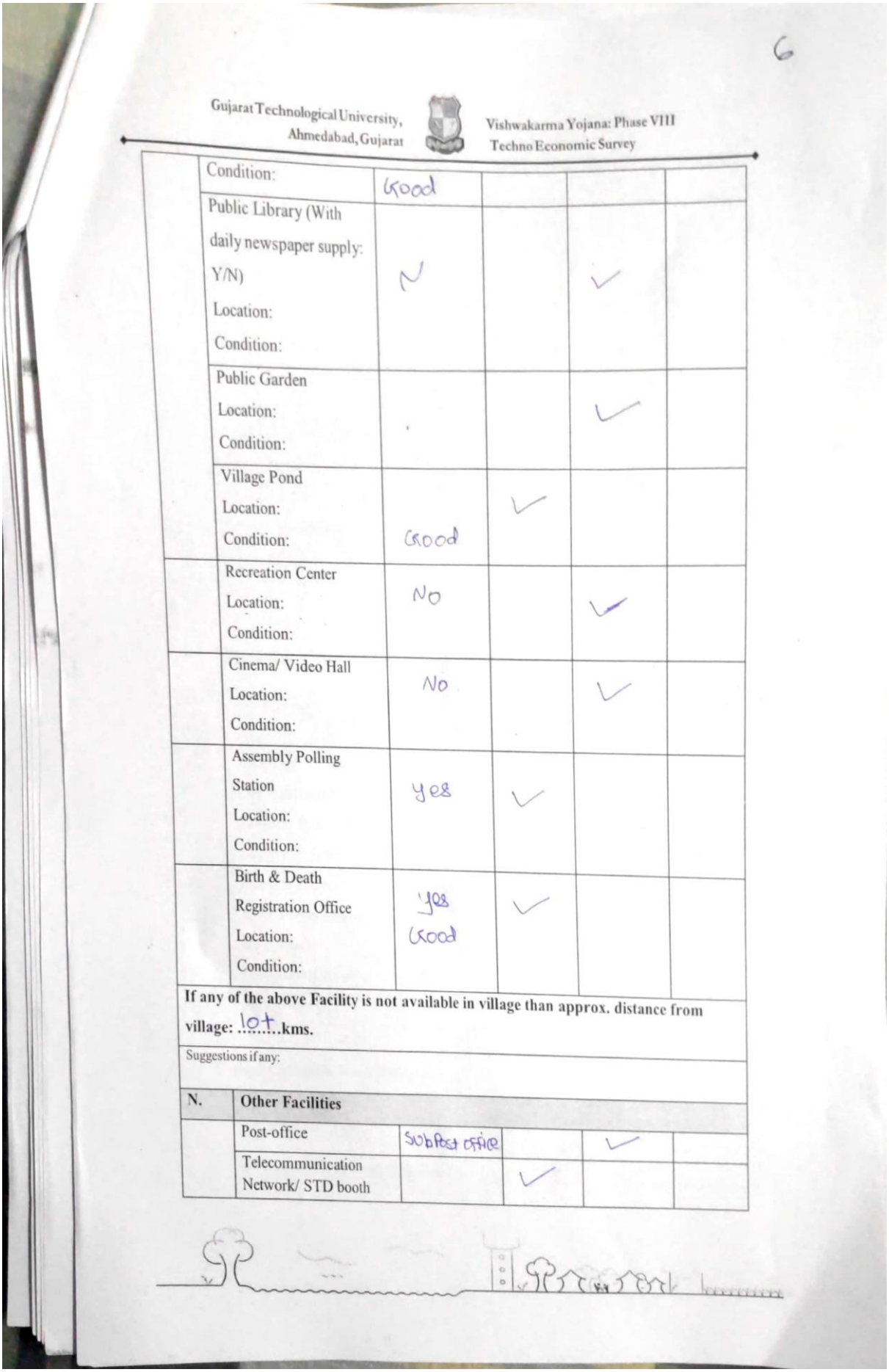
Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks

5

K.	Health Facilities:				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:			✓	
	Private Clinic/Private Hospital/ Nursing Home			✓	
	If any of the above Facility is not available in village than approx. distance from village: 5-10 kms.				
Suggestions if any:					

L.	Education Facilities:				
	Aaganwadi/ Play group			✓	
	Primary School		✓		
	Secondary school		✓	✓	
	Higher sec. School			✓	
	ITI college/ vocational Training Center			✓	
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities			✓	
	If any of the above Facility is not available in village than approx. distance from village: 5-10 kms.				
Suggestions if any:					

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



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

	General Market			✓	
	Shops (Public Distribution System)		✓		
	Panchayat Building		✓		
	Pharmacy/Medical Shop	within 5 km		✓	
	Bank & ATM Facility			✓	
	Agriculture Co-operative Society		✓		
	Milk Co-operative Soc.		✓		
	Small Scale Industries		✓		
	Internet Cafes/ Common Service Center/Wi Fi		✓		
	Other Facility		✓		
Suggestions if any:					

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

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

7. **Data Collection From Village**

Village Base Map Available: Hard Copy/Soft Copy	

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

8. Additional Information/ Requirement:

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

9. Smart Village Proposal Design

Sr. No.	Descriptions	Information/ Detail	Remarks
1.			

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

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Email ID: rurban@gtu.edu.in

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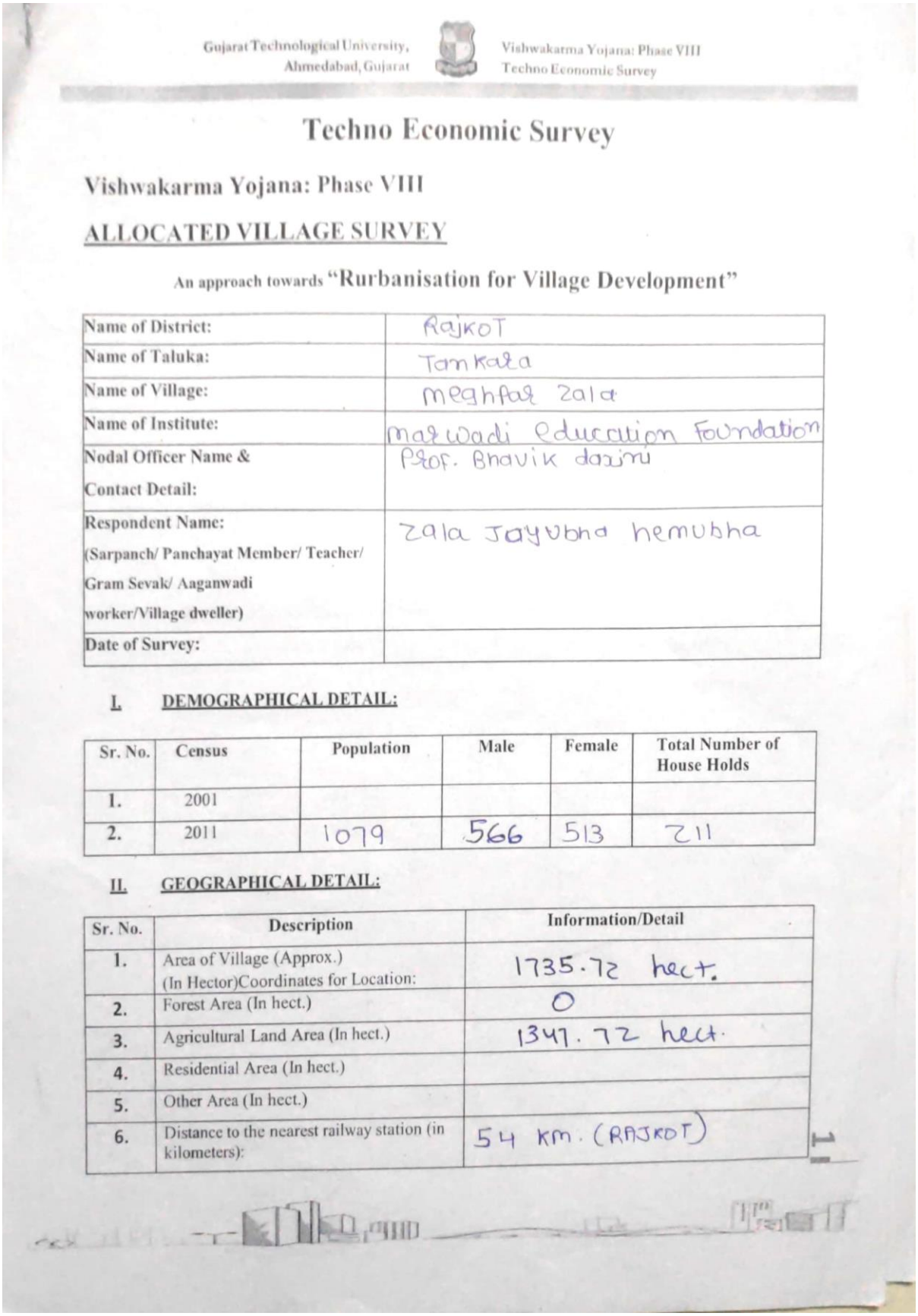
12.3 Survey form of Allocated Village Scanned copy attachment in the report for Part-I



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Techno Economic Survey

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Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

Name of District:	Rajkot
Name of Taluka:	Tankara
Name of Village:	meghpar zala
Name of Institute:	marwadi education foundation
Nodal Officer Name & Contact Detail:	Prof. Bhavik dasani
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	zala jayubha hemubha
Date of Survey:	

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001				
2.	2011	1079	566	513	211

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	1735.72 hect.
2.	Forest Area (In hect.)	0
3.	Agricultural Land Area (In hect.)	1347.72 hect.
4.	Residential Area (In hect.)	
5.	Other Area (In hect.)	
6.	Distance to the nearest railway station (in kilometers):	54 KM. (RAJKOT)

7.	Name of Nearest Town with Distance:	8 KM (Tankara)
8.	Distance to the nearest bus station (in kilometers):	6.3 KM (Mota Khijadiya)
9.	Whether village is connected to all road for the any facility or town or City?	yes

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1.	Agriculture
	2.	Buissness
	3.	Labour

Major crops grown in the village:	1.	Ground nut
	2.	cotton
	3.	wheat

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

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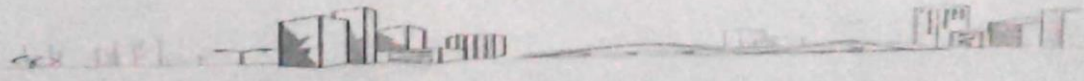
	Other(Specify)**Lake/ Pond**				
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	✓		
	Underground Sump	Capacity:			
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1	Open drainage			
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	all weather Road	✓		
	Main road	all weather road	✓		
	Internal streets	all weather road	✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.	ODR 0 KM	✓		
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	N Wankaner ST (35 KM)			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	N Mota Khijadiya Bus stop (6.3 KM)			
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Chhakda, private vehicle			
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Y/Govt. more than 6 hours			



	Power supply for Domestic Use	Y (24 hours)			
	Power supply for Agricultural Use	Y (8 hours)			
	Power supply for Commercial Use	Y (24 hours)			
	Road/ Street Lights	Y			
	Electrification in Government Buildings/ Schools/ Hospitals		✓		
	Renewable Energy Source Facilities (Y/ N)	N		✓	
	LED Facilities		✓		
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.			✓	
	Location Condition				
	Community Toilet (With bath/ without bath facilities)			✓	
	Solid & liquid waste Disposal system available			✓	
	Any facility for Waste collection from road			✓	
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL. OTHER (SPECIFY)	WELL	✓		
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)				

V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)		✓		
	Sub-Centre			✓	
	PHC			✓	
	BLOCK PHC			✓	
	CHC/RH			✓	
	District/ Govt. Hospital			✓	
	Govt. Dispensary			✓	
	Private Clinic			✓	
	Private Hospital/ Nursing Home			✓	
	AYUSH Health Facility			✓	
	sonography /ultrasound facility			✓	
	If any of the above Facility is not available in village than approx. distance from village: 10 kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group			✓	
	Primary School	2 Private 1 Government	✓		
	Secondary school			✓	
	Higher sec. School			✓	
	ITI college/ vocational Training Center			✓	
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities			✓	

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

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

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

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

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

Suggestions if any:

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

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

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

VII. DATA COLLECTION FROM VILLAGE

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

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VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

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

IX. Smart Village / Heritage Details

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

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

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

જયપાલ ડુંગરાલ ?

સરપંચશ્રી,
મેઘપર (ઝા.) ગ્રામ પંચાયત

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12.4 Gap Analysis of the Allocated Village

Table no. 12.4a. Gap Analysis

VILLAGE GAP Analysis					
Village Facilities	**Planning Commission/UDPFI Norms**	**Village Name:**	**Meghpar Zala**		
		Population:1079			
		Existing	**Required as per Norms**	**Smart Village / Cities / Heritage Future Projection Design**	**Gap**
Social Infrastructure Facilities					
Education					
Anganwadi	Each or Per 2500population	1	1	-	0
Primary School	Each Per 2500 population	1	1	-	0
Secondary School	Per 7,500 population	0	0	-	0
Higher Secondary School	Per 15,000 Population	0	0	-	0
College	Per 125,000 Population	0	0	-	0
Tech. Training Institute	Per 100000 Population	0	0	-	0
Agriculture Research Centre	Per 100000 Population	0	0	-	0
Skill Development Center	Per 100000 Population	0	0	-	0
Health Facility				-	
Govt/Panchayat Dispensary or SubPHC or Health Centre	Each Village	0	1	-	-1
Primary Health & Child HealthCenter	Per 20,000 population	0	0	-	0
Child Welfare and Maternity Home	Per 10,000 population	0	0	-	0
Multispecialty Hospital	Per 100000 Population	0	0	-	0
Public Latrines	1 for 50 families (iftoilet is not there in home, especially for slumpockets & kutcha house)	0	1	-	-1
Physical infrastructure facilities					
Transportation		**Adequate**		-	-
Pucca Village Approach Road	Each village	**Adequate**	2 km approach road	-	-
Bus/Auto Stand provision	All Villages connectedby PT (ST Bus or Auto)	**Adequate**	Pickup standat main highway of Kotambi	-	-

			village		
Drinking Water (Minimum 70 lpcd)		**Adequate**	-	-	-
Over Head Tank	1/3 of Total Demand	**Adequate**	1	1	0
U/G Sump	2/3 of Total Demand	**Adequate**	1	1	0
Drainage Network - Open		**Adequate**	30% open	-	-
Drainage Network - Cover		**Adequate**	70% covered	-	-
Waste Management System		**Inadequate**	-	-	-
Socio-cultural infrastructure					
Community Hall	Per 10000 Population	1	1	-	0
Public Library	Per 15000 Population	0	0	-	0
Cremation Ground	Per 20,000 population	0	1	-	-1
Post Office	Per 10,000 population	1	1	-	0
Gram Panchayat Building	Each individual/group panchayat	1	1	-	0
APMC	Per 100000 Population	0	0	-	0
Fire Station	Per 100000 Population	0	0	-	0
Public Garden	Per village	0	1	-	-1
Police post	Per 40,000Population	0	0	-	0
Shopping Mall : Shops are available in village					
Electrical design					
Electricity Network		**Adequate**			

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

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

Sr.No.	Village Name	Discipline	Part-I	Part-II
1.	**Meghpar Zala**	**Civil**	Design of government grocery shop	Avedo
			Community hall	Library
			Common public toilet	Post Office
			Prathmic arogya kendra	Ground water recharge by vertical shaft
			Vegetable market	Police Station
			Panchayat building	Medical store
		Electrical	Auto sprinkle irrigation using solar energy	Solar street light system
			Solar PV system on the primary school	IoT based Smart irrigation system
			GSM Based Home Appliances Control System (HACS) for Domestic Power Users	Solar cleaning system
2.	**Gundala**	**Civil**	General Market	Public Park
			Library	Pond
			Police station & Fire station	Bus Stand
			Police station & Fire station	Bus Stand
			Primary Health Centre	Rain Water Harvesting
			Public Toilet	Bank
		Electrical	Energy Audit	Electrical Design of Bus Stand
			IOT Based Home Automation	Solar Rooftops
			Street Lights	Piezoelectric Speed Breaker

12.6 Drawings (If required)

We have putted all the design in last at the report

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

fig. no. 12.5a. summary of good photographs

12.8 Village Interaction with sarpanch Report with the photograph

During interaction with the sarpanch, we came to know the following things: -

The village has no local bank or ATM available. Government schooling is available from std. 1 to 8. There are approximately 142 students currently studying there. There is an overhead water tank available in the village. Irrigation facilities through pipelines are available in the village. There are no active government schemes directly benefited to the villagers. Tree plantation is sufficient in the village. Street lighting is also insufficient in the village. There are no public toilets available in the village. No Medical or Para-medical facilities are available in the village. More than 50% of the population is dependent on agriculture for their daily bread. The main crops are groundnut, cotton, and wheat. The approximate population of village is 1,500. Drainage facilities in the village are fully closed and there is no waste disposal/collection system implemented. The village has good mobile network coverage. Approximately 80% of the village population belongs to the 'Zala' caste. There is no CCTV surveillance available in the village. The village lacks cyber cafes and public markets.

Fig. no. 12.7a Interaction with school principle

During covid-19 there were no positive cases in the village. The village also lacks post office, fire station, and police station. The main approach road to the village is through a river and in monsoon the river overflows and the roadway is blocked entirely. No direct connectivity to any MDR or Highway or any other road is available to reach the village.

12.9 Sarpanch letter for design approval

Approval Letter For Proposed Design Approval

Vishwakarma Yojna Phase VIII

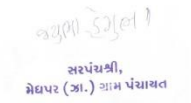
Meghpar Zala Village, Rajkot Dist.

Subject : Approval of design proposal for Meghpar Zala Village

I, sarpanch of Meghpar Zala village give approval for following design proposals given under Vishwakarma Yojna Phase VIII - An approach towards rurbanisation by students of Marwadi University named Deep Makwana (180573109032), Rajat Bhuva (170570106008) and Dhruvil Hedapara (160570106027)

Approved Designs:
- **Panchayat Building**
- **Market**
- **Government Grocery Shop**
- **Healthcare Centre**
- **Community Hall**
- **Public Toilet**
- **GSM Based Home Appliance Control System**
- **Auto Sprinkler Irrigation Using Solar Energy**
- **Solar PV System on primary school**

Date : 12-04-2021



Chapter 13: Designs In A3 Sheets

13.1 Physical design: Avedo

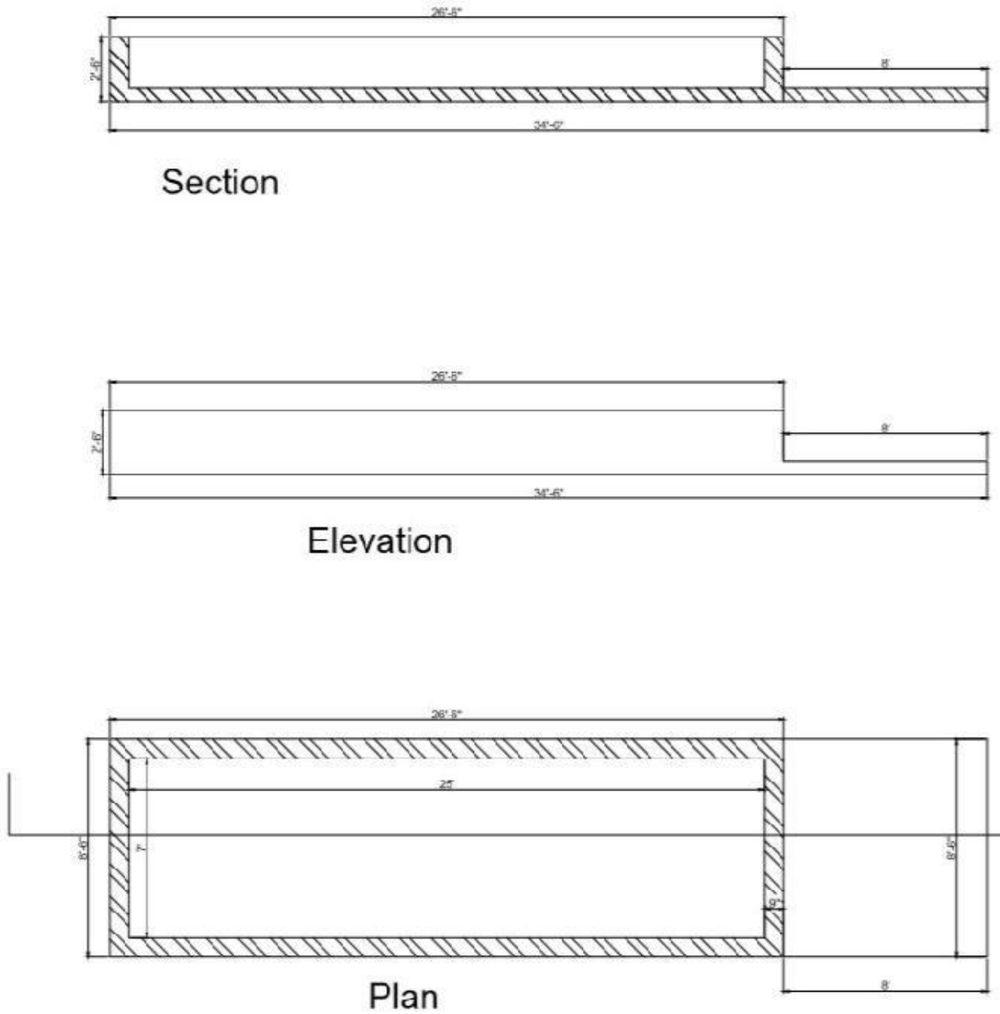


Fig.no.13.1a plan and elevation of avedo

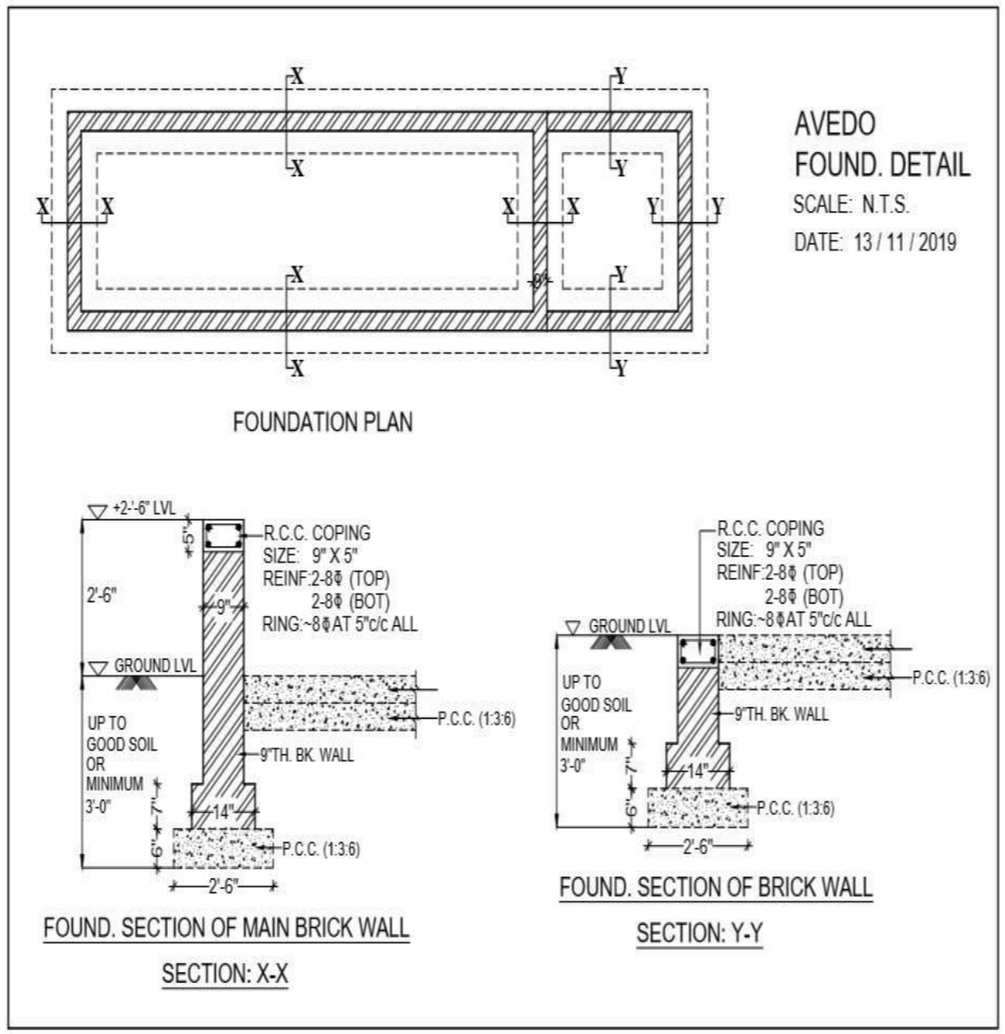


Fig.no.13.1b foundation plan section of avedo

13.2 Socio-cultural design: Library

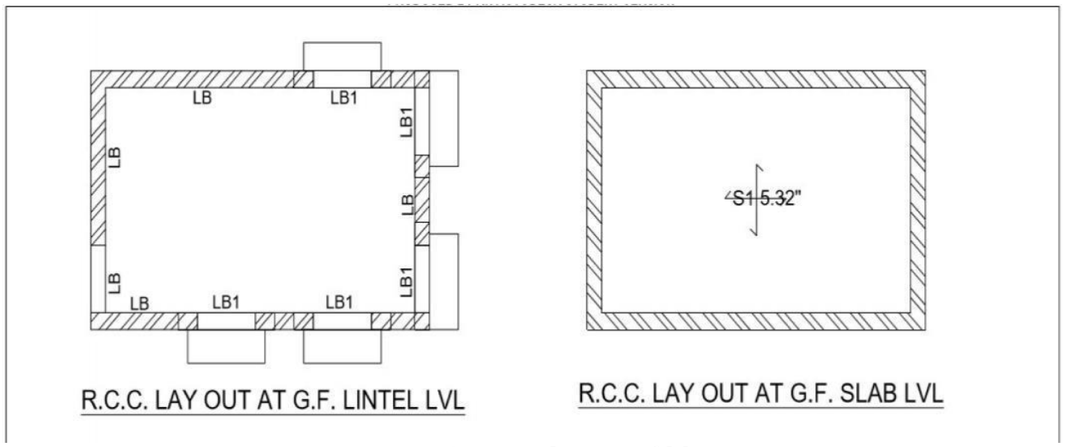


Fig. 13.2a rcc layout of library

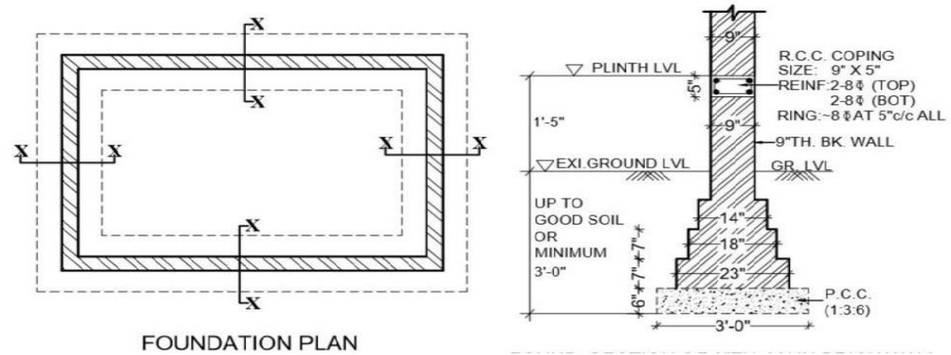
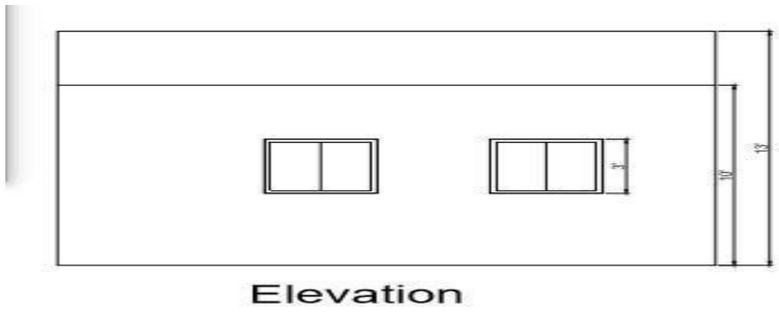
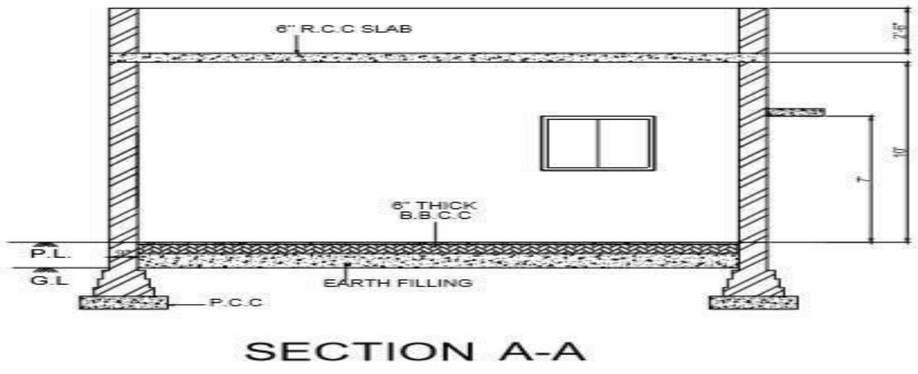
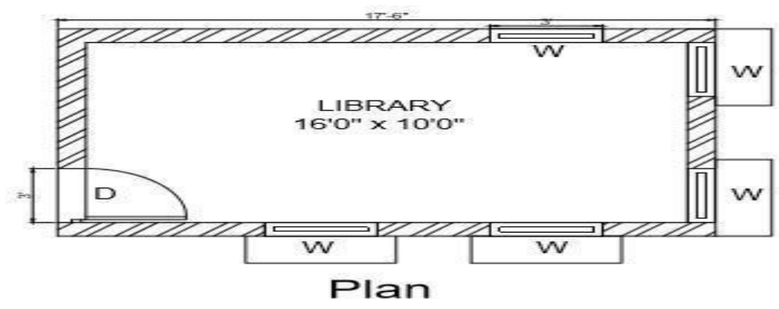


Fig. 13.2b foundation plan of library







D	3'0" x 7'0"
W	3'0" x 3'0"

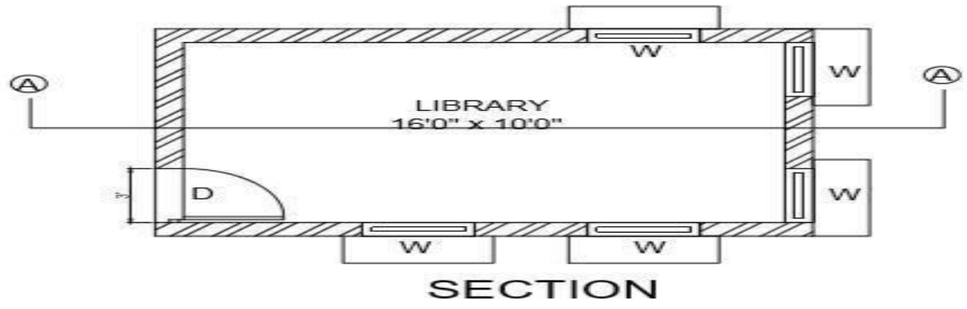
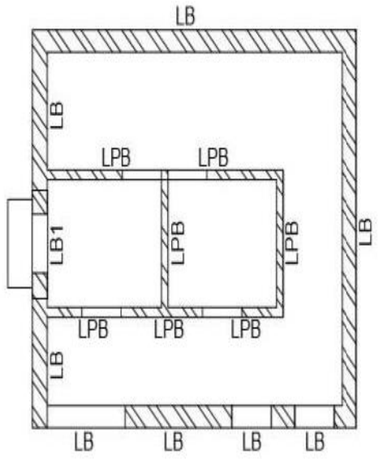
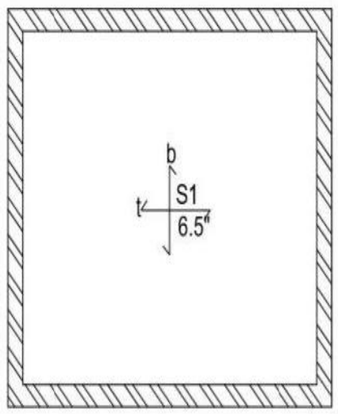
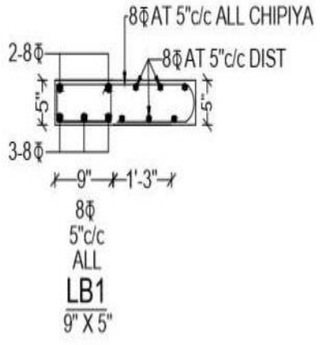


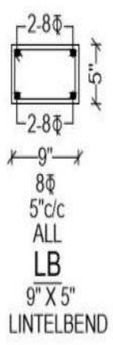
Fig. 13.2c section and elevation plan of library

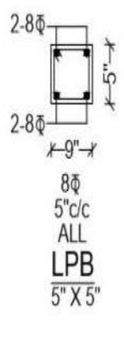
13.3 Physical Design: Post office











SCHEDULE OF SLAB

MK OF SLAB	THICK	COVER	REINFORCEMENT II TO SHORT SIDE	REINFORCEMENT II TO LONG SIDE
S1 TWO WAY	6.5"	0.8"	8ϕ AT 5.5"c/c ALT B/U	8ϕ AT 9.5"c/c ALT B/U

POST OFFICE
G.F. LINTEL-SLAB DETAIL
SCALE: N.T.S.
DATE: 13 / 11 / 2019

Fig13.3a post office RCC layout

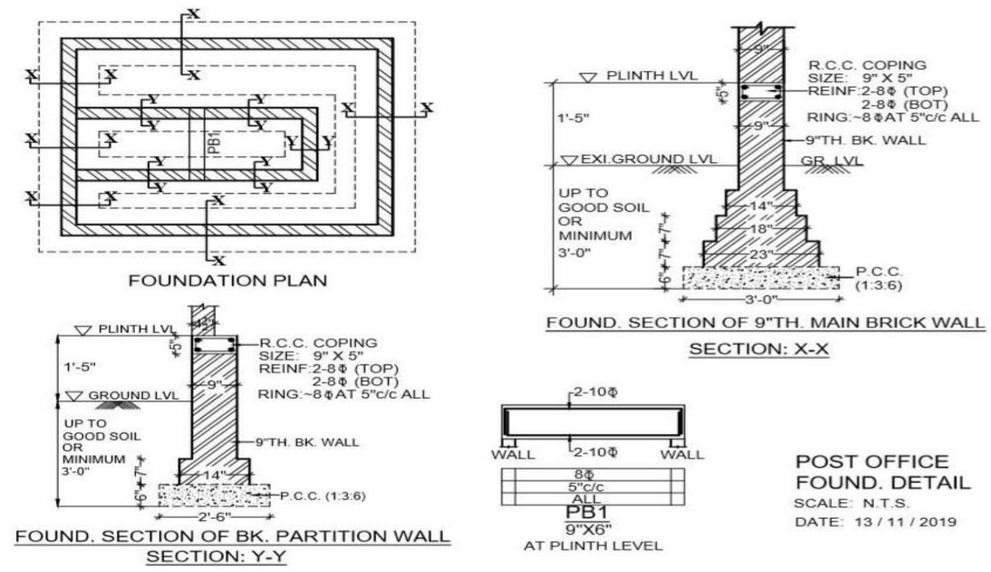
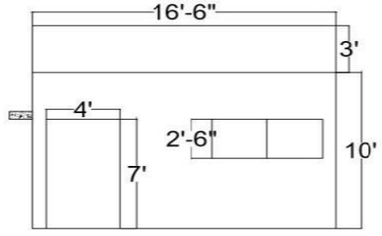
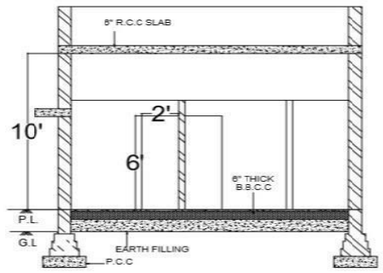
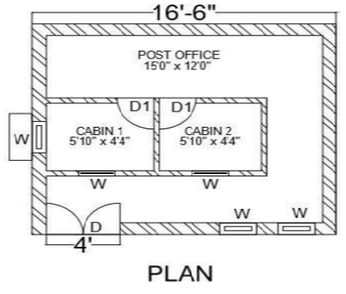


Fig 13.3b structural layout of post office







D	4'0" x 7'0"
D1	2'0" x 7'0"
W	2'0" x 2'6"

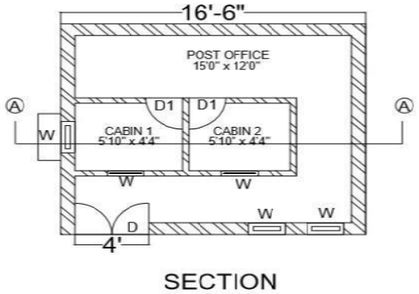
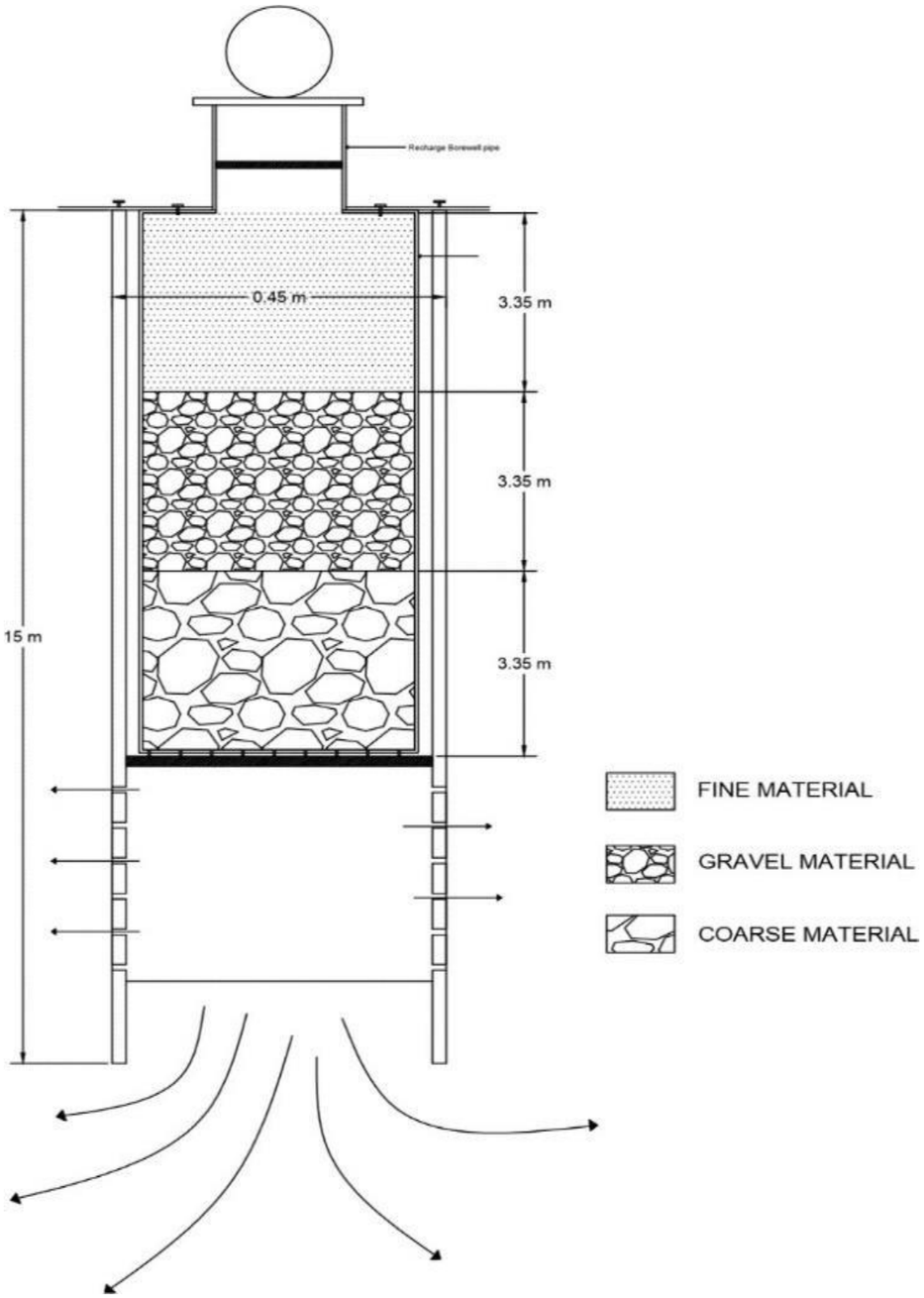


Fig 13.3c plan and elevation layout of post office

13.4 Sustainable Design: Ground water recharge by Vertical shaft



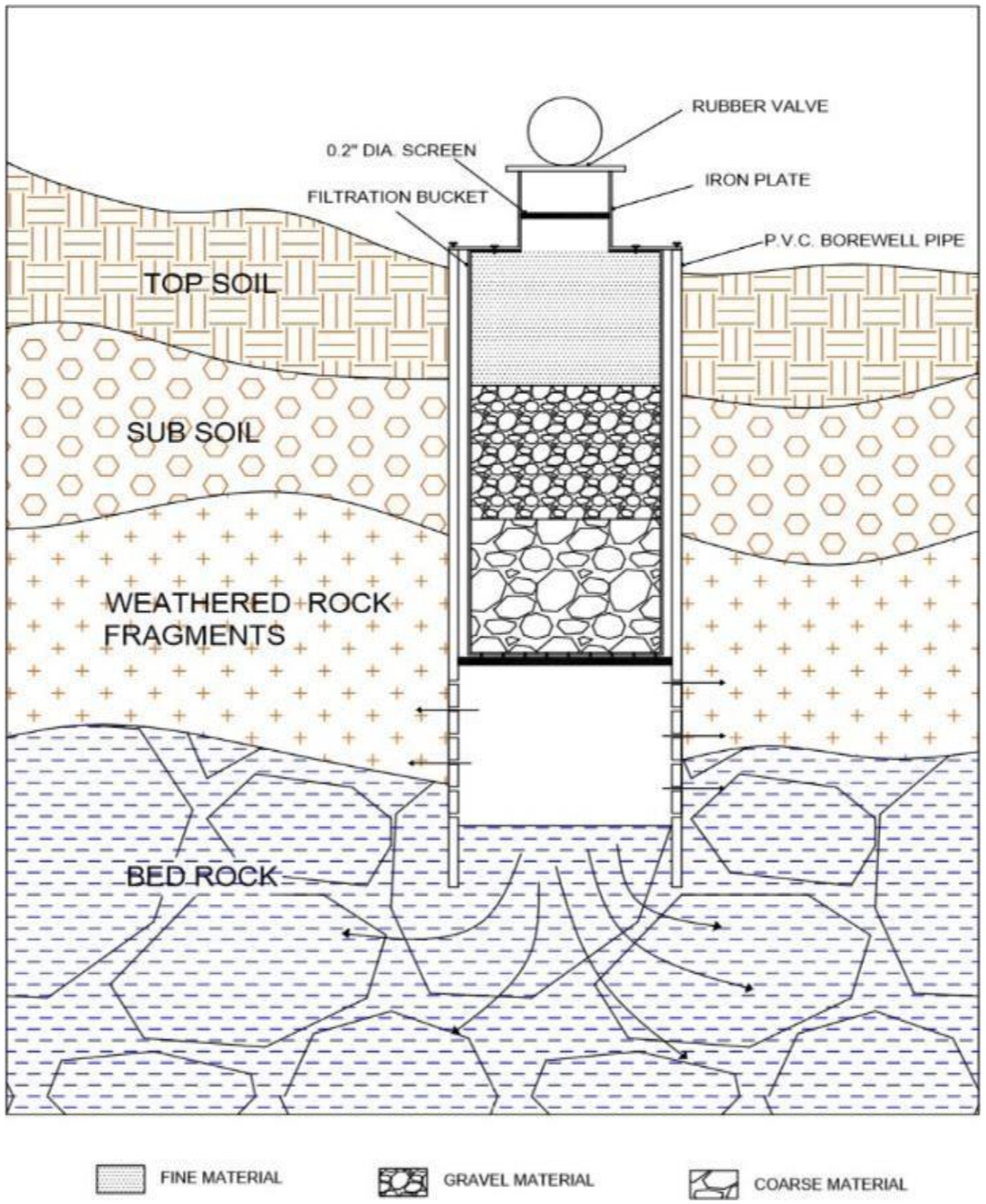


Fig. 13.4a vertical recharge shaft section

13.5 Social design: Police station

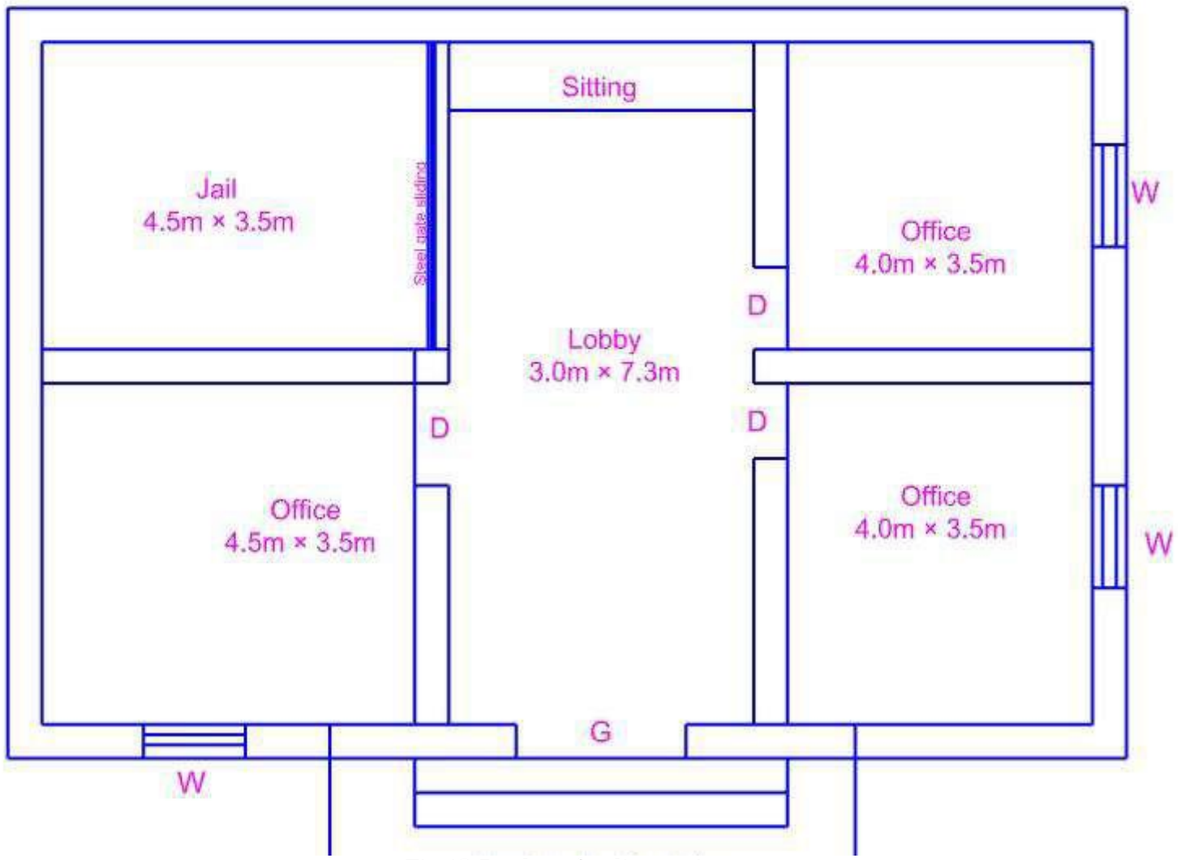


Fig 13.5a plan of police station

13.6 Social Design: Medical store

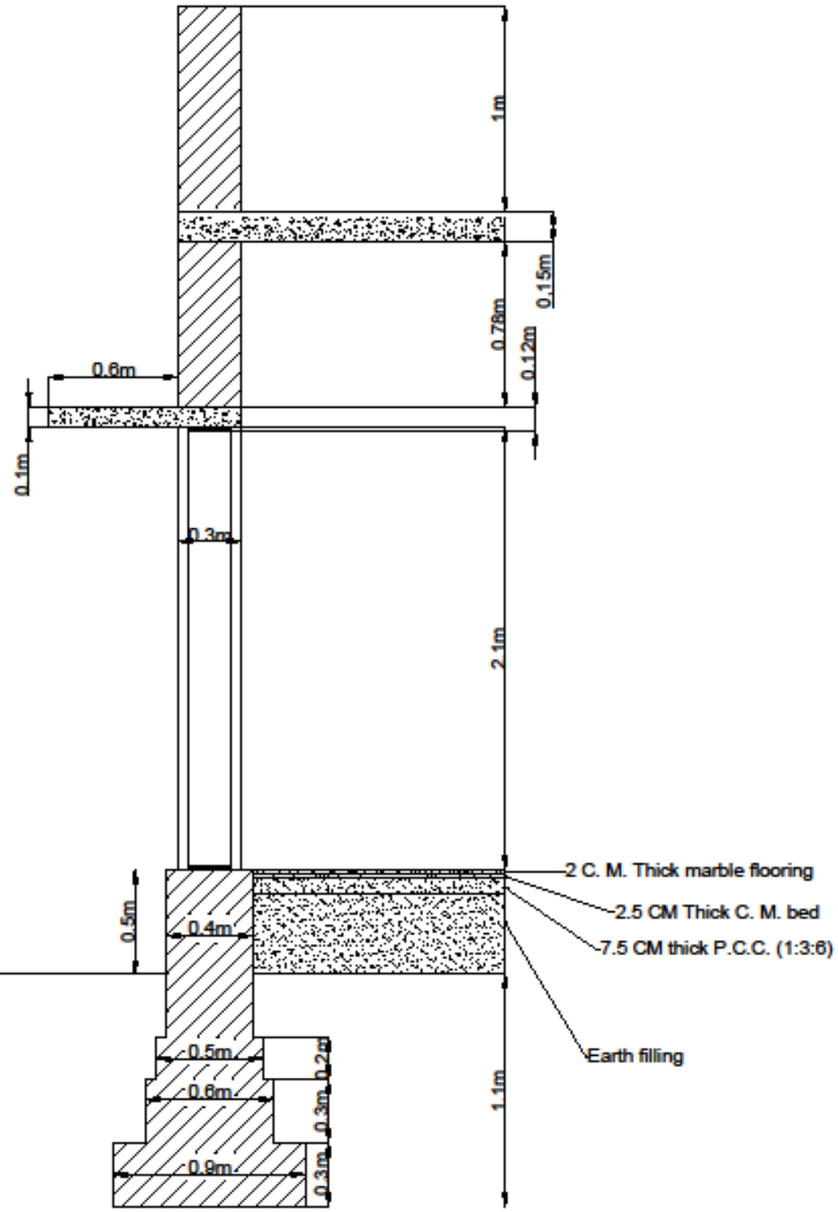


Fig 13.6a cross section of wall

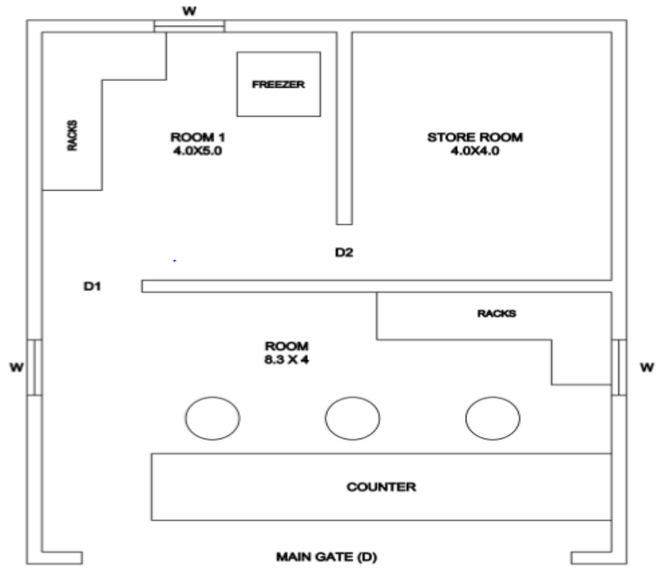
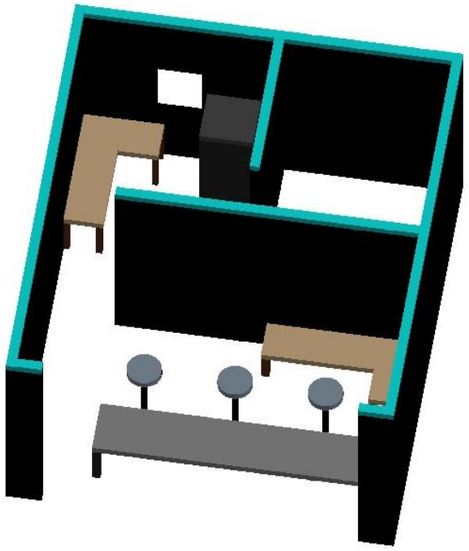


Fig 13.6b 2d plan of medical store



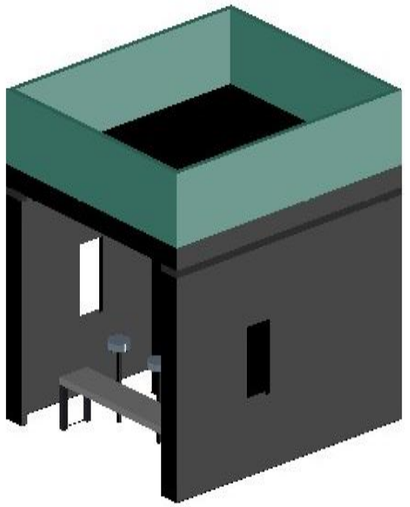


Fig 13.6c 3d view of medical store

13.7 Electrical design 1: Solar cleaning system

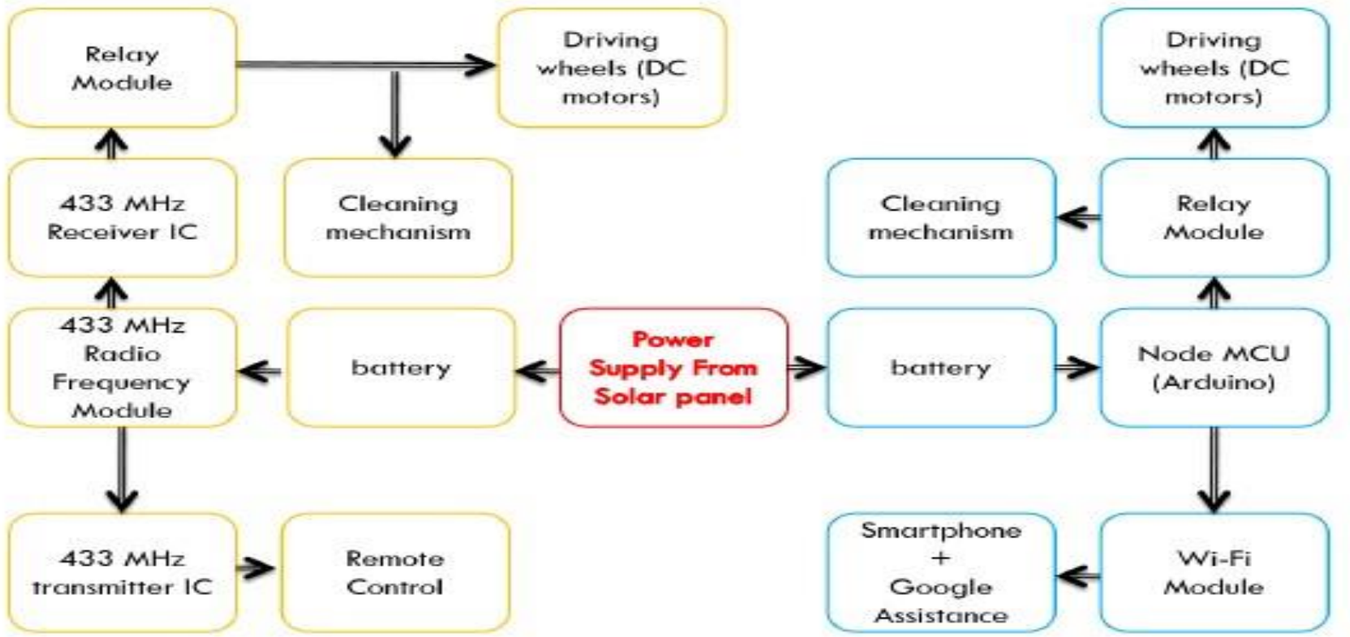


Fig 13.7a Block Diagram of solar cleaning system

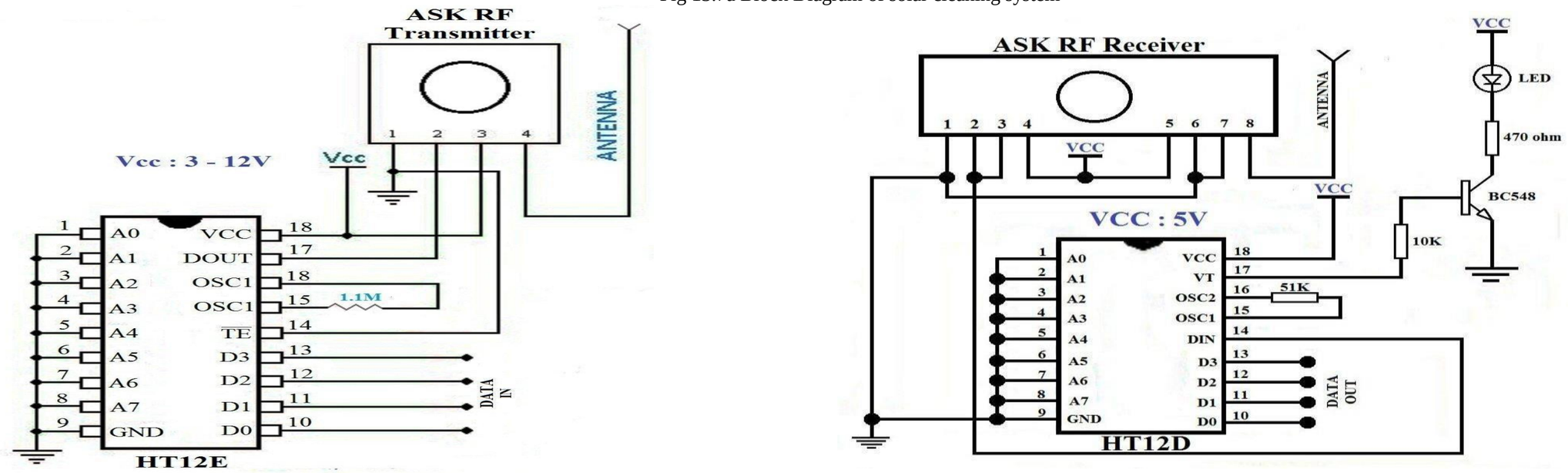


Fig 13.8b Circuit Diagram of Solar Cleaning System

13.8 Electrical Design 2: IoT based smart irrigation system

Fig.13.8a prototype of IoT module

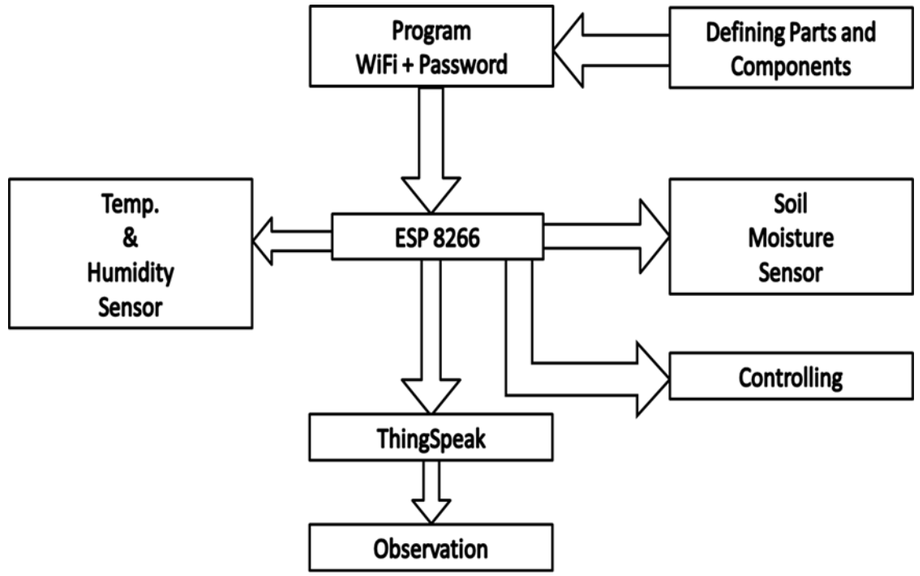


Fig.13.8b Block diagram of irrigation system

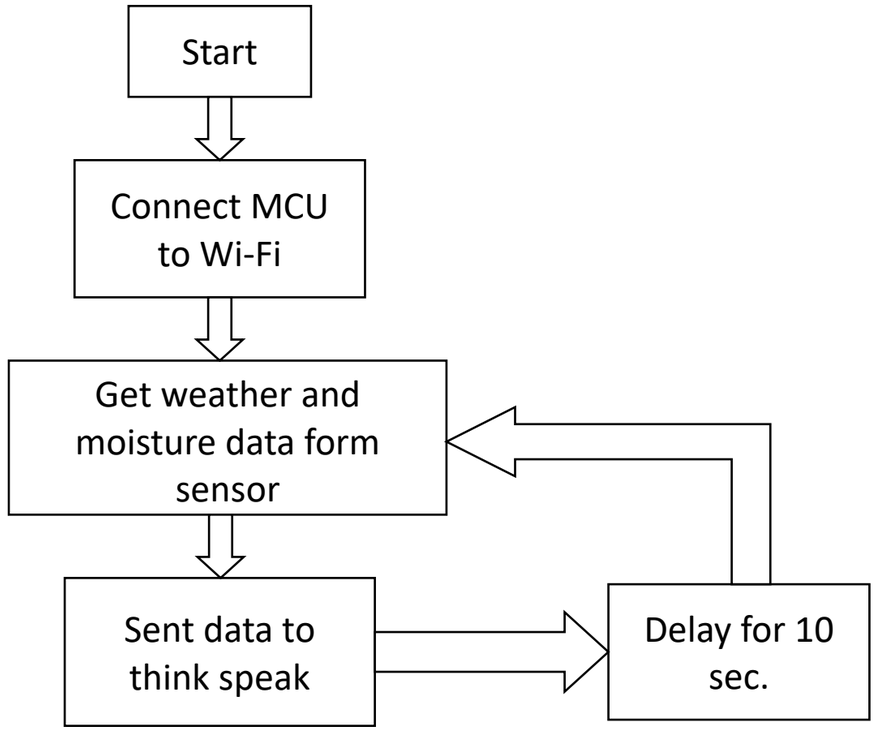


Fig. 13.8c Algorithm of system

13.9 Electrical Design 3: Solar street light system

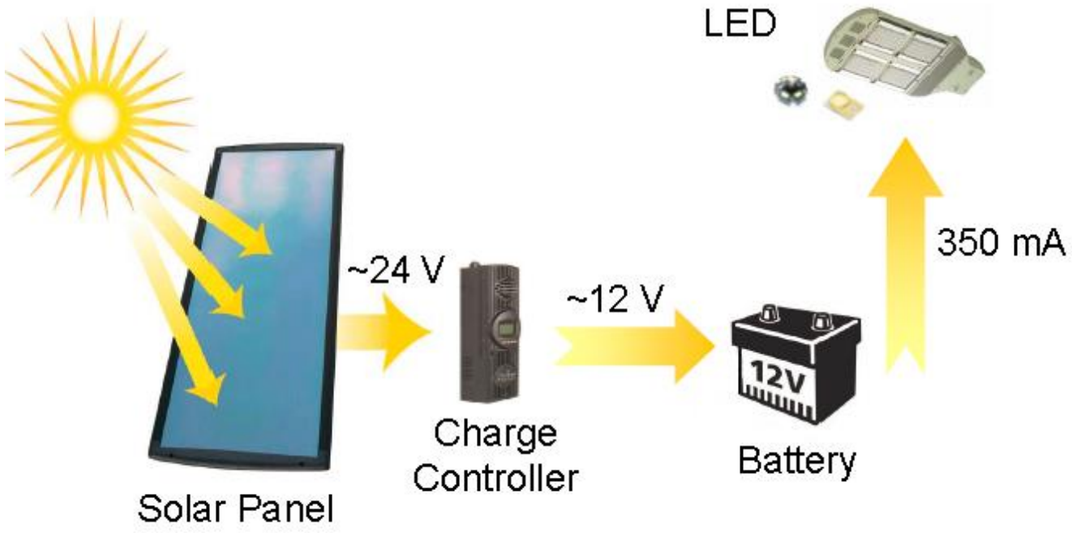


Fig.no.13.9a block diagram of solar street system

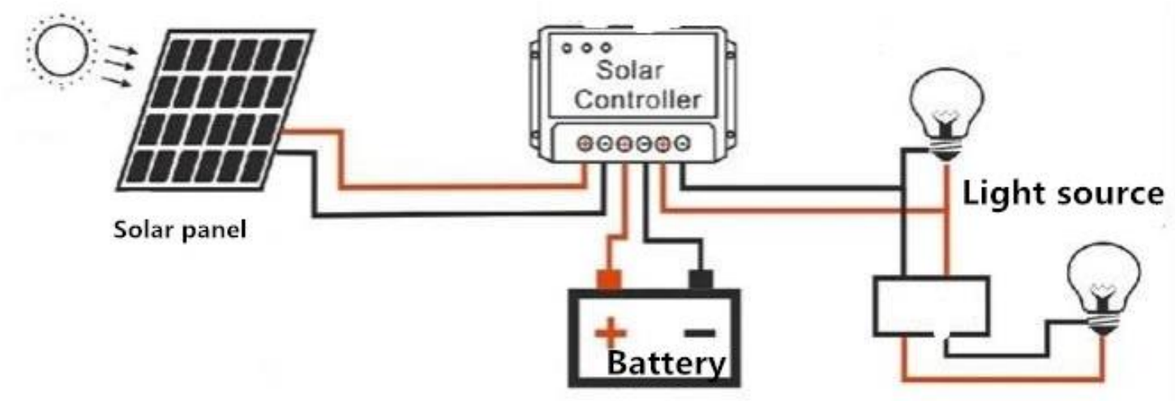


Fig. 13.9b connection diagram of solar street light system

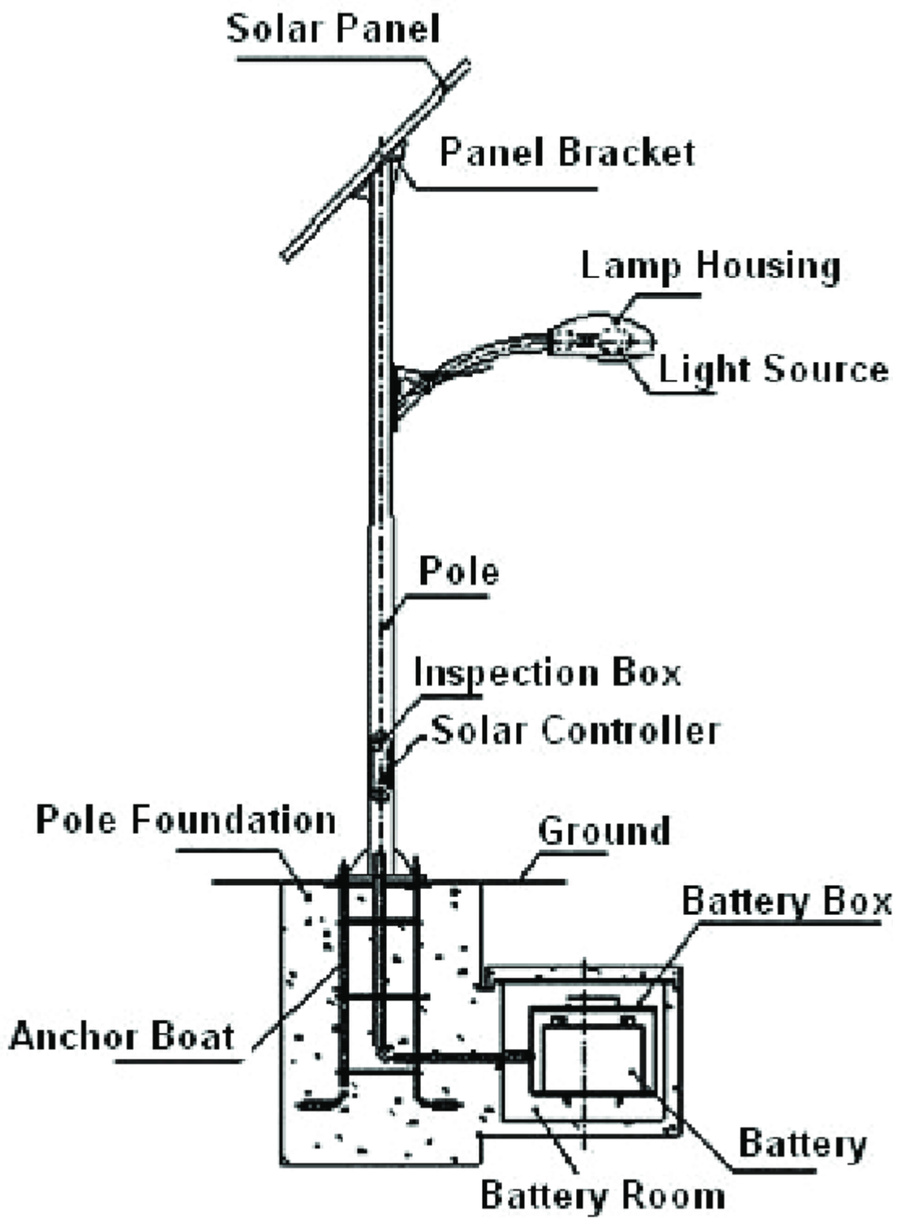


Fig. 13.9c construction street light pole