DETAIL PROJECT REPORT

VISHWAKARMA YOJNA: VIII

AN APPROACH TOWARDS RURBANISATION

Davada :Village

Mahesana :District

PREPARED BY

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YEAR: 2020-21

GUJARAT TECHNOLOGICAL UNIVERSITY
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CERTIFICATE

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

Detail Project Report for, VILLAGE: Davada

DISTRICT: Mehsana

Under

Vishwakarma Yojana: Phase-VIII

In partial fulfillment of the project offered by

GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA

During the academic year 2020-21

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

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ABSTRACT

Vishwakarma Yojana project and how you do your vision project:

To improve living standard of villagers, Reduce migration from village to urban areas .to make a new vision for a villageans.

About your village description:

Davada village is located in Mehesana Tehsil of Mehesana district in Gujarat, India. It is situated 20km away from Mehesana, which is both district & sub-district headquarter of Davada village. As per 2009 stats, Davada village is also a gram panchayat. The total geographical area of village is 431.17 hectares.

Davada has a total population of 2,431 peoples. There are about 476 houses in Davada village. As per 2019 stats, Davada villages come under Becharaji assembly &Mehesana parliamentary constituency. Unjha is nearest town to Davada which is approximately 12km away.

About existing village condition:

People was façade so many problems due to COVID- 19like shortage of food cutlery items. Some of them face financial problems due to COVID-19.

About your proposed designs your view for village development:

To give villagers full facilities & amenities like urban areas .like advance farming. Good road network. Good water supply. Well managed drainage. PHC (Public Health Center) well designed. Good transportation.

About future scope of the village development:

Providing good infrastructure & living Standard and reduce migration from village to urban areas. Data collection wills e give full master plan for development.

Key Words:

Rurbanization, smart village, Proposal, Village development

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1.1 BACKGROUND

Maktupur village has been taken as the reference village for the development of Davada village. Maktupur village is located at 33 Km from PATAN. The village is connected with Palanpur Ahmedabad. This village is developed during recent years very efficiently and now this village have all basic amenities like, Cement Concrete road, underground drainage, water sup- ply, solid waste management, gram panchayat, most houses are pucca, transportation services, higher education etc. the education is very good in this village. This village has post office. Below Figure represents the Google map of the village.

Study area of location

Name: Maktupur

- District: Mehesana
- Taluka: Unjha
- Distance from Patan: 33 km
- Pin code:384170
- Language: Gujarati and Hindi
- Time zone: IST(UTC+5:30)
- Elevation/Altitude**:** 110 meters. Above-Sea-level

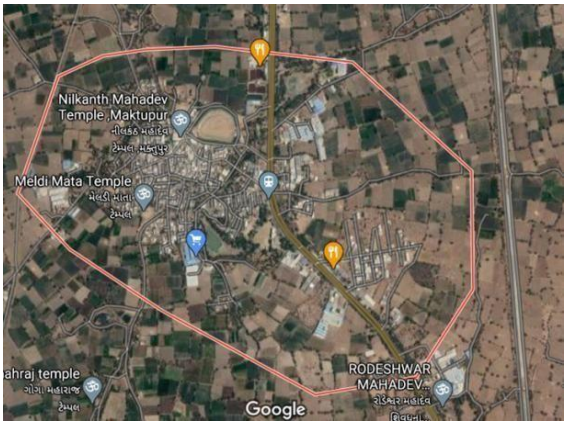


Fig (01) ideal village map

1.2: CONCEPT: IDEAL &NORMALVILLAGE

1.2.1 Objectives of study

- Prevent distress migration from rural to urban areas, which is a common phenomenon in India's villages due to lack of opportunities & facilities that guarantee a decent standard of living.
- Better livelihood opportunities which are not in villages.
- To get basic amenities.
- Contribute towards social empowerment by engaging all sections of the community in the task of village development.
- Improving the economic conditions of the Semi-skilled and Un-skilled labour by publishing their availability status on the Internet;
- Providing updated information and databanks to the Government for better analysis and individual profiling

1.2.2 The top ideal villages in India

- Punsari (Gujarat):- The villages with all the urban facilities.
- Mawlynnong (Meghalaya):- Asia‘s cleanest village.
- Hiware Bazaar (Maharashtra); - The villages of billionaires.
- Pothanikkad (Maharashtra):- The village with 100% literacy rate.
- Dharnai (Bihar):- The solar powered village of India.
- Chappar (Haryana):- An Indian village that distribute the sweets when a girl is born.
- Kokkarebellur (Maharashtra):- A villages that believes in conservation of nature.
- Ballia (Uttar Pradesh):- The village that beat arsenic poisoning of water.
- Kathiawadi (Maharashtra):- The village that transformed itself in to a model village

1.2.3 The idea of smart village

Smart village is a concept adopted by national, state and local government of India, as initiate focused on biolistic rural development derived from Mahatma Gandhi vision of Adarsh Gram (ideal village) and Swaraj Prime minister Narendra Modi launched Sansad Adarsh Gram Yojana on 2nd October 2014, Gandhi's birthday in addition of Smart cities and Digital India as development program for India The parliamentarian's Model village scheme main goal is for each member of parliament and minister to adopt rural village and develop it into a model by 2019 under SAGY guidelines The vision of SAGY is a integrated village development plan encompassing personal, Human, Social, an Economical dimensions

1.2.4 History of village development

Accordingly, on 31st march 1952, an organization knows as Community Projects Administration was setup under the planning commission to administer the programs relating to community development. This programmed inaugurated on October 2nd, 1952 was an important landmark in history of rural development.

In October 1974, The Department of Rural Development came into existence as a part of Ministry Of Food And Agriculture. On 18th August 1979, the department of rural development was elevated to the status of a new ministry rural reconstruction.

It was renamed as Ministry Of Rural Development on 23rd January 1982. In January 1985 the Ministry Of Rural Development was again converted into a development under the Ministry Of Agriculture And Rural Development which was later rechristened as Ministry of Agriculture in September 1985.

On 5th July 1991, the department was upgraded as Ministry Of Rural Development. Another department viz. department of wasteland development was created under this ministry on 2ndJuly 1992. In March 1995, the ministry was renamed as the Ministry Of Rural Areas And Employment with three departments namely Department Of Rural Employment and Poverty, Alleviation, Rural Development and Wasteland Development.

Again, in 1999 Ministry Of Rural Areas And Employment was renamed as Ministry Of Rural Development. To impart greater momentum of rural the effort in these sectors the government launched the Pradhan Mantri Gramya Yojana (PMGY) and Ministry Of Rural Development was en- trusted with the responsibility of implementing drinking water, housing and rural roads component of PMGY.

Keeping in view the needs and aspirations of the local people, Panchayati Raj Institutions (PRIs) have been involved in the programme implementation and these institutions constitute the core of decentralized development of planning and its implementation.

Realizing that empowerment of rural women is crucial for the development of rural India; women's component is introduced in the programs for poverty alleviation to ensure flow of adequate funds to this section. The Constitutional Amendment (73rd), Act 1992 provides for reservation of selective posts for women.

Department Of Drinking Water And Sanitation has been separated from the Ministry Of Rural Development from 13th July, 2011 and renamed as Ministry Of Drinking Water And Sanitation.

1.2.5 The idea of a model/smart village

- The idea of a –Adarsh Gram‖ or model village has been explored earlier as well, most notable.
- Through the Pradhan Mantri Adarsh Gram Yojana, launched by the Central Governmentin2009.
- 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.
- Rs 20 lakh per village. The target villages under the scheme were those with more than50%.

- Population belonging to Scheduled Castes (SCs). Additionally, State governments have also taken.
- Steps in this direction. Himachal Pradesh launched a Mukhiya Mantri Adarsh Gram Yojanaalong.
- Similar lines in 2011, with the allocation of Rs 10 lakh per village.
- The idea of a ‐Adarsh Gram‖ or model village has been explored earlier as well, most notably through the Pradhan Mantri Adarsh Gram Yojana, launched by the Central Government in2009.

1.3 DETAILSTUDY

- **Physical &Demographic Representation**

State Name	District Name	Sub District	Village Name
Gujarat	Sabarkantha	Sabarkantha	Punsari

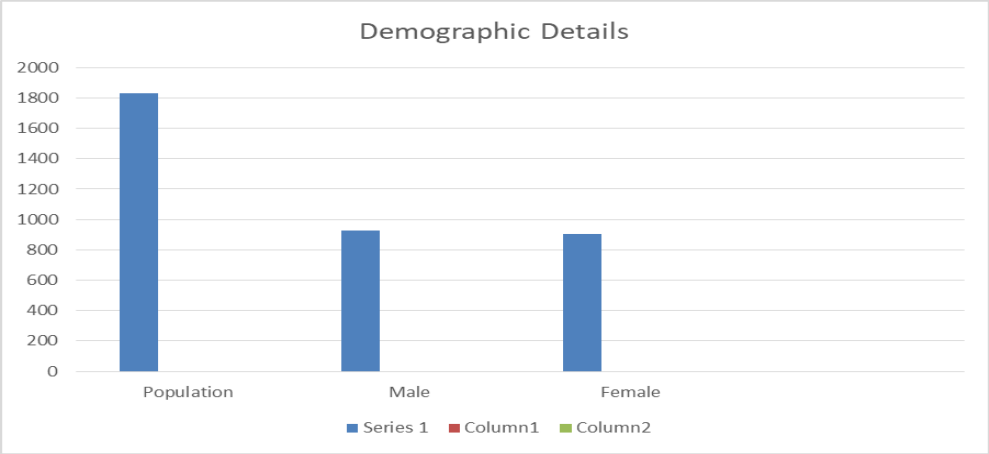


Fig (02) Demographical detail

Sr.No.	Census	Population	Male	Female
1	2011	5500	2770	2730

Occupational details

- Farming
- Business
- Dairy
- Animal husbandry

Social profile

The social scenario of village is excellent .in the past few years there is 0% migration in the village. The gram panchayat had spent around 12-13 crores for the development of the village and that to with use government schemes and from the revenue, the gram panchayat has zero financing from NRI, NGO and CSR. The income of the village is approx. 5.50-6.00 lakhs.

Infrastructures facilities

Various infrastructure facilities like educational buildings, Health and Wellness Centers, Administrative buildings, Banking facilities, etc. are visited and observed. Represents the infrastructural facilities at Punsari village.

Village gate

RO Plant at village

Village facilities

Skill center

Village E-Gram seva

Panchayat building

Waste management and disposal

Fig (03) Infrastructure details

1.4 SWOT ANALYSIS OF IDEALVILLAGE

Herewith the SWOT analysis for ideal village is represented. Such analysis can be useful for understanding scope of future developments with available strength and also the prevailing weaknesses are to be overcome by appropriated techniques.

Strength	Weakness	Opportunities & threats
• Land • Transportation system • Drainage facilities • Drinking facilities	• Illiteracy • Solid Waste Management • Low wage payment	• Cottage industries • Govt. Schemes • Education facilities • Job insecurity

1.5 FUTURE PROSPECTS OFVILLAGE

The village should use advance technologies in agricultural, water-supply as well as for other fields.

- Rain water harvesting system should be installed in every household to conserve the water.
- E - Auction of Agro products.
- Recycling of drainage water.
- Easy data base management for agriculture.
- Create awareness about new government schemes and planned meeting involving villagers etc.

1.6 BENEFITS OF THE VISIT OFVILLAGE

- We see some different type of little requirements of village.
- We discussed the good and bad thing about village from village people.
- We saw all type of basic and primary amenities available.

Town and village experience cultural and economic growth and regeneration

- Village becomes smart,, with improve internet speed and connectivity
- Villages become more attractive to future home-owners.
- Tourism and culture can stimulate employment and investment in rural areas.
- Encourage to return to their home villages and prevent further brain drain from local villages.
- It solves many of the big societal challenges such as diversity, climate change and the sustainableprovision of food, biomass and energy.
- Villages become more attractive to foreign and domestic investors.
- It provides greater opportunities for the jobseekers.

1.7 CIVIL CONCEPT OF IDEALVILLAGE

- The various infrastructure facilities such as kaccha & pucca houses, schools, college's hospitals etc. Areavailable in the village.
- The different surveys are made and analyze all the possible sustainable design to make a village anideal village.
- The basic accommodations are must be available in the village such as; drainage facility, toilet blocks,solid waste management, gram panchayat, tap watered.
- Village is totally covered with 100% CCTV camera.
- Village is totally brightened with 100% led system.

Chapter 2: Literature review

2.1 INTRODUCTION: URBAN&RURAL

Urban:

Urban is that area where the population density is more and new facilities are provided to the people. Urban areas are the region surrounding a city. Most of inhabitants of urban areas have non- agricultural jobs. Urban areas have municipality, corporation, cantonment board or notified town area committee etc. According to census 2011, there are 7,935 towns, 4,041 statutory town and 3,894 census towns.

Rural:

All the areas which are not characterized as urban area is called rural area, in which the population is Very low compared to urban areas. Mainly they depend on agricultural activities. According to census 2011, there are 6, 40,867 villages in India. The area where more than 75% of male population is associated with agricultural activity is known as rural area.

2.2 IMPORTANCE OF THE RURALDEVELOPMENT

Rural development is necessary not only for an over-whelming majority of the population living in villages but the development of rural activities is essential to accelerate the pace of overall economic development of the country. Rural development has assumed greater importance in India today than in the earlier period in the process of the development of the country. It is a strategy package seeking to achieve enhanced rural production and productivity, greater socio-economic equity, and aspiration, balance in social and economic development. The primary task is to mitigate the hunger of about 70 percent of the rural population, providing adequate and nutritious food. Then follow an adequate provision of clothing and footwear, a clean house in a clean environment, medical care, recreational facility, education, transport and communication

2.3 ANCIENT VILLAGES / DIFFERENT DEFINITION OF: RURAL AREA/VILLAGES

Rural areas are also known as the 'Countryside' or a 'village' in India. It has a very low population density. In rural areas, agriculture is the chief source of livelihood along with fishing cottage in- dustries, pottery etc., as opposed to urban areas which have larger populations. The rural area means any places as per the latest census which fulfills the following criteria. A population of less than 5,000 with 400 persons per sq. km. density require75 People work is nonagricultural.

2.4 SCENARIO: RURAL / URBAN VILLAGE OF INDIA POPULATIONGROWTH

POPULATION GROWTH OF INDIA as per Census 2011:

- For the first time since Independence, the absolute increase in population is more in urban area that
- Rural – Urban distribution: 68.84% &31.16%
- Level of urbanization increased from 27.81% in 2001 Census to 31.16% in 2011Census.
- The proportion of rural population declined from 72.19% to 68.84% Table 3.1 Population of IndiaPopulation (in Crore) 2001 2011 Difference India 102.9 121.0 18.1 Rural 74.3 83.3 9.0 Urban28.6
- 37.7 9.1 Population Growth of Gujarat as Per Census 2011:
- The government has started many programs aimed at improving the standard of living in villages or ruralareas. To build rural infrastructure, the government launched a time-bound business plan for action Bharat Nirmanin2005. Under Bharat Nirman, action is proposed in the areas of Water Supply, Housing, Telecommunication and Information Technology, Reads, Electrification and Irrigation.

	1991-2001	2001-2011	Difference
India	21.5	17.6	-3.9
Rural	18.1	12.2	-5.9
Urban	31.5	31.8	+0.3

2.5 SCENARIO: RURAL / URBAN VILLAGE OF GUJARAT AS PER CENSUS 2011 ANDLATEST

- The total population growth in this decade was 19.28 percent while in previous decade it was 22.48 percent.ThepopulationofGujaratforms4.99percentofIndiain2011.In2001,thefigurewas4.93

.		Total	Rural	Urban
Population	Persons	1210193422	833087662	377105760
	Males	623724248	427917052	195807196
	Females	586469174	405170610	181298564

2.6 RURAL DEVELOPMENT ISSUES &CONCERNS

As we know the 60 to 70 percent of rural population in India lives in primitive conditions. This statement exists even after 70 years of independence of India. So that Rural Development programs have urgency in the present condition also. There are many obstacles in the development programs of rural which are given below:

- People have to migrate to the urban areas due to unavailability of education
- Economy of the people living in rural areas is low
- Very less people are employed in the rural areas
- There is no electricity supply in many villages
- No transportation facility
- Less income opportunity
- Lack of sanitation
- They have not any kind of new technology for the cooking and living etc.
  Now also many rural peoples using primitive methods of cooking, living and farming and they have truston these methods.

Various Measures for Rural Development

- Poverty can be removed and different in gap is minimized in the village is the main objective of any village to developed successfully. To develop rural area as whole in terms of culture, society, economy, technology and health
- The village should be proper developed to get basic facilities is and proper plan required getting benefit and also understanding required getting benefit. The cost of infrastructure should be less for the proper development of the village and get maximum benefit. So quality of life may increase of the villagers and get pure environment feeling Empower women and small-scale farmers, and indigenous peoples, including through securing equitable land tenure supported by appropriate legal frameworks.

- Support of the villagers is requiring developing the infrastructure in the village and accordingly also proper use of it require.
- Due to development of infrastructure the people may include in work and it get income from that work

2.7 VARIOUS GUIDELINES/NORMS FOR VILLAGES FOR THE PROVISIONS OF DIFFERENT INFRASTRUCTUREFACILITIES

Table 1: URDPFI Guidelines

Facilities	Planning commission norms	Required as per norms
Education		
Anganwadi	Each village	1
Primary School	Each Village	1
Secondary School	Per 7,500 Population	2
Higher Secondary school	Per 15,000 Population	0
College	Per 125,000 Population	0
Tech. Training institute	Per 100,000 Population	0
Agriculture Research centre	Per 100,000 Population	0
Medical Facility		
Gov./Panchayat Dispensary or Sub PHC or Health Centre	Each village	1
PHC & CHC	Per 20,000 Population	0
Child Welfare and Maternity Home	Per 10,000 Population	1
Hospital	Per 100,000 Population	0
Transportation		
Pucca Village Approach road	Each village	
Bus/auto stand	All Villages connected by	1
Drinking Water		
Water Facilities	-	-
Over Head Tank	1/3 of Total Demand	1.6 lac cap
U/G Sump	2/3 of Total Demand	3.2 lac cap
Public Latrines	Each Village	60
Cremation Ground	Per 20,000 Population	1
Post Office	Per 10,000 Population	1
Gram Panchayat Building	Each individual/group	1
APMC	Per 100,000 Population	0
Fire Station	Per 100,000 Population	0
Police Station	Per 15,000 Population	0
Community Hall	Per 10,000 Population	1

To ensure coverage of all rural habitations with access to safe drinking water:

- Increase productivity of water and supply of water.
- Availability of pure drinking water to each household.
- Conservation of water through rain water harvesting and ground water recharge structure.
- To essential transportation facilities.
- Village approach road and internal road are in proper maintenance.
- Improve the quality of clinic/hospital to access the health service.
- Door-to-door waste collection system.
- Celebration of national festival like Independence day/Republic day.
- Celebration of Environment day and also plantation of trees.

Importance in Rural Context

- For the agricultural production water, land and forests are the primary resources and resources essentiallymaintain human life and wellbeing.
- Rural households are the nearest to the environment or environment sources and they have capacity toprotect land, water, and forest.
- Rural households are live in community.
- The villagers not get benefit from the environment so they don‘t get benefit from the environment soeconomic should not be possible for the villagers.

Sustainable Village Development Concept

Sustainable Development is the development with consumption of resources in such a way that may not cause the unavailability of resources for the future generation. In which sustainable agriculture techniques play an important role. It includes use of animal waste and farm waste as manures for the fields, use of biogas for domestic use, by using waste crops lands nutrients can be retained. A small-farm management to improve productivity, profitability and sustainability of the farming system will go a long way to ensure all round sustainability and rural development

2.8 PROJECT/SCHEME

Following are the schemes that are running or on board for the rural development by Indian Government:

1. Pradhan Mantri Gram Sadak Yojana(PMGSY)
2. Indira Awas Yojana
3. Pradhan Mantri Adarsh Gram Yojana
4. Mahatma Gandhi National Rural Employment Guarantee Act.(MGNREGA).
5. Swachh Bharat Mission (Garmin) (SBM)

Chapter 3: Smart village (Punsari)

3.1 UNDERSTANDING SMART VILLAGE (CONCEPT, DEFINITIONS ANDPRACTICES)

- **Concept**

As per above diagram shows proper meaning of the smart village, Self-sufficient and self-Reliant village with empowerment of Manpower through available natural sources and Appropriate Rural Technologies.

"A city can be defined as 'smart' when investments in human and social capital, transport and modern (ICT) communication infrastructure fuel SUSTAINABLE ECONOMIC DEVELOPMENT and a high quality of life, with a wise management of natural resources, through participatory action and engagement"".

- **Definition**

A city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, in- dependent and aware citizens.

- **Practices**

1. Strategic system planning
2. Demonstration of low energy building
3. Demonstration of nearly zero-energy building renovation for cities and districts
4. Sustainable energy solutions
5. energy systems for urban heating and cooling

3.2 BENCH MARKS-VISION-GOALS, STANDARDS AND PERFOMANCE MEASUREMENTINDICATORS

Table (2)

Sr.No.	Parameter	Benchmark
A	**Transport**	• Maximum travel time of 30 minutes in small & medium size cities and 45 minutes in metropolitan areas. • Continuous unobstructed footpath for 2 m wide on either side of all streets. • Dedicated and physically segregated bicycle tracks with width of 2 m or more, one in each direction, should be provided on all streets with carriage way larger than 10m. • High quality and high frequency mass transport within 800m & 5-minute walking distance) of all residences in areas over175persons / ha of built area

B	**Spatial Planning**	• 175 persons per Ha along transit corridors. • 95% of residences should have daily needs retail, parks, primary schools and recreational areas accessible within 400m walking distance. • 95% residences should have access to employment and public and institutional transport or bicycle or walk. • At least 20% of all residential units to be occupied by economically weaker sections in each Transit Oriented
C	**Water Supply**	• 24 x 7 supply of water • Every household with direct water supply connections • 135 LPCD of supply of water • Every house should have metered of water connections • Max efficiency in collection of water related charges
D	**Sewerage& Sanitation**	• Every households should have access to toilets • Every schools should have separate toilets for girls • Every households should be connected to the wasteter network • Every efficiency in the collection and treatment of wastewater • Max efficiency in the collection of sewerage network
E	**Solid management**	• Every household should be covered by daily door-step Collection system. • Max collection of municipal solid waste • 100% segregation of waste at source, i.e. Bio-degradable and non- degradable waste • Max Efficiency in recycling of solid waste
F	**Storm storage**	• Max coverage of road network with storm water drain- age network. • Aggregate number of incidents of water logging reported in a Year=0. • 100% rainwater harvesting
G	**Electricity**	• Every households having 24 x 7 supply of electricity. • Every house with metered electricity supply.
H	**Healthcare facilities**	• Availability of telemedicine facilitiesto100%residents • 30 minutes of emergency response time • 1 dispensary for every15,000resident • Nursing home, child, welfare and maternity center - 25 to 30 beds per lakh population • Intermediate Hospital (Category B) - 80 beds per lakh population • Intermediate Hospital (Category A) - 200 beds per lakh population • Multi-Specialty Hospital - 200 beds per lakh population

3.3 TECHNOLOGICALOPTIONS

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

India has become the second biggest Smartphone market in terms of unique Smartphone users, crossing 220 million users, surpassing the US market, as per the report by Counterpoint research. Over 20 mobile phone brands are now assembling their parts in India. With over 460 million internet users, India is the second largest online market, ranked only behind China. By 2021, there will be about635.8 million

Internet users in India. Urban population is adopting latest technology so fast that within a short span of three months, there are more than 10 crore JIO users. Indians often turn to mobile internet, as the large majority of the digital population in India was mobile internet users in 2016.India had an estimate of 262 million mobile internet users living in urban communities and 109 million living in rural areas which is close to one third of urban users. Alongside smart phone, there are alternative mediums for accessing fast internet in villages like optical fiber technology. This is one of the advanced technologies nowadays and is replacing cable network rigorously. Optical fiber communication is more advantageous than cable network due to its comparatively low cost, easy to install, high data transfer speed and abundantly available raw material.

Online Library and E- Education

After provision of internet facility at villages using various advanced technology, our next responsibility towards making villages smarter is to provide a quality education to the villagers. Internet is one of the easy ways of accessing the data and information. This technology can now be explored to more extent by providing online education in schools and colleges. Worldwide digital contents are available on internet which can be accessed by children in villages to make them compatible with rest of the world. All Schools shall be connected with broadband. Free Wi-Fi shall be provided in all secondary and higher secondary schools (coverage would be around 250,000 schools). Fig: - 3.3 Online Education to Children. A program on digital literacy would be taken up at the national level. MOOCs–Massive Online Open Courses shall be developed and leveraged for e-Education.

Smart Agriculture

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

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

.

a. Smart apps for smart agriculture like IFFCO KISAN, Agri App can be introduced in villages for providing timely updates regarding availability and cost of seeds, fertilizers, pesticides and other agricultural commodities. Present stock and shortage of seeds, fertilizers and pesticides can be communicated with farmers in an advance by using these apps. Government initiatives like water harvesting, subsidies on products, crop insurances, agricultural product exhibition, etc. can directly be communicated with the farmers using this smart app. Live streaming of agricultural commodities rates, market network can be done on these smart apps which will help farmers to sell their products with better prizes‘. A. training can be provided to farmers through which organic fertilizers and pesticides can be manufactured at community level to boost its better use than chemical fertilizers and fertilizers. This will help in maintaining soil quality and increasing productivity. Such types of Training work- shops can be arranged at Tehsil level for nearby farmers and they should be promoted participate in it‘d.Waterharvestingisthetoday‘smostessentialneedandisapartofsmartagriculture.Government is running various schemes for rain water harvesting and providing financial support for the same. Recently Maharashtra Government have run Mageltyala Sheet tale‖ scheme and thousands of

farmers have benefited through this scheme. Such types of projects can be explored at other ground like roof top rain water harvesting, industrial water recycling and etc. at large scales and should be financially supported by the state and central governments. The proper awareness can be created among villagers for water conservation, monitoring and harvesting.

b. Solar powered bore wells can be installed directly in fields to avoid both the water and electricity crisis. Due to lack of 24 x 7 electricity farmers are unable to install irrigation in

c. Their fields and remain dependent on natural sources. Solar powered bore wells can help them in increasing agricultural productivity through timely water supply along with overcoming power crisis.

Smart and Efficient Public Transport System

Lack of transportation facility is the major reason behind isolating villages from rest of the world. Since last 70 years of freedom, roads and train network in rural part of India could not be spread to our expectations. There are thousands of villages in our country to which as such no trans- potation is available. The direct impact of this is on accessibility of villagers to urban areas, market and lack of any other facilities which is only available in big cities. To overcome this problem, smart transportation can be main melody for development of smart villages. Our government is playing vital role in improving the situation and has already taken steps in right directions. A total of 599 highway projects covering around 12,903 km of national highways have been sanctioned till date incurring an expenditure of INR 108,000 crore over the next 5 years. Under the Smart Cities Scheme, Government of India has already earmarked INR 50,802 crore for the project with a proposed budget of INR 48,000 crore to be utilized for developing first 20 Smart cities [7]. Similar type of bold initiative from government is expected for actual development of smart transportation in rural India too. While supporting to the scheme of Clean and Smart cities & villages, we must promote use of clean fuels like Bio-fuels, ethanol, and compressed natural gas (CNG) for our vehicles. Besides these, electric and solar powered vehicles can also be promoted equally. Vehicles running on hydrogen as fuel and using fuel cell technology are also a clean option available with us. CNG has already become a popular fuel in India due to its low cost. However, it needs infrastructure support in terms of a greaternumberoffuelingstationsandaccessibility.Thiswilldefinitelyhelpusinfulfillingourdreamofestablishingcleanandsmart Cities, smartvillages along with saving our environment from pollution by lowering the use of carbon burning fuels like petrol, diesel, and coal.

Smart Sewage Management System and Sanitation

No village or group of villages can be termed truly „smart" without an effective sewage management system and there is a need for framing a proper sanitation plan for towns intended to become smart. Management of large quantity of household waste and garbage had become major headache for local managing bodies. Also dumping such garbage in locality is affecting common people's health.

To solve the problem related with sewage management, an urgent and effective action plan is required. The knowledge enhancement and capacity building on sanitation diagnostics, town sanitation planning and decision making and analysis of cost effective and sustainable waste water treatment Technologies for mainstreaming fecal sludge should be main focus for developing smart villages. Pre-paring our mind set for sewage management at personal level will be more fruitful.

Every individual can have dust bin fixed outside their home where they can put their household garbage instead of throwing in open space. Different colored dust bins can be chosen for different categories of wastes like dry and wet, decomposable and non-decomposable waste, etc. Ample number of wastes collecting vehicles so called „Ghantagadi" can be availed for each village to collect it. Waste material dumping yards shall be far away from civilization and shall have provision for categorizing and recycling of collected waste. Also, similar types of actions are required to manage bio waste generated in hospitals as well as e waste generated.

Renewable Energy Sources and Solar Energy

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

Latest and Affordable Medical Facilities

After fulfilling basic needs like food and drinking water, affordable medical facilities are equally important for common man. Many rural residents are not able to take treatment for basic ailments either due to the non-presence of health care services in the vicinity or due to lack of funds to access the same. Lack of public sector infrastructure and latest technology is one major obstacle in providing good healthcare to villagers. There is no sufficient number of primary health centers available for rural parts of India. Even though a well-structured public health care system exists, the infrastructure as well as the staff that are required to provide the health care services is inadequate in many different perspectives. Generally rural public health facilities across the country are having a difficult time attracting, retainingandensuringregularpresenceofhighlytrainedmedicalprofessionals.ManydoctorsarenotWilling to serve in the rural areas due to lack of facilities even if they are paid high salaries. Evaluation reports have also shown that there is lack of equipment‘s, poor or absence of repairs, improper functioning or lack of complementary facilities in hospitals like 24 hour running water, electricity back- ups, transportation, etc. To overcome these issues related with the systematic problems a phase wise systematic solution is required. One such step towards ensuring rural public health is introducing an ample number of mobile medical vans in the rural areas can solve the problem of accessibility. Mobile vans equipped with basic medical facilities could supplement a primary health centers and travel to those areas where the primary health centers do not exist or have failed to meet the requirements of common people. These vans can have schedule of visits in particular areas and can be called in times of emergencies. The quality of service can be improved by increasing the awareness level of the users. Awareness is required for many of Government schemes available for economically poor and rural people.

3.4 ROAD MAP AND SAFEGUARDS FOR SMART VILLAGES

- A smart city road map consists of four/three (the first is a preliminary check) major components:
- First, we have to check why we necessary smart village initiative, why we need.
- To describe exactly what is the community: maybe that definition can condition what you are doing in the subsequent steps; it relates to geography, links between cities and flows of people between them;
- Study Community: Before deciding to build a smart city, first we need to know that. This can be done by determining the benefits of such an initiative. Study the community to know the citizens, the business's needs – know the citizens and the community's unique at- tributes, such as the age of the citizens, their education, hobbies, and attractions of the city
- Develop a Smart City Policy: Develop a policy to drive the initiatives, where roles, responsibilities, objective, and goals, can be de- fined. Create plans and strategies on how the goals will be achieved.
- Engage The Citizens: This can be done by engaging the citizens through the use of government initiatives, open data, sport events, etc.
- People, Processes, and Technology (PPT) are the three principles of the success of a smart city initiative. Cities must study their citizens; know the processes, business drivers, create policies, and objectives to

meet the citizens' needs. Then, technology can be implemented to meet the citizens' need, in order to improve the quality of life and create real economic opportunities.

Fig (04):- Road map & safe guard

3.5 ISSUES &CHALLENGES

Followings are some issues in village:

Funding:-

One of the biggest challenges is having a streamlined funding for the development of Smart cities. It was decided that each Smart City will receive 500 Crore over the period of 5Years by Central Government. But this amount won‘t be sufficient. To match the contribution of Central government there should be some contribution from the state government too in order to create sustainable funding to take the smart cities from pilot phase to execution and then completion. There are many private firms that are providing funding but it requires being in proper process**.**

Technology:-

There are certain technologies that are a part of the project and it is expensive to use them. Be- cause of the advancement, some technologies are borrowed from other countries which makes it more expensive. This hinders the success of smart city project. Another challenge is in the discovery of technology and the need for a medium that can bring technology users and creators together to adopt faster platforms Maintenance, management, recovery of this instrument should be done carefully.

Availability of Master Plan:-

Most of our cities don‘t have master plan so rarity development plan, which is the key to smart city planning and implementation and encapsulates all a city needs to improve and provide better opportunitiestoitscitizens.Unfortunately,70-80percentofIndiancitiesdon‘thaveone.

Urban Water and Sanitation Challenges

Swatch Bharat Abhiyaan was launched by Hon‘ble Prime Minister of India on 2nd October 2015, which caught attention of everybody not only in India, but also in the world. The government has taken various steps to create awareness among the masses for keeping the area surrounding them neat and clean. Government is also paying special attention for cleaning of rivers, railway stations, tourist destinations and other public places.

Education / Job Opportunity

- Smart learning is an important support to bridge educational systems and citizen living experience. The

building of smart learning environments for citizen will provide individuals more opportunities to learning easy, engaged and effective, and therefore provide wisdom into the creativity of the whole city.

- The future of a smart city is reliant on human talent and skills, making job creation one of the big- gest benefits. These jobs will obviously be smart and focus on skills including data analytics, programming, high-end consulting, and system and network integration. With IT infrastructure being the backbone of any smart city, IT professionals will certainly be in greater demand
- We are already seeing a shift towards the creation of technologically strong business sectors with more and more mid-sized technology teams (10+ people) being established. This shift creates new employment opportunities and a more competitive market for the top techtalent. But to play a significant role and carve a space for yourself within a smart city, you need to be willing to develop and maintain smart skills, engage in learning and be ready to adapt.

Governmental Issues:

Three-tier governance: Successful implementation of smart city solutions needs effective horizontal and vertical coordination between various institutions providing various municipal amenities as

3.6 SMARTINFRASTRUCTURE

Smart infrastructure provides the foundation for all the key themes related to a smart city, including smart people, smart mobility, smart economy, smart living, smart governance and smart environment.

- Smart infrastructure has many components like Digital management of infrastructure, sensor net- works, digital water and waste management, institutional, physical, social, economic infrastructure
- Physical Infrastructure refers to its stock of cost efficient and intelligent physical infrastructure such as the rural mobility system, high speed broadband infrastructure, the housing stock, the energy system, the water supply system, sewerage system, sanitation facilities, solid waste management system, drainage system, etc. which are integrated through use of technology
- Social Infrastructure relates to components that enable development of human and social capital, such as the education, healthcare, entertainment, etc. It also includes performance and creative arts, sports, the open spaces, children‘s parks and gardens
- Economic Infrastructure includes developing proper infrastructure that generates employment opportunities and attract investments.

3.7 CYBERSECURITY

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

- Municipalities should support the development of a harmonized cyber security framework
- The European Commission and Member States should foster knowledge exchange and collaboration in cyber security among industry, Member States and municipalities
- IPT Operators should develop a clear definition of their security requirements.
- IPT Operators and Municipalities should allocate higher spending on cyber security
- Manufacturers and solution vendors should integrate security in their products.

3.8 DISTRICT COOLING ANDHEATING

- In the Southeast, air conditioners are almost crucial pieces of equipment for home comfort. How- ever, it can be difficult to find the right air conditioner for your home, one that will provide enough cool air in

the summer to cool your home without driving your energy costs through the roof

- District cooling is the cooling equivalent of district heating. Working on broadly similar principles to district heating, district cooling delivers chilled water to buildings like offices and factories needing cooling
- In winter, the source for the cooling can often be sea water, so it is a cheaper resource than using electricity to run compressors for cooling.
- Alternatively, District Cooling can be provided by a Heat Sharing Network which enables each building on the circuit to use a heat pump to reject heat to an ambient ground temperature circuit.
- District heating is a system for distributing heat generated in a centralized location for residential and commercial heating requirements such as space heating and water heating.

3.9 STRATEGIC OPTIONS FOR FAST SMART VILLAGES DEVELOPMENT

The strategic components of area-based development in the Smart Cities Mission are

- City Improvement(retrofitting),
- city renewal (redevelopment) and city extension (Greenfield Development)
- Pan-city initiative in which Smart Solutions are applied covering larger parts of the city.
- BelowaregiventheDeion‘softhethreemodelsofArea-basedsmartcitydevelopment.
- Retrofitting will introduce planning in an existing built-up area to achieve smart city objectives, along with other objectives, to make the existing area more efficient and livable.
- Redevelopment will effect a replacement of the existing built-up environment and enable eco- creation of a new layout with enhanced infrastructure using mixed land use and increased density.
- Green field development will introduce most of the smart solution in a previously vacant area using innovative planning, plan financing and plan implementation tools with provision for affordable housing, especially for the poor
- Pan-city development envisages application of selected smart solution to the exist in city wide Infrastructure. Application of smart solution will involve the use of technology, information and data tomake infrastructure and service better.

3.10 INDIA’S URBAN WATER AND SANITATION CHALLENGES AND ROLEOFINDIGENEOUS TECHNOLOGIES

Swachh Bharat Abhiyaan was launched by Hon „blue Prime Minister of India on 2nd October 2015, which caught attention of everybody not only in India, but also in the world. The government has taken various steps to create awareness among the masses for keeping the area surrounding them neat and clean. Government is also paying special attention for cleaning of rivers, railway stations, tourist destinations and other public places. To achieve the target of cleanliness, the technologies to treat the waste material should also be developed along with creating awareness. There are many technologies that are used to treat waste material. They are usually very costly, very complex to be under- stood and viable only for large size units. At the same time, indigenous technologies are low cost capital and easy to use and they can also be used by different size units. In India, they are particularly suit- able for the small and medium units.

The objective of the workshop was to disseminate indigenous technologies of water, wastewater and solid waste treatment developed by the Bhabha Atomic Research Centre (BARC) under ―Swachh Bharat Abhiyaan‖ and to bridge gap between the research at the Vishwakarma Yojana: Maktupur, Mehsana Gujarat Technological University 27 | Page research centers and the practical application of the technologies. The BARC is playing a pivotal role in the development of these technologies.
Some of these technologies are as follows:

Indigenous water purification technologies:

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

Environment friendly Plasma technologies:

Solid waste dumping sites or landfill sites need more amount of land which is not available in urban areas. Incineration of solid waste pollutes the environment if the incinerators are not designed or operated properly. Thermal Plasma Technology is ideally suited for waste treatment. By plasma technology Hazardous & toxic compounds are broken down to elemental constituents at high temperatures; Inorganic materials are converted to Vitrified Mass; and Organic materials are Paralyzed or Gasified, converted to flue gases (H2 & CO) & Lower hydrocarbon gases when operated at low temperature (500 – 600^{o}C). Disposal of carcass is also being thought of using plasma pyrolysis.

Role of environmental isotope techniques in the water resources development and management:

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

The BARC UF Membrane Technology for Domestic Water Purifiers:

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

Radiation Hygienization of Municipal Sewage Sludge:

The Sewage is the waste water generated from domestic premises and consists mainly of human waste. It typically contains 99.9% water and about 0.1% solid. The solid waste in sewage is typically organic in nature and is broken down in the sewage treatment plants resulting in sewage sludge as a byproduct. In Radiation Hygienization process dry sludge generated at STP „s is 52hygienized using radiation technology using standard Gamma facility at a Dose of 10 kgs. Such radiation plants are operating in India for sterilizing medical products.

3.11 INITIATIVES IN VILLAGE DEVELOPMENT BY LOCAL SELF-GOVERNMENT

In the past "government as provider" approach, the priorities were to secure budget allocations and develop projects. The Housing Policy and the NCU statement implicitly give higher priority to two other requirements: first, the reform of policies and regulations that now inhibit development initiatives by the people; and second, more efficient resource management and the building of institutional capacity.

Resource Management and Institutional Development, India's urban institutions do not have the capacity to provide adequate services at present, let alone address the requirements of accelerated urban growth in the future. Proposals relate to three types of institutions.

He primes public sector actors in the urban development process; call for clearer allocations of responsibility and authority to them; and recognize the need for new organizational relationships be- tween local governments and development authorities and State governments that would avoid over- laps and

facilitate coordinated programming. Improved personnel incentives will be needed to permit the recruitment and retention of qualified staff as will skills training programs. Resource constraints, however, preclude simply expanding local government under current practices in proportion to urban growth. In many areas, the very nature of the way work is conducted will have to be redesigned to permit much higher levels of productivity.

The NCU recognizes reforms of internal management as vital. This is likely to entail implementing more systematic and efficient approaches in many areas: for example, budgeting and financial management; project management and control; billing and collections; infrastructure systems maintenance; and personnel management. A. Financial Systems constraints on government budgets and the rigidities of the present system of intergovernmental transfers prevent an adequate response of traditional arrangements to the challenge of urbanization. A new and more decentralized system of public and private financial intermediaries will be required. The establishment of the NHB represents an important step: an apex institution that will stimulate the creation of a network of mortgage financing. The NCU also calls for the creation of Urban Infrastructure Development banks to permit local governments to borrow for infrastructure. B. Non-Governmental Organizations given the size of the job and the difficulty governmental agencies have in dealing directly in some aspects of the development of urban areas (e.g. stimulating informal sector enterprise and provision of shelter) there is a recognition of the need for new and expanded NGOs to assist in facilitating the urbanization process

3.12 SMART INITIATIVES BY DISTRICT MUNICIPAL CORPORATION

- Segregation of types of waste while collection
- Maintenance of roads
- Publicize and propagate the scheme in the district
- Encourage Gram Panchayat for taking part in the competition
- Give in principle/administrative approval to works under Smart Village
- Guide the Gram Panchayat and help it achieve the goals of Smart Village
- Submit progress report periodically to state level
- Mosquito repellent smokes spread out in the city for prevention of malaria and dengue.

3.13 ANY PROJECTS CONTRIBUTED WORKING BY GOVERNMENT / NGO / OTHER DIGITALCONCEPT

The Government of India launched the *Shyama Prasad Mukherji Rurban Mission* (SPMRM) in 2016, with the objective to spur social, economic and infrastructural development in rural areas. The mission aims at making villages smart and growth centers of the nation. In its first phase, it targeted to develop a cluster of 300 Smart Villages over the next three years across the country. *Sansad Adarsh Gram Yojana*, which envisages integrated development of selected villages was another step taken by government in this direction.

Pradhan Mantri Awas Yojana (**PMAY**) is an initiative by Government of India in which affordable housing will be provided to the urban poor with a target of building 20 million affordable houses by 31 March 2022. It has two components:

Pradhan Mantri Awas Yojana (Urban) (**PMAY-U**) for the urban poor and Mantri Awas (Garmin)(**PMAY-G** and also **PMAY-R**) for the rural poor. This scheme is converged with other schemes to ensure houses have a toilet, SaubhagyaYojana electricity connection, Ujjwal Yojana LPG gas connection, access to drinking water and Jan Dhan banking facilities, etc. Total 88 lakhs houses are approved against

total demand of 1.12Cr as of 29 Aug 2019.
Ayushman Bharat is National Health Protection Scheme, which will cover over 10 crore poor and vulnerable families (approximately 50 crore beneficiaries) providing coverage up to 5 lakh rupees per family per year for secondary and tertiary care hospitalization

While the government-led initiatives rely on integration and convergence of the existing central and state government schemes to develop these Smart Villages or clusters, the CSR initiatives are generally more innovative in terms of implementation and use of technologies. For example, smartphone- maker Nokia has launched a Smartpur project which aims to create a sustainable ecosystem where community members can leverage digital tools to bring efficiency in daily lives. It aims to bring transparency in governance, economic prosperity for households and ease of access to various government services and information. Tata Trusts supports agriculture intervention for tribal communities under its *LakhpatiKisan*Smart Villages program. While these CSR or philanthropic institutions do work closely with government institutions, their model of engagement and the partnership with the government vary significantly

Chapter 4: Allocated Village

4.1: Introduction

4.1.1 Introduction about village

According to Census 2011 information the location code or village code of Davada village is 509448. Davada village is located in Mehsana Tehsil of Mehsana district in Gujarat, India. It is situated 20km away from Mehsana, which is both district & sub-district headquarter of Davada village. As per 2009 stats, Davada village is also a gram panchayat. The total geographical area of village is431.17 hectares. Davada has a total population of 2,431 peoples. There are about 476 houses in Davada village. As per 2019 stats, Davada villages come under Becharaji assembly & Mehsana parliamentary constituency. Unjha is nearest town. Davada which is approximately 12km away.72km from Capitan of state Gandhinagar

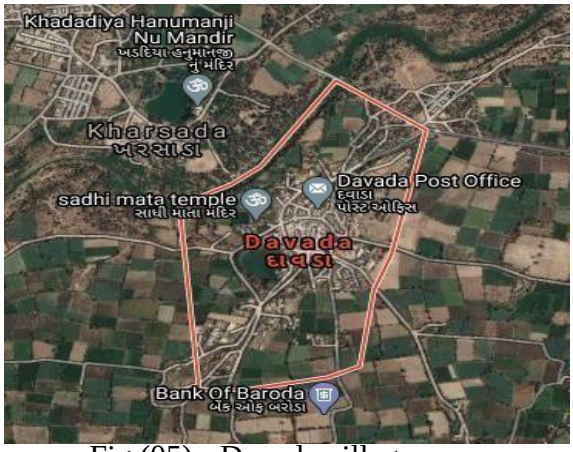


Fig (05):- Davada village

4.1.2 Need of study

Basic facilities, such as water supply network, drainage network, road network, etc. are not in proper condition in the village. In the village, the waste management system is not available, whether it may be solid waste management or it may be liquid waste management. Therefore, our study aims to provide all the necessary facilities among the villagers to meet the various requirements

4.1.3 Study area

Davada is a Village in Mehsana Taluka in Mehsana District of Gujarat State, India. It is located 15 KM towards North from District headquarters Mehsana. 21 KM from.72 KM from State capital Gandhinagar, Davada Pin code is 384120 and postal head office is Bhandu.Bokarvada (2 KM) , Navapura (2 KM) , Gorad (3 KM) , Virta (4 KM) , Bhandu (5 KM) are the nearby Villages to Davada. Davada is surrounded by Visnagar Taluka towards East. Mehsana Taluka towards South Chanasma Taluka towards west, Sidhpur Taluka towards North .Unjha, Mehsana, Visnagar, Sidhpur is the nearby Cities to Davada.Davada are a historic village. There dwell the families of Zala Darbar. In the past it is said about Sangramsinh Zala that he fought in the battle to save the cow, in which his head was cut down and fought alone and today he is worshipped as God and every fifth of the Navaratri is filled with a fair

4.1.4Objectives of study

The main objective of the study is to prepare the planning proposals for development of village Davada.

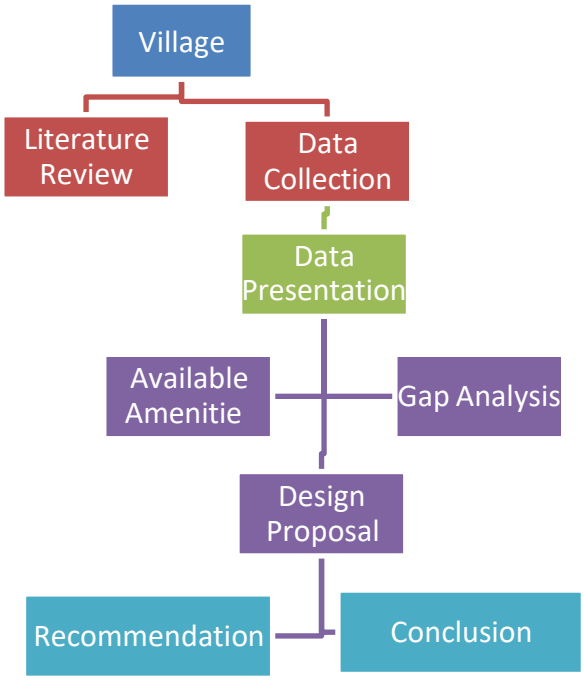
- To develop the Street road network.
- To provide a waste management system.
- To provide a water sanitation system and make sure to provide water as per requirements.
- To use the rainwater for farming.
- To develop the infrastructure according to Indian standard.
- To Increase productivity in rural areas and reduce poverty.
- To improve the living standards by providing food, shelter, clothing, employment and education.
- To decrees migration

4.1.5 Scope of study

- To conduct the data of existing condition of villages.
- The survey will be conducted for providing better infrastructure.
- The study will provide detailed master plan for the village.
- Conceptual and detailed planning proposals will be prepared for better development.
- To develop a good living standard for villagers

4.1.6 Methodology for development

To achieve the aim of development of village-Davada, following methodology is adopted. Work is divided in various stages and detailed flow chart for study methodology is shown below



4.2 Study area profile

4.2.1 Study area with brief

Davada is a Village in Mehsana Taluka in Mehsana District of Gujarat State, India. It is located 15 KM towards North from District headquarters Mehesana.21 KM from. 72 KM from State capital Gandhinagar, Davada Pin code is 384120 and postal head office is Bhandu

4.2.2 Map

Fig (06):- Base map

4.2.3 Physical &Demographical growth

Davada Local Language is Gujarati. Davada Village Total population is 2431 and number of houses are 476. Female Population is 47.9%. Village literacy rate is 68.7% and the Female Literacy rate is 28.5%

4.2.4 Economic profile

The majority of the population is dependent on the agricultural income. Rest of the population is dependent on the jobs in the industries on the outskirts of the village. Also there are people who run their own business and shops in the village and some people in government section

4.2.5 Problem faced by villagers

A many farmers is facing problem of water for farming, Poor condition of PHC (Public Health Center) Poor condition of internal street roads. Poor Drainage condition, Waste is not dumped properly Government transportation facilities is poor & also bus stand condition is poor

4.2.6 Social Scenario

The village lives under the influence of the Sarpanch Chenaji Thakor. The most of the people in the village are farmers. Other than farming, people of village works in the industries on wage. Some of have own shop the people of the village are very kind and helpful in the nature.

4.2.7 Migration Reason

Some people is working so far from home so they have to live in other area around working areas, Some people want good living standers like city or town so they leave the village and migrate in cities

4.3 Data collection

4.3.1 Data collection method

The data are collected from the Villagers, Sarpanch, Gram panchayat member, School Teachers, PHC staff Farmers.

The methods for data collection are:

1. Survey
2. Individuals observation
3. Interview

4.3.2 Primary details of survey

Introduction of village the village is situated in the Mehsana District, Mehesana Taluka. The co-ordinates of the village are latitude 23.7072° N and longitude, 72.3422° E. The village is located near Ahmedabad-Mehsana Highway (SH-41). The nearest town to the Davada village is Mehsana. It is 12 km from the village.

4.3.3 Average size of house

The average house size is 2 floor (1 Ground .2 first floor). Height 20 feet.

4.3.4 No of human being in-house

In a 1 house minimum 4 people lives, But somewhere big families in a 1 house like 5 to 7 people in a house.

4.3.5 Material availability

A Food Milk like all material available easily in village but some material like electronic item hardware items are not available easily

4.3.6 Geographical Details

There is a total quantity of land is a 431.17 hector and 60% of land is for agriculture purpose and another 40% is for a residential and other purpose

4.3.7 Demographical details

Total population in a village around 2500 most of them are farmer

4.3.8 Occupational details

People in the village are doing farming generally and some are connect with dairy production

4.3.9 Agriculture details

There is a 60% land of village is occupied for farming and most of people is farmer in the village they produce

4.3.10 Physical details

There is availability of water by pipeline with help of overhead tank (ESR) and poor condition of drainagepeople is use pond to dump drain water. Lake is in very bad condition. People use to throw waste near thelake

4.4 Infrastructure Details

4.4.1 Drinking water

Fig (07):- ESR (Overhead tank)

Drainage Facilities

There has a repairing Drainage Facilities, and there has not good underground facility.

4.4.2 Transportation & road network

Fig (08):- Village gate

The road network is good from main gate to the center of the village but other road to internal street is not in a good condition

Fig (09):- Road in Davada village Fig (10):- Pickup stand of Davada village

4.4.3 Housing condition

There has average condition of houses in Davada village.

Fig (11):- Housing condition

4.4.4 Social infrastructure facilities

Fig (12):- PHC (Public Health Center)

PHC center is not good in Davada village No facilities are there in PHC of Davada village

Primary school is very nice of Davada village there are good facilities in school. Staff of school is helpful for students and villagers.

Fig (13):- Primary school

Anganwadi is good condition of Davada village. There is some grass in Anganwadi need some cleaning.

Fig (14):- Anganwadi

4.4.5 Public building

Public building of Davada village is not good need improvement of public building.

Fig (15):- Public building

4.4.6 Socio-culture facilities

There is park in Davada village but it‘s not in working condition need some cleaning and improvement.

Fig (16):- Park

4.5 Concept

4.5.1 Dudh mandali

There has a dudh mandali but not in working condition. All people collect milk from direct seller.

Fig (17):- Dudh mandali

Post office of Davada village is not good. There is in old house .no facilities in post office need new post office

Fig (18):- Post Office

There is public toilet in Davada village but it is not in working condition need improvement.

Fig (19):- Public Toilet

- **Community Hall**

In the Davada village there is no facility for the community hall.

- **Public library**

In the village there is no facility available for the public library.

- **Existing Condition of Public Buildings**

Major every public building in the village is in not good condition

- **Technology Mobile/ WIFI / Internet Usage Details**

Good Mobile network connectivity. No WIFI facility available

- **Sports Activity as Gram Panchayat**

In the village there is no sport activity done by the Gram Panchayat.

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

- **Public Garden/Park/Play ground**

In Davada village there is facility available like Public Garden/ Park.

- **Community hall**

In the village there is no community hall

- **Village Pond/Lake**

In the village, lake is situated at the center of village. Lake is in very bad condition. People use to throw waste near the lake.

Chapter 5: SUSTAINABLE TECHNICAL OPTIONWITH CASE STUDY

5.1 CIVILCONCEPT

5.1.1 Advanced Sustainable Construction Techniques (3-DPrinting)

Abstract: 3D printing concrete is an emerging technology in which structures are made only using concrete in layers with the help of Software. With this technology, even geometrically intricate structures, heavy load bearing structures and hydraulic structures can be made easily in no time with less wastage of materials and minimum costs. It does not require any additional form-work during construction and also the human resource required is comparatively less. It is a sustainable technology which can also be used for aesthetic purpose. This technology was invented by Charles Hull in 1984. This review paper is about the methods of using 3D printer in the construction field and its future trends.

Introduction: 3D printing is a technology for producing 3D models of an object of any shape or size in layers using computer software. This technology was first invented by Charles Hull in the year 1984, as he designed the first 3D printer. He was the pioneer of the solid imaging process called Stereo lithography and the stereo lithographic file format, which the widely used format for 3D is printing even today. The first solid object from a digital design was printed by Hideo Kodama of Nayoga Municipal Industrial Research Institute. Following this several advancements were made to make the printers more efficient, affordable and applicable for several fields like research, engineering, military, construction and architecture, fashion, medical industry, computer industry, etc. The production of metal parts like engine brackets and nuts began from 2010. 3D printing is mainly based on Additive Manufacturing (AM) process. AM is defined as the process of joining materials to make objects from 3D model data, usually layer upon layer. In this process the model is first created using CAD software and then transferred to the printer as a set of stereo lithography language, which is then converted to layers that can be laid directly. Each layer has an activating agent and a power material which helps in bonding of the layers. For large scale construction computer-controlled placement of extruded cement- based mortar to create objects in layers.

Surveying

For contractors, a strategy for saving time and materials can lead to higher profitability and the good feeling of not creating unnecessary waste. Here's a look at five techniques that are having the greatest impact on sustainable building construction.

1. Prefabricating Materials in Controlled Environments

Constructing as much of a structure in a controlled environment as possible has improved the quality of buildings and resulted in less trash, says Spencer Finseth, principal of Minneapolis- based Greiner Construction.

2. Construction Waste Management

Reducing waste is becoming more achievable for contractors as haulers have grown more sophisticated in recent years. Where jobsites once had trash bins for different types of waste, they now need just one, in many cases, because haulers use pickers to separate materials.

3. Managing the Site for Improved Environment

4. Lean Manufacturing to Reduce Energy

5. Material Selection

5.1.2 Soil liquefaction:

What is soil Liquefaction?

Soil Liquefaction occurs when a saturated or partially saturated soil substantially loses Strength and Stiffness in response to an applied stress such as shaking during an earthquake or other sudden change in stress condition, in which material that is ordinarily a solid behaves like aliquid. The phenomenon is most often observed in saturated, loose (low density or uncompact), sandy soils. This is because loose Sand has a tendency to compress when a load is applied. Dense sands, by contrast, tend to expand in volume or 'dilate'. If the soil is saturated by water, a condition that often exists when the soil is below the water table or sea level, then water fills the gaps between soil grains ('pore spaces'). In response to soil compressing, the Pore water pressure increases and the water at- tempts to flow out from the soil to zones of low pressure (usually upward towards the ground surface)

Liquefaction hazard is one of the major concerns for earthquake geotechnical engineering. In this paper an attempt has been made to assess liquefaction potential of Chennai city using SPT N values. Chennai is located between 12.75° to 13.25° N and 80.0° to 80.5° E on the southeast coast of India and in the northeast corner of Tamil Nadu. To understand the liquefaction possibility of Chennai city, about 650 Bore logs have been collected from different geotechnical agencies and used for the analysis. These boreholes were drilled for different projects in Chennai; most of them were drilled up tohardstratumandaminimumdepthof10m.SPTboreholedatacontainsinformationaboutdepthoverwater table, the classification of soil and the field observed „N" values, index properties, and rock depth. These borehole information are used to prepare N corrected table by applying the universally followed correction factors for liquefaction study. These corrected N values are further used to estimate the factor of safety against Liquefaction of soil layer. Based on the factor of safety, the regional liquefaction hazard maps have been developed for depths of 1.5m, 3.0m, 6.0m and 10.0m. To represent the worst scenario, least factor of safety has been identified for each borehole location and mapped. Further the estimated factor of safety against liquefaction is used to estimate liquefaction potential index by considering depth of layer. These results are analyzed and compared in this paper.

5.1.3 Sustainable Transportation System

Introduction: Transportation infrastructure, as a complex network, connects cities and accommodates human activities coupling the social, economic and environmental systems with the urbanization and population growth. Additionally, the transportation network contributes to the socioeconomic development and the increased quality of life through generating inter- or intra-city connections during urbanization in addition, goals such as low-carbon, resilient and sustainable development should not be ignored. When the transportation network is expanded. In detail, transportation infrastructure among cities leads to urban aggregation and diffusion, greatly boosting the regional and national economic development. However, the irrational planning of transportation infrastructure also generates negative effects, such as the ecological destruction, increased traffic accidents, climate change, CO_2 emissions and lower transport efficiency. Therefore, it is necessary to identify multiple impacts of transportation infrastructure from existing studies.

Abstract: Transportation infrastructure has an enormous impact on sustainable development. To identify multiple impacts of transportation infrastructure and show emerging trends and challenges, this paper presents a scientometric review based on 2543 published articles from 2000 to 2017 through co- author, co-occurring and co-citation analysis. In addition, the hierarchy of key concepts was analyzed to show emerging research objects, methods and levels according to the clustering information, which includes title, keyword and abstract. The results expressed by visual graphs compared high-impact authors, collaborative relationships among institutions in developed and developing countries. In addition, representative research issues related to the economy, society and environment were identified such as cost overrun, spatial economy, prioritizing structure, local development and land value. Additionally, two future directions, integrated research of various effects and structure analysis of transportation network, are recommended. The findings of this study provide researchers and practitioners with an in-depth understanding of transportation infrastructure‘s impacts on sustainable development by visual expression.

5.1.4 Vertical Farming Introduction:

Vertical farming is the practice of growing crops in vertically stacked layers or integrated in other structures (such as in a skyscraper or old warehouse) with use of less water and no soil. The modern ideas of vertical farming use indoor farming techniques and controlled-environment agriculture (CEA) technology, where all environmental factors can be controlled such as artificial control of light, humidity, temperature also Bio fortification which is to breed crops to in- crease their nutritional value.

Abstract:

The vertical farm is a world-changing innovation whose time has come. Imagine a world where every town has their own local food source, grown in the safest way possible, where no drop of water or particle of light is wasted. Smart farming makes a tremendous contribution for food sustainability for 21stcentury. The reason is that the environmental and water management affects plant growth directly. Vertical farming is considered as a modern tool for feeding large world population by year of 2050.Erecting a farm that is in close proximity to the people which it serves by availability of cheaper, organic, disease free crops alongside sustaining the limited natural resources.

How dose Vertical farming work

There are four critical areas in understanding how vertical farming works:

1. Physical layout,
2. Lighting,
3. Growing medium, and
4. Sustainability features.

Firstly, the primary goal of vertical farming is producing more foods per square meter and so the crops are stacked vertically to grow. Secondly, a perfect combination of natural and artificial lights is used to maintain the perfect light level in the room. Technologies such as rotating beds are used to improve the lighting efficiency. Thirdly, instead of soil, we will employ hydroponics (bathing the plant roots in a nutrient bath) or geoponics (spray-misting the plant roots) Oraquaponic growing mediums are used. Peat moss or Coconut husks and similar non-soil mediums are very common in vertical farming. Finally, the vertical farming method uses various sustainability features to offset the energy cost of farming. In fact, vertical farming uses 95% less water than traditional farming.

HYDROPONICS

Hydroponics is a method of growing plants without soil. Instead of having their roots supported and nourished by soil, the plant are supported by an inert growing medium like cocopeat and are fed via nutrient-rich water solution and uses about 70% less water than traditional farm- ing. Hydroponic systems may be as simple as a glass of water filled with pebbles and water con- taining fertilizer or as complex as a large greenhouse structure containing beds of clay pellets/troughs filled with cocopeat that are periodically supplied with a nutrient solution. Nutrient Film technique (NFT) is also a kind of hydroponic farming that is adopted by many commercial farmers has days.

Hydroponics can be done in 3 ways:

1. Progressive farmers can adopt it in commercial farming,
2. People can adoptitas hobby, and
3. Can be most beneficial for urban farming in metros.

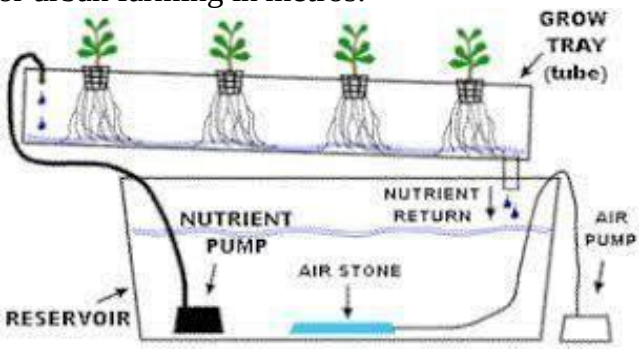


Fig (20):- Setup of Hydroponics (NFT method)

Design

Nutrient Film Technique (NFT), a method of hydroponics, was been observed in a household. This method was used to grow Tomato, Cucumber, Lettuce, and Fenugreek. **Approximate Price was Rs 8000.**

Fig (21) Setup for NFT method

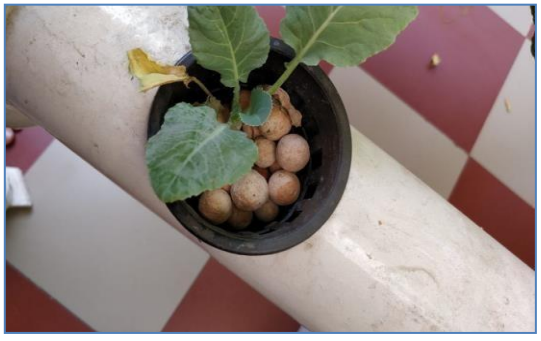


Fig (22) Plant bowl

Table 3 estimation of hydroponics

Sr. No.	Equipment	Features
1	Pipes	Length: 3ft Breath: 5ft 4 rows with 24 holes Pipes:8 Hole diameter– 3inches Distance b/w holes – 4 inches

		Diameter of pipe – 4 inches
2	Tank	Capacity-50 lit Price-Rs 600
3	Mixture	Price: Rs 800/Lit
4	Fountain Motor (1 No.)	Rs 250
5		Rs 100
6	Plant Bowls	Rs 200/pack
7	Clay Balls	Rs 150/kg

Need for Vertical Farming

Increasing food demand due to growing population along with ever decreasing arable lands poses as one of the greatest challenges. The high yield farming methods that support our immense population are characterized by their instable consumption of our limited reserves of fresh water, fossil fuel and soil.

Vertical farming is the urban farming of crops inside a building in a city or urban center, where in the floors is designed to accommodate certain crops. These heights will act as future farm lands and that they can built by nations with little or no arable land, transforming nations which are currently unable to farm into top food producers.

Vertical farming creates an alternate source of sustainable food production units for to- day's urban needs and future generation. The food production is just the start .These vertical farm swill recycle grey water and black water, generate power from the incineration of plant waste (think plasma arc gasification) which will reduce waste to its constituent molecules, and harvest water from dehumidification.

Scope and Potential

1. Less deforestation and land use. This means less erosion and less flooding.
2. Abandoned or unused properties will be used productively.
3. Crops will be protected from harsh weather conditions like floods, drought sand Snow.
4. Reduction in vehicular transport as the crops produced is easily consumed.
5. Less CO2 emission and pollution by decreasing reliance on coal burning product.
6. Overall wellness as city wastes will be channelized directly into farm buildings.
7. Water is used more effectively.

Conclusion:

Vertical farming technologies are still relatively new. Companies are yet to successfully produce crops at scale and make it economically feasible to meet the growing food demand. The visionaries behind this new farming technique are working toward a networked agricultural system that looks to the open-source software movement for inspiration. In future by in cooperating image processing and mobile applications we can control this module remotely by the using mobile application software.

We pose a question which is how much percentage of vertical farming can incorporated to create a balanced environment, although landscape agriculture has to be maintained as long as we get accommodated to this new technique. –Vertical farming needs to be heard, learnt and done‖

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

Introduction: Reinforced concrete (RC) has been developed and applied extensively in the twentieth century and it continues to be used in this century as well. It combines the good compressive strength of concrete with the tensile strength of steel and has proven to be successful in terms of both structural performance and durability. One major flaw, namely its susceptibility to environmental attack can severely reduce the strength and life of these structures. In humid conditions atmospheric pollutants percolate through

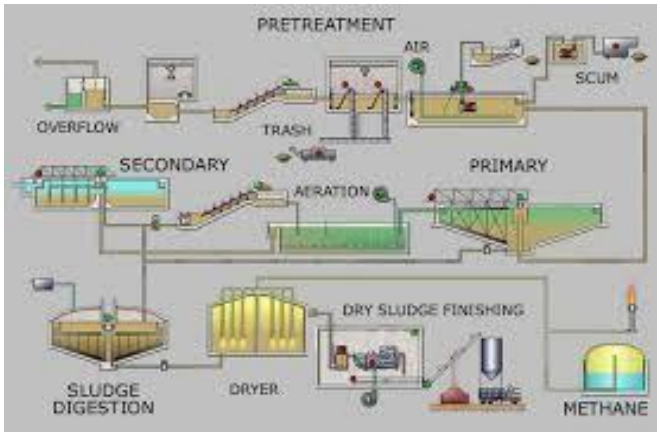
the concrete cover and cause corrosion of steel reinforcements. The resulting corrosion products occupy volumes several times that of the steel. The increased volume induces tensile stresses in the concrete that result in cracking, delamination and spelling. As a result, the reinforcements get exposed to direct environmental attack and the corrosion is accelerated. Along with unpleasant appearance it weakens the

Concrete structure to a high degree. Moreover, bond between the steel and the concrete is reduced. Pitting corrosion may also reduce the ductility of the steel bar by introducing notches on the surface of the steel bars that leads to a premature necking. A large proportion of damage is caused due to insufficient planning and incorrect assessment of the environmental attack such as carbonation and chloride exposure. Corrosion affected structures are highly susceptible to catastrophic collapse.Unlikeotherdevicesandfacilitiesthatarerenewedperiodicallywithnewerone‘shumanendeavor has been to maintain centuries old structures. As a result, structural engineers deal with RC structures of age varying more than hundred years. They are also subjected to a wide range of environmental load regimes. Typically, an RC structure that is subjected to heavy environmental loading requires major restoration work within fifteen years of its construction.

Abstract: The reduction in the useful service-life of reinforced concrete structures, mainly due to rein- for cement corrosion, is a cause of concern to the construction industry worldwide. It not only affects the physical appearance of the structure but it leads to notable effect on structural performance of the RC structures. The present research paper focus on mechanism of corrosion, types of corrosion, various parameters effecting corrosion and different strategies to monitor corrosion. It also discusses various effects of corrosion on reinforced concrete structures

5.1.6 Sewage Water Treatment

Introduction: Discharge of untreated sewage water in the water body is a common practice in many countries. This is the common cause for pollution of surface and groundwater because there is a large gap between generation and treatment of domestic wastewater in India. In general, the wastewater dis- charged from domestic premises like residences, institutions, and commercial establishments is termed as sewage or wastewater. Normally domestic and municipal wastewater are composed of 99.9 % water and remaining 0.1 % suspended, colloidal and dissolved solids, mainly organic in nature because it consists of maximum amount of carbon compounds, viz., human waste, paper, vegetable matter, etc.



Abstract: This is a conventional kind of monitoring study. The objective of the study was to assess and the physicochemical parameters in wastewater at inlet and outlet of sewage treatment plant (STP) and also to study the effectiveness of the STPs. The average concentration of parameters at inletsamplingsitepH,electricalconductivity,totaldissolvedsolids,are7.16,2,169µS/cm,766.06 mg/l, and major ions bicarbonate, nitrate, sulphate, phosphate, chloride, sodium, potassium, magnesium and calcium values 515.88, 4.28, 82.85, 15.17, 7.01, 23.08, 29.34, 4.14 and 84.31 mg/while the average concentration of these Parameters, after treatment shows following values 7.47, 2,161.43 (µS/cm), 695.81, 436.52, 1.25, 99.22, 12.69, 6.83, 23.18, 29.07, 4.40 and 82.65 mg/l, respectively. Further, to check the Na % and sodium absorption ratio at inlet and outlet which 27.89 %, 0.67 and 28.19 %, 0.68, respectively, for the suitability of the wastewater. Finally, the agglomerative hierarchical clustering techniques were used to study the similarity in the sewage treatment plants. The result suggests that there is considerable improvement in the wastewater quality after treatment except at the Pappankalan and Coronation Pillar, Timarpur. And it also contributes pathogens which consumes available oxygen from water bodies. Besides this, industrial wastewater gets mixed with municipal waste polluting the water bodies and land which is irrigated by the wastewater.

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

Chapter 6: Swachh Bharat Abhiyan

6.1 Swatchhta needed in village

Davada village is not good for waste management. There are many problems for waste management. All people dump waste near the road & in pond. In a monsoon there is so many problem of mud People use pond as a dumping ground & dump all type of waste in pond. Some people use it for washing clothe & animal use it for drinking water.

Fig (23):- Pond

- To provide sweepers for clean village.
- To provide different color garbage bins for collection waste
- Green: - biodegradable waste
- Blue: - plastic &metal waste
- Provision for Public Toilets is required, as they are lacking in village

6.2 Guidelines - Implementation in allocated village with Photograph

By inviting people to participate in the drive, the Swatchhta Abhiyan has turned into National movement. A sense of responsibility has been evoked among the people through the Clean India Movement. With citizens now becoming active participants in cleanliness Activities across the nation, the dream of a Clean India" once seen by Mahatma Gandhi has begun to get a shape.

Village has following thing implemented:-

- Use of toilets and Maintenance of it.
- Inclusion of water and sanitation issues in Gram Panchayat Development plan (GPDP).
- Hygiene education.
- Toilets for all households and institutions.

Village has Certain Draw Backs:

- Solid waste management.
- Public toilet.
- Surveillance of water bodies.
- Water supply scheme.
- Environment management framework.

Fig (24):- Dustbin

6.2.1 Activities Done by Students for allocated village with Photograph

To reach the village in COVID-19 pandemic is more difficult to us but we provide villagers well knowledge about Swatchhta

Table 4

ENSURE	• **Identification of households without toilets for corrective action** • **Toilet use and maintenance.** • **Facilities for solid and liquid waste management.** • **Water-use efficiency by rationalizing water use.** • **Inclusion of water and sanitation issues in Gram Panchayat Development Plan (GPDP).** • **Compliance with environmental safeguards for allGPDP activities.**
PROMOTE	• **Hygiene education.** • **Toilets for all households' and institutions.** • **Modern agriculture and water-use technologies to conserve water.** • **Use rationalization by selecting appropriate cropping patterns.**
ESTABLISH	• **Local environmental safeguard measures.** • **Surveillance of water bodies.** • **Safeguards for water bodies.**
PLAN AND IM-PLEMENT	• **Environmental management framework.** • **Water supply schemes.**
FACILITATE	• **Appropriate irrigation methods** • **Regulation of water extraction based on demand yield match.** • **Participation of local communities in improving water and sanitation management.**

Why Swatchhta Abhiyaan?

To accelerate the efforts to achieve universal sanitation coverage and to put focus on safe sanitation, the Prime Minister of India launched the Swachh Bharat Mission on 2nd October, 2014. The Mission Coordinator shall be Secretary, Ministry of Drinking Water and Sanitation (MDWS) with two Sub-Missions, the Swachh Bharat Mission (Garmin) and the Swachh Bharat Mission (Urban), which aims to achieve Swachh Bharat by 2019, as a fitting tribute to the 150th Birth Anniversary of Mahatma Gandhi, which in rural areas shall mean improving the levels of cleanliness in rural areas through Solid and Liquid Waste Management activities and making Gram Panchayat Open Defecation Free (ODF), clean and sanitized.

Guidelines:-

- Bring about an improvement in the general quality of life in the rural areas, by promoting cleanliness, hygiene and eliminating open defecation.
- Accelerate sanitation coverage in rural areas to achieve the vision of Swachh Bharat by 2nd October2019.
- Motivate communities and Panchayati Raj Institutions to adopt sustainable sanitation practices and facilities through awareness creation and health education
- Encourage cost effective and appropriate technologies for ecologically safe and sustainable sanitation

- Develop, wherever required, community managed sanitation systems focusing on scientific Solid &Liquid Waste Management systems for overall cleanliness in the rural areas.
- Create significant positive impact on gender and promote social inclusion by improving sanitation especially in marginalized communities

6.3 Steps of clean village:

- While traveling doesn't throw any wrapper, paper or any dry waste on road. Keep it in your bag or pocket (as it is a dry waste you can keep them in your bag/pocket).
- Keep paper bags with yourself to store wet waste and throw them in dustbin only.
- Spitting on roads (as it can be the reason of viral disease).
- Avoid chewing Pan-Masala, Gutka and Tobacco.
- Avoid use of plastic bag.
- Follow government's rules and regulations.
- If someone is breaking the rule then make them aware of it.
- Spread awareness to keep our village clean.

Education start-ups can also partner with other schools for spreading awareness among the adults in rural areas. If the elderly populace of villages does not comprehend the value of education, they won‘t allow their children to study

Chapter 7: VILLAGE CONDITION DUETO COVID-19

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

- Village locals were informed by the sarpanch and Talati about the pandemic situation and were also informed about the norms given by Government to fight this situation.
- They then sealed the village border to stop the movement of villagers and also to restrict entry of others.
- With help of Government officers, Sarpanch and other village people they sanitized the village streets and houses and other places.
- People also started using sanitizer and mask when they went out of home.
- All the villagers were following Government norms of how to be safe from this situation and were also regularly taking account of updates by Government for this situation.

Fig :-(25) Village condition due to COVID-19

7.2 Steps taken by students while visiting the village

- All the safety measures were taken by the students while visiting the allocated village.
- Mask was always on and we also washed our hands regularly.
- No litter was made while travelling.
- We kept social distance while interaction with everyone in the village be it the locals or the Sarpanch.
- Corona virus disease 2019 (COVID-19) is a contagious disease caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). The first case was identified in Wuhan, China in December 2019.

Common symptoms of COVID-19 include fever, cough, fatigue, breathing difficulties, and loss of smell and taste. Symptoms begin one to fourteen days after exposure to the virus.

While most people have mild symptoms, some people develop acute respiratory distress.

Syndrome (ARDS) ARDS can be precipitated by cytokine storms, multi-organ Failure, septic shock, and blood clots. Longer-term damage to organs (in particular, the lungs and heart) has been observed. There is concern about a significant number of patients who have recovered from the acute phase of the disease but continue to experience a range of effects known as long COVID for months afterwards. These effects include severe fatigue, memory loss and other cognitive issues, low-grade fever, muscle weakness, and breathlessness.

COVID-19 spreads via a number of means, primarily involving saliva and other bodily fluids and excretions. These fluids can form small droplets and aerosols, which can spread as an infected person breathes coughs, sneezes, sings, or speaks. The virus may also spread by direct contact and it is unknown how often it spreads via fomites (contaminated surfaces). The exact route of trans- mission is rarely proven conclusively, but infection mainly happens when people are near each other for long enough, which is known as "close contact". It can spread as early as two days before infected persons show symptoms (presymptomatic), and from asymptomatic individuals. People remain infectious for up to ten days in moderate cases, and two weeks in severe cases. The standard diagnosis method is by real-time reverse transcription polymerase chain reaction (rRT-PCR) from a nasopharyngeal swab.

Preventive measures include social distancing, quarantining, and ventilation of indoor spaces, covering coughs and sneezes, hand washing, and keeping unwashed hands away from the face. The use of face masks or coverings has been recommended in public settings to minimize the risk of Transmissions

Fig: (26):- Safety from COVID-19

Chapter 8: Design Proposal

8.1 Design Proposals

There are some design proposals given from the sarpanch and Talati:

1. Elevated Storage Reservoir(ESR)
2. Community Hall
3. Anganwadi
4. WI-FI Tower
5. Public toilet
6. Public library

8.1.1 ESR (Elevated service reservoir)

Water tanks are used to store water to tide over daily requirements of water by localities, industries, towns etc. Davada village already have one water tank but capacity and condition of that water tank is not sufficient to meet the requirement of villagers. The existing water tank is of 50000. We are proposing another water tank of 2.5 lakh liters Capacity to meet the requirement of villagers.

8.1.2 Community Hall

A basic Community Hall is Essential need for any village or town. In Davada there is no facilities and we are proposing hall between three villages we is in attach with village to solve the purpose.

8.1.3 Anganwadi

Anganwadi is type of rural child care canter .program to combat child hunger and malnutrition education and supplement as well as preschool activities .in Davada there is a 2 Anganwadi but the condition of both is not in good condition so we are providing a design of Anganwadi with new amenities

8.1.4 WI-FI Tower

Is a now a urban facilities provide to villager for connecting to the others so we are providing a WI-FI tower will new futures

8.1.5 Public Toilet

In Davada village the condition of public toilet is not good so we are providing a new design of public toilet to villagers with full facilities

8.1.6 Public Library

A public library is very important in social amenities .it is providing a good knowledge to the people in Davada village there is a no facilities of public library with new design

8.2 Reason for Students Recommending this Design

- ESR - to provide desired quantity of water.
- Community Hall - is to provide village meeting Facilities in village.
- Anganwadi – is to provide for children to learn new things
- WI-FI Tower – For network connection we design Wi-Fi network.
- Public Toilet – For sanitation purpose we design public toilet, because in village there is no public toilet.
- Public Library –In our daily life education is very important. So we design library for education purpose & increase knowledge of students.

8.3 About designs Suggestions / Benefit of the villagers

Water Tank:

Presently, they are using water from, tank of insufficient capacity is after interaction with villagers we get to know they get water once in 2 or 3 days, and the structure was medium condition, thus by introducing the water tank in the village, villagers will get the desired supply of water for domestic purposes without making additional efforts for that. Assuming height of tank floor above G.L 12m and capacity are 2.5 lit requiring.

Community Hall:

Currently there has no facility in this village. Thus we are proposing hall to easy the socially or important meeting with village public.

Anganwadi:

Is a basic need for a village to educate a child .Davada village is not having proper maintained Anganwadi there is poor condition of Anganwadi. The main benefit of this is to provide good facilities tothe children

WI-FI Tower:

There is poor connectivity in a village .the WI-FI tower is connect people to the urban people and with good things

Public Toilet:

Currently in Davada village there is poor condition of public toilet and villagers are using pound and farms or other land as toilet

Public Library:

Davada village has no library for villagers .the new design of library is increase knowledge of villager’s .connect to urban area

8.1.1 ESR (Elevated service reservoir)

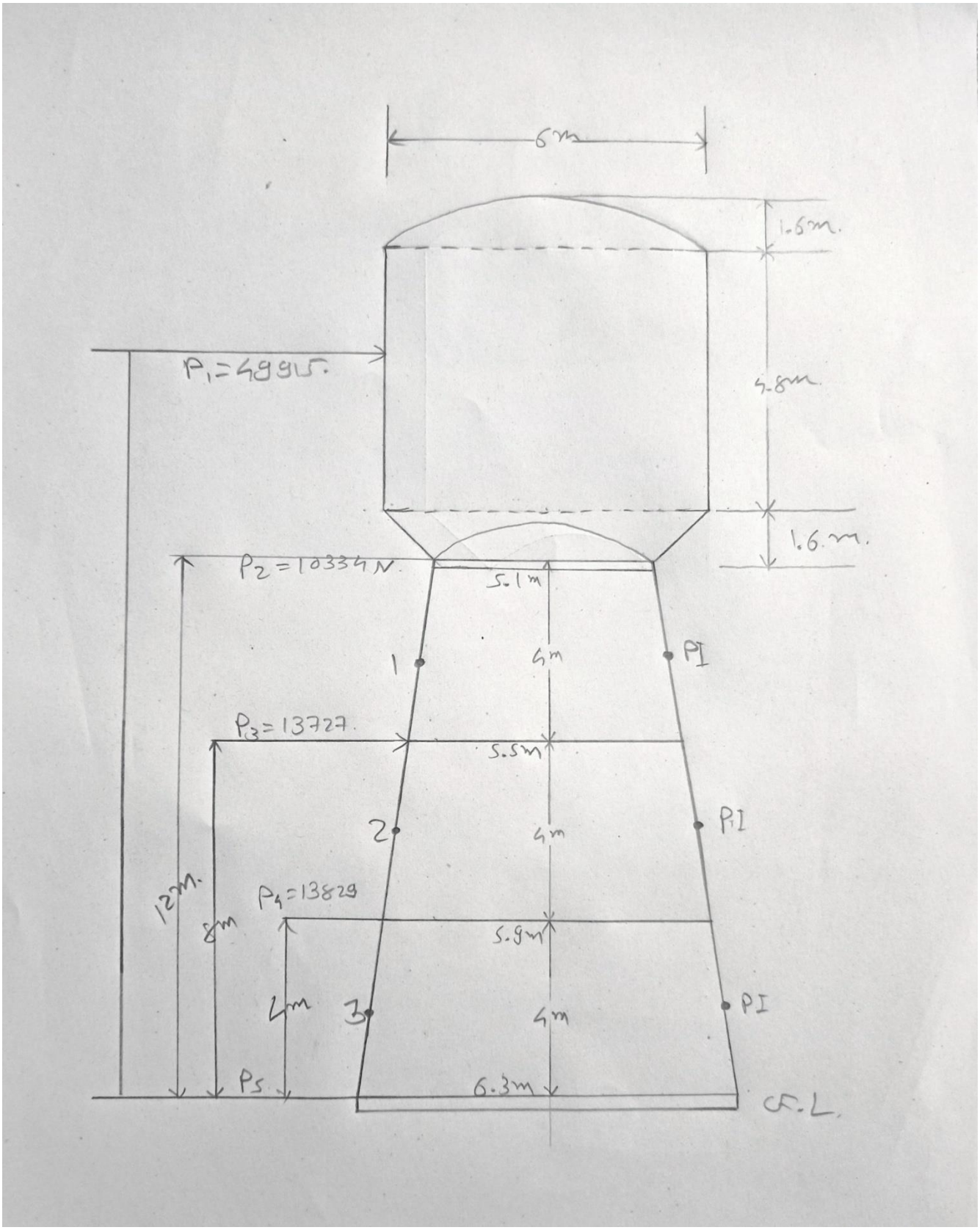


Fig: (27):- Plan of Elevated Storage Reservoir (ESR)

ELEVATED STORAGE RESORVOIR				
ABSTRACT SHEET				
Sr. NO	DESCRIPTION OF WORK	QTY OR NOS	RATE RS PS	COST RS PS
1	Earth work in excavation	28.30cumec		
2	Baldars	5nos	215.00	1075.00
3	Mazdoors	4nos	215.00	860.00
4	Total			1950.00
5	Total earthwork in excavation for128.64cumec	128.64/28.30=4.6*1935=8901		8900.00
6	Earth work in fillingin foundation	28.30		
7	Balder	3	215.00	645.00
8	Bhisthi	1/2	260.00	130.00
9	Total			775.00
10	Total earth work in filling 100.198 cumec	100.198/28.30=3.6*775=2790		2790.00
11	Disposal of surplus earth in lead 30m			
12	Mazdoors		215.00	645.00
13	Foundation basic cost Per 1 cum	25.728 / cum	5538	142482
14	Column basic cost per1 cum	23.069 / cum	7383	170318
15	Rcc ring beam at top Basic cost	0.848 /cum	7450	6318
16	Rcc ring beam at Bottom basic cost	3.675 / cum	7854	28866
17	Rcc domed roof 100mm	9.99 / cum	61141	611105
18	Cone shaped slab 200mm thick	7.75 / cum	25035	194072
19	Rcc cylinder wall Cost per 1 cum	126.63 / cum	7249	917978
20	Rcc circular Girder	3.84 / cum	6914	26585
21	BRACING AT4M height	1.66 / cum	7498	12507
22	Bracing at 8m height	1.55 / cum	7617	11845
23	Plastering (1:3)	357.19 / 10 sqm	969	34622
24	Plastering (1:6)	652.84 / 10 sqm	766	50000
25	Painting	647.17 / 10 sqm	1660	10431

26	Complete finishing work	271.43 / 10sqm	1035	28152
27	Supplying, placing, fitting of reinforcement Bars (36mm dia)	41.45 / m	55419	2297118
28	Total			4560169
29	Deduct 10% contractor Profit			-456016.9
	Add 12% gst			492498
	Add 3% electrification			123124.56
30	Grand total			4719774.66
	Say			47,20,000.00

ELEVATED STORAGE RESORVOIR

MEASUREMENT SHEET

Sr. No.	DECRIPTION OF WORK	**NOS**	L (m)	B (m)	A (m2)	D (m)	QTY (m^3)
1	Earth work in excavation	1			64.32	2	128.64
2	Earth work in filling	1					100.198
3	Rcc work in foundation(1:1.5:3)	1			64.32	0.4	25.728
4	Rcc work in columnsbelow g.l (1:1.5:3)	6			0.282	1.6	2.714
5	Rcc work in columns above g.l up to 4m ht (1:1.5:3)	6			0.282	4	6.785
6	Rcc work in coloumns from4m to 8m ht (1:1.5:3)	6			0.282	4	6.785
7	Rcc work in coloumns from 8m to 12mht(1:1.5:3)	6			0.282	4	6.785
8	Total rcc work in coloumns(1:1.5:3)						23.069
9	Rcc work in Bracing at 4m ht(1:1.5:3)	1	18.535	0.3		0.3	1.668
10	Rcc work in bracing at 8m HT(1:1.5:3)	1	17.278	0.3		0.3	1.555
11	Rcc work in circular girder(1:1.5:3)	1	16.22	0.4		06	3.845
12	Rcc work in ring beam at bottom of The cl wall (1:1.5:3)	1	23.56	0.3		0.52	2.675
13	Rcc work in Ring beam at top of the cl wall(1:1.5:3)	1	23.56	0.16	99.95	0.225	0.848
14	Rcc work in	1				0.1	9.995
15	Domed roof(1:1.5:3) rcc work in conical slab (1:1.5:3)	1		6	47.0	0.25	11.751

16	Rcc work in conical dome(1:1.5:3)	1			38.76	0.2	7.752
17	Rcc work in cylindrical wall (1:1.5:3)	1		0.215	117.8	5	126.35
18	Deductions in rcc Work in bracings in coloumns	2*6	0.3	0.3		0.6	0.648
19	Total rcc working coloumns after deductions						22.901
20	Total rcc Work (1:1.5:3)						138.174
21	Plastering in C m (1:2) for inner surface of conical Slab (12mm)	1			47.06		47.006
22	Plastering in C m (1:6) for outer surface of conical slab (12mm)				60.2		60.2
23	Plastering in C m (1:2) for inner Surface of conical dome (12mm)	1			38.76		38.76
24	Plastering in C m (1:6) for outer Surface of conical dome (12mm)				43.135		43.135
25	Plastering in C m (1:2) for inner surface of cylindrical wall (12mm)				117.8		117.8
26	Plastering in c m (1:6) for outer surface of cylindrical wall (12mm)				125.03		125.03
27	Plastering in C m (1:2) for inner surface of domed roof (12mm)				96.5		96.556
28	Plastering in C m (1:6) for outer Surface of domed roof(12mm)				99.95		99.95
29	Plastering in c m (1:6) for columns(12mm)	6			45.23		271.433
30	Plastering in c m (1:6) for circular girder(12mm)	1	16.022			0.6	91.732
31	Plastering in c m (1:2) for ring beam at top (12mm)		23.56	0.16			18.213
32	Plastering in c m (1:2) for ring beam bottom(12mm)		23.56	0.3		0.225	38.95
33	Plastering in c m (1:6) for bracing at 4m ht (12mm)		18.535	0.3		0.52	22.422
34	Plastering in c m (1:6) for bracing at 8m ht (12mm)		17.278	0.3		0.3	20.936
35	Total plastering in cm(1:2)12mmthick					0.3	357.289

36	Total plastering in cm (1:6) 12mm						652.838
37	Thick water proof Cement painting for tank portion						647.174
38	White washing for columns	6			45.23		271.433
39	Total whitewashing						918.607

8.1.2 Community Hall

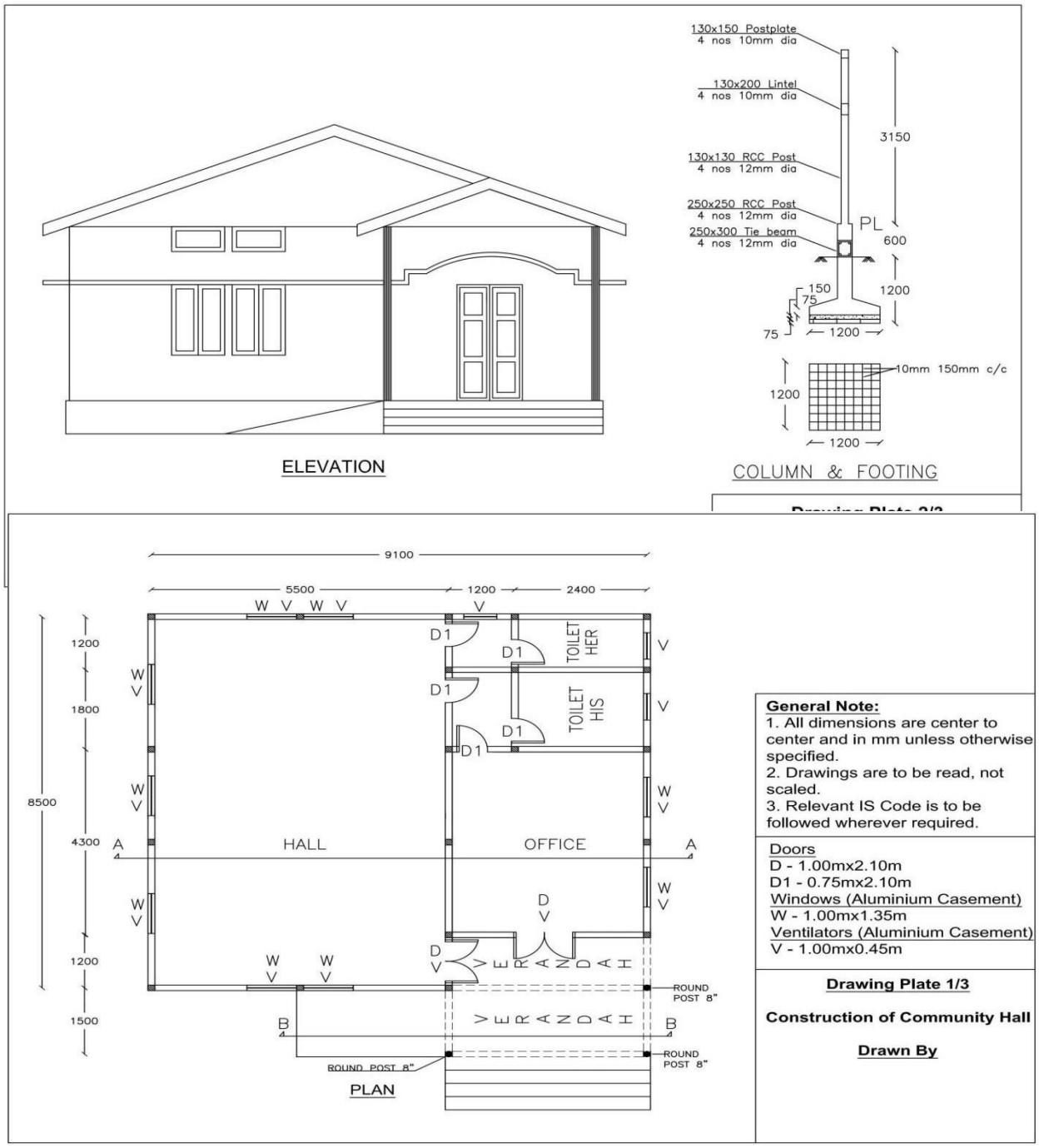


Fig (28) Plan and Elevation of Community hall

COMMUNITY HALL

ABSTRACT

Sr. No	Description	Unit	Quantity	Rate	Amount	Remarks
1	Earthwork in Excavation for foundation	CuM	39.74	65	2583.1	
2	Sand Filling in Plinth Level	CuM	50.89	325.75	16577.42	
3	Brick Flat Soiling	SqM	121.12	289.37	35048.49	
4	Excavation in Foundation	CuM	13.54	4739.15	64168.9	
5	Excavation in Super structures		5.2	4929.24	25632.05	
6	Using 25mmthick plank	SqM	55.89	145.84	8150.99	
	Column above PL		175.56	215.73	37873.56	
	Chhajja		21.29	250	5322.5	
	Beam		38.46	191.27	7356.24	
	Lintel		25.64	163.01	4179.57	
7	Brick Masonry	CuM	6.04	4649.29	28081.71	
8	112mm thick	SqM	160.12	521.62	83521	
9	Wood	CuM	0.4	55200.04	22080.02	
	With Sal Wood	CuM	0.7	42229.17	29982.71	
10	Add Plinth Wall	CuM	206.1	110.21	22714.28	
11	Stirrups	Qtl	2.8	5241.78	14676.98	
12	Bolt	Each				
	(300*16 mm)	Each	7 nos	290	2032	
	(300*12 mm)		14 nos	142	1994	
	(100*10 mm)		18 nos	63	1125	
13	Handle	Each				
	(100mm)		9 nos	61	549.81	
	(150mm)		14 nos	75.37	1055.18	
	Total Amount				414704.8	
	10% Deduction Total				373234.32	
	Add Septic tank				25000	
	Add HTW with C. C Platform				10000	
	Add Electrification				36000	
	Add Sanitary installation				15000	
	TOTAL Amount				459234.32	
	SAY				460000/-	

COMMUNITY HALL

MEASUREMENT SHEET

Sr No	Description	Unit	No	L (m)	W (m)	H (m)	Quantity	Total
1	Earthwork in Excavation for foundation	CuM						
	1)Up to depth of 2m below the ground							39.74
	In Ordinary soil flooring		23	1.2	1.2	1.2	39.74	
2	Sand Filling in Plinth Level	CuM						
	150mm carriage filling 1)		1	8.5	9.1	0.6	46.410	50.89
	Filling 2)		1	1.5	3.6	0.6	3.24	
	Ramp		0.5	2.75	1.5	0.6	1.238	
3	Brick Flat Soiling	SqM						
	Footing		23	1.2	1.2		33.12	
	Floor 1		1	8.5	9.1		77.35	
	Floor 2		1	1.5	3.6		5.4	121.12
	Ramp		1	1.5	3.5		5.25	
4	Excavation in Foundation	CuM						
	Footing 1		23	1.2	1.2	015.	4.97	
	Footing 2		20	1.2	0.25	0.15	2.25	
	Column 1		23	0.25	0.25	0.75	1.08	
	Column 2		23	0.25	0.25	0.3	0.43	
	Beam 1		3	8.5	0.25	0.3	1.91	
	Beam 2		2	9.1	0.25	0.3	1.37	
	Beam 3		4	3.6	0.25	0.3	1.08	
	Beam4		1	3	0.25	0.3	0.23	
	Beam5		2	1.5	0.25	0.3	0.23	
5	Excavation in Super structures from plinth level up to 1st floor	CuM	20	0.13	0.13	3.15	1.06	
			3	3.14	0.10	3.15	0.3	
			3	8.5	0.13	0.2	0.66	
	Column 1		2	9.1	0.13	0.2	0.47	
	Column 2		3	3.6	0.13	0.2	0.28	
	Lintel		1	3	0.13	0.2	0.08	

			2	1.5	0.13	0.2	0.08	5.2
	Plate Beam		3	8.5	0.13	0.15	0.5	
			2	9.1	0.13	0. 15	0.35	
			2	1.5	0.13	0.15	0.06	
			1	3.6	0.13	0.15	0.07	
	Chhajja		2	8.5	0.45	0.075	0.57	
			2	9.1	0.45	0.075	0.61	
			2	1.5	0.45	0.075	0.1	
6	Using 25mm thick plank							
	Footing	SqM	4	23	0.225	1.2	24.84	55.89
	Column below PL		4	23	0.25	1.35	31.05	
	Column above PL	SqM	4	20	0.13	3.15	32.76	
			2	20	0.35	4.2	58.8	175.56
			2	20	0.5	4.2	84	
	Chhajja		2	8.5	0.5		7.65	
			3	9.1	0.45		12.29	21.29
			2	1.5	0.45		1.35	
	Beam 1		3	2	8.5	0.3	15.3	
	Beam2		2	2	9.1	0.3	10.92	
	Beam3		4	2	3.6	0.3	8.64	38.46
	Beam4		1	2	3	0.3	1.8	
	Beam5		2	2	1.5	0.3	1.8	
	Lintel 1		3	2	8.5	0.2	10.2	
	Lintel 2		2	2	9.1	0.2	7.28	
	Lintel 3		4	2	3.6	0.2	5.76	
	Lintel 4		1	2	3	0.2	1.2	25.64
	Lintel 5		2	2	1.5	0.2	1.2	
7	Brick Masonry	CuM						
	Plinth		3	8.5	0.25	0.3	1.91	
			2	9.1	0.25	0.3	1.37	
			4	3.6	0.25	0.3	1.08	
			1	3	0.25	0.3	0.23	6.04
			2	1.5	0.25	0.3	0.13	
	Steps		1	3.6	0.9	0.15	0.32	
			1	3.6	0.6	0.15	0.16	
			1	3.6	0.3	0.6	0.26	

	Ramp		0.5	3.5	0.25	0.6	0.26	
8	112mm thick wall	SuM						
	Brick work in (1:4)		3	8.5	3.15		80.33	
			2	9.1	3.15		57.33	203.07
			3	3.6	3.15		34.02	
			1	3	3.15		9.45	
	Verandah		2	1.5	1.05		3.15	
			1	3.6	1.05		3.78	
	Gable wall		2	0.5	1.7	9.1	15.02	
	Deduction	SuM						
	Post		20	3.15	0.13		8.19	
	Lintel		1	25.27	0.2		5.14	
	D		2	1	2.1		4.2	
	D1		5	0.75	2.1		7.88	42.96
	W		9	1	1.35		12.15	
	V		12	1	0.45		5.4	
	Net Quantity						160.12	160.12
9	Wood	CuM						
	D		2	0.15	0.075	2.1	0.09	
			2	0.15	0.075	1	0.02	
	D1		5	0.15	0.075	2.1	0.24	0.4
			5	0.15	0.075	0.75	0.04	
	With use in Ceiling partition Wood		10	8.5	0.075	0.5	0.32	
			10	9.1	0.075	0.5	0.34	0.71
			2	3.6	0.075	0.5	0.03	
			4	1.5	0.075	0.5	0.02	
10	Add Plinth Wall	CuM	1	2	36	0.65	46.8	
			1	2	10.9	0.65	14.11	
	Deduction						15.02	206.01
	Net Quantity						206.01	
11	Stirrups	Qtl					279.54 KG	2.8 Qtl
12	Bolt	Each						
	D (300*16mm)			2	1		2 nos	
	D1 (300*16mm)			5	1		5 nos	7 nos
	Extra Bolt							

	(300*12mm)							14 nos
	(100*10mm)							18 nos
13	Handle	Each						
	W (100mm)			9	1		9	23 nos
	D (150mm)			2	2		4	
	D1(150mm)			5	2		10	

8.1.3 Anganwadi

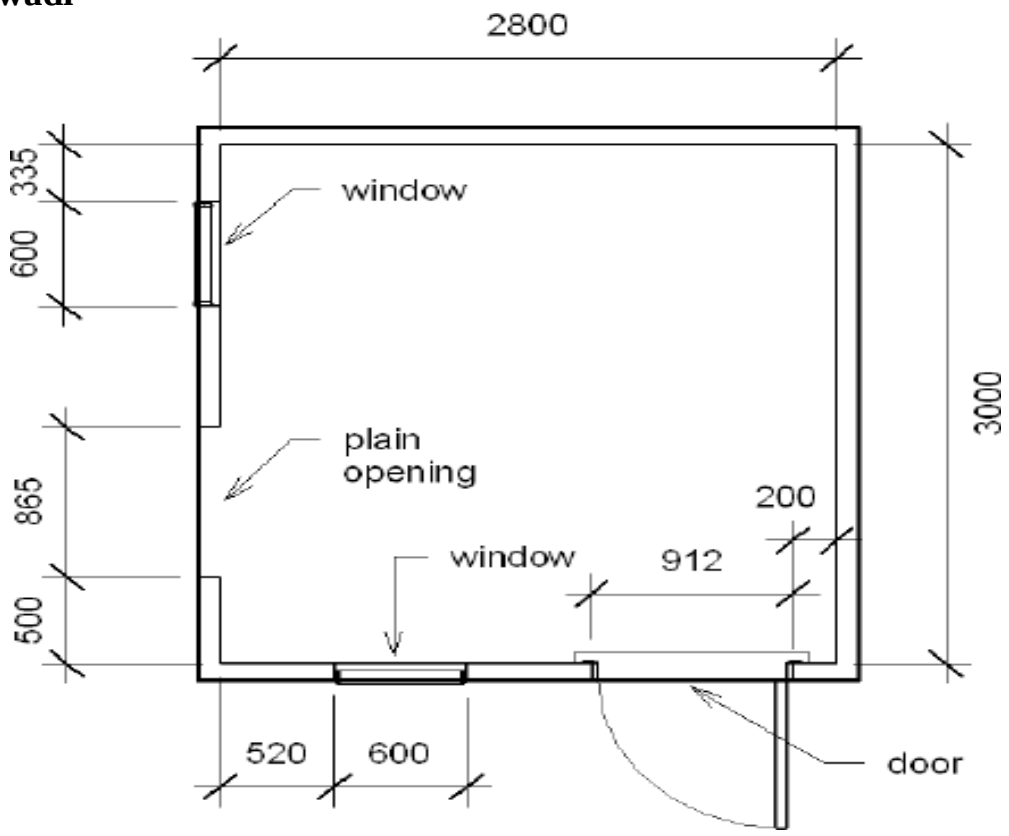


Fig: (29):- Plan of Anganwadi

ANGANVADI								
MEASUREMENT SHEET								
Sr No	**Description**	**Unit**	**No**	**L (m)**	**W (m)**	**H (m)**	**Quantity**	**Total**
1.	Flooring	CuM		2.8	3	-	8.4	
2.	Plastering	M2	2	2.8	-	3	16.8	
			2	3		3	18	
3.	Deduction							
	Window	Nos	2	0.6	-	1	1.2	
	Door	Nos	1/2	0.912	-	2.1	0.957	32.64

8.1.4 Wi-Fi Tower

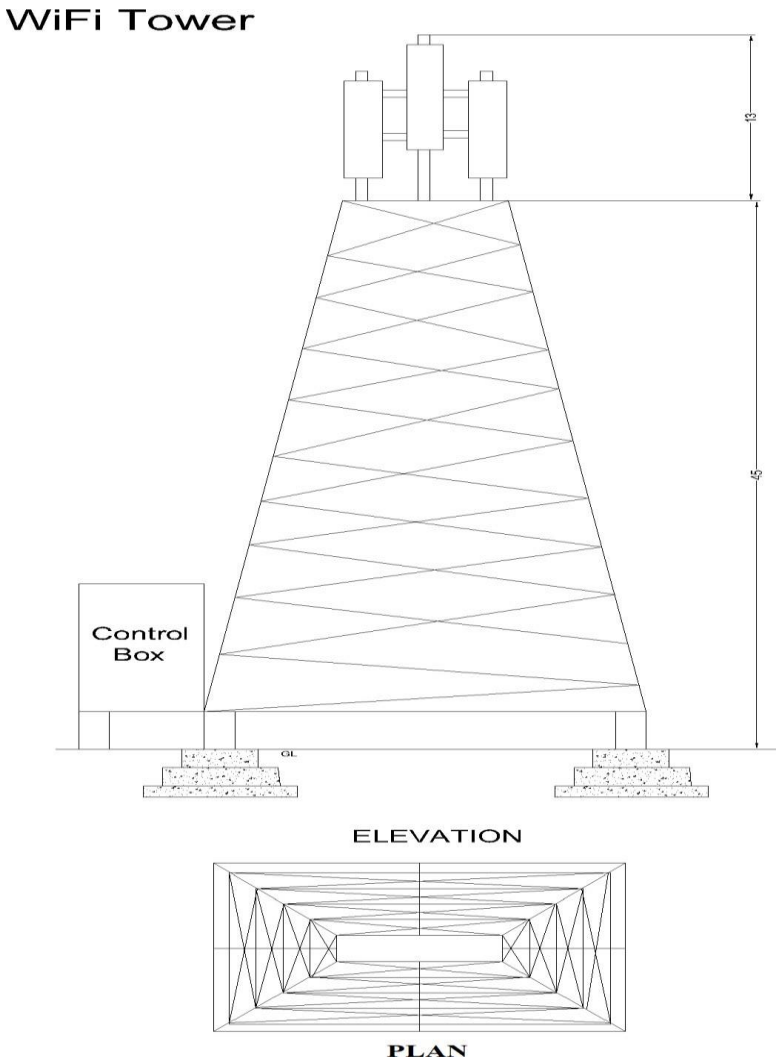


Fig: (30):- Plan of WI-FI

WI-FI TOWER						
ABSTRACT						
Sr. No	**Description**	**Unit**	**Quantity**	**Rate**	**Amount**	**Remarks**
1	Vertical Tower Construction	NOS	1.00	250000.0	250000.00	
2	Foundation Construction	CUMT	1.00	25000.00	25000.00	
3	Boundary Construction	CUMT	1.00	15000.00	15000.00	
4	Lighting and Wiring Costingg	MT	200.00	40.00	8000.00	
Rupees Three lakh Only.				**Total**	298000.00	
				SAY	300000.00	

8.1.5 Public Toilet

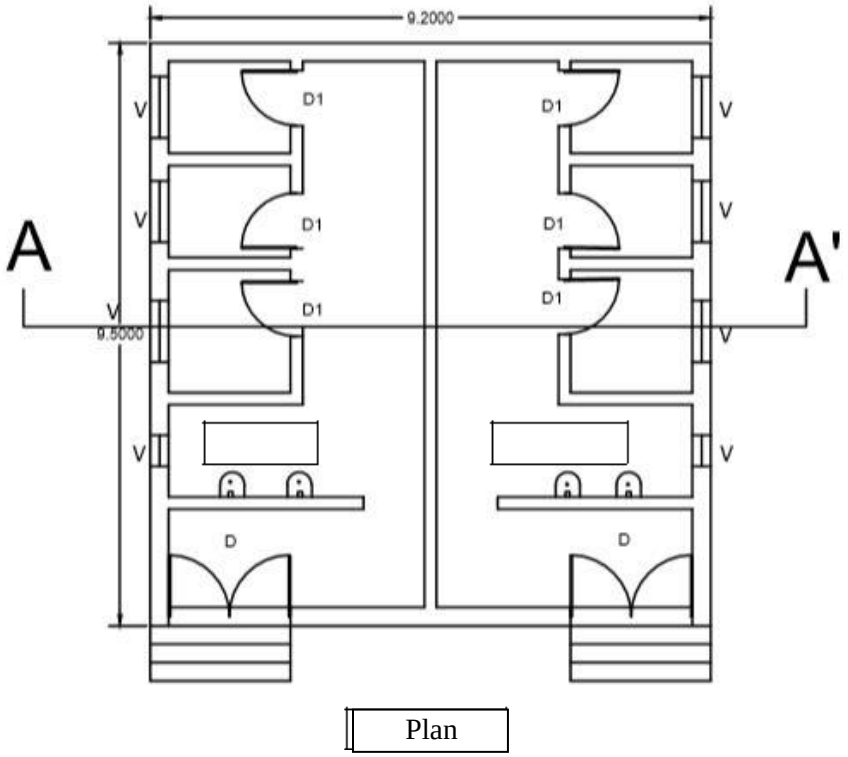


Fig: (31):- Plan of Public Toilet

PUBLIC TOILET							
MEASUREMENT SHEET							
Sir no	**DESCRIPTION**	**NO**	**L m**	**B m**	**H m**	**QUANTIY**	**UNITS**
1							
	Excavation for						
	Foundation						
	L=69.3	1	69.3	0.9	1.2	74.84	CuM

2							
	R.C.C.work in foundation						
	L=69.3	1	69.3	0.9	0.2	12.47	CuM
3							
	Brick masonry work in						
	Foundation(L=37.10)						
	1st step						
	L=76.5 –16*(0.6/2) =71.7	1	71.7	0.6	0.1	4.30	Cu.m
	2^{nd} step						
	L=76.5 –16*(0.5/2) =72.5	1	72.5	0.5	0.1	3.63	Cu.m
	3^{rd}step						
	L=76.5–16*(0.4/2) =73.3	1	73.3	0.4	0.1	2.93	Cu.m
	4^{th} step	1	74.1	0.3	0.7	15.56	Cu.m
	L=76.5 –16*(0.3/2) =74.1						
	Total Brick masonry					26.42	Cu.m.
	Work in foundation						
4							
	Brick masonry work in						
+	superstructure						
	L=50.20m	1	76.5	0.3	3.5	80.33	Cu.m.
	Deduction for door&						
	Window						
	Door	2	1.2	0.3	2.1	1.51	Cu.m.
	Door1	6	0.8	0.3	2.1	3.02	Cu.m.
	Ventilator –V	8	0.6	0.3	0.6	0.864	Cu.m.
	Deduction for lintel						
	Door	2	1.2	0.3	0.1	0.072	Cu.m.
	Door1	6	0.8	0.3	0.1	0.144	Cu.m.
	Ventilator –V	8	0.6	0.3	0.1	0.144	Cu.m.
	Total Brick masonry Work						
	=80.33–5.754					74.576	Cu.m.
5							
	Brick masonry work in step						Cu.m.
	Step:1	2	1.5	0.3	0.25	0.225	Cu.m.
	Step:2	2	1.5	0.3	0.25	0.225	Cu.m.
					Total	0.45	Cu.m.
6							
	D.P. Cat plinth level						
	For200mmthick wall	1	31.1	0.7	0.6	13.06	Cu.m
	For300mmthick wall	1	45.5	0.9	0.9	36.86	cum
	Total					49.92	Cu.m
7							
	EARTHFILLING	2	4	1.5	0.6	7.2	Cu.m
	Basin	2	4	1.6	0.6	3.84	Cu.m
	Wc	4	2	1.5	0.6	1.8	Cu.m

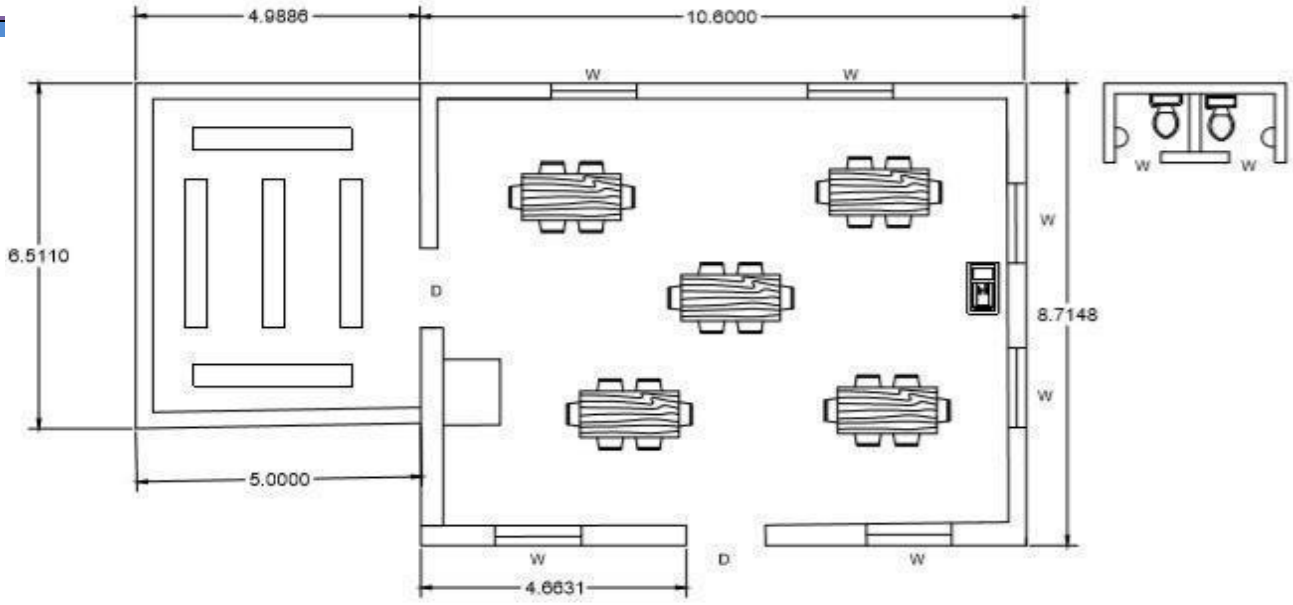
	Bath	2	2	2.0	0.6	2.4	Cu.m
	Wide area	2	2	5.2	0.6	12.48	CuM
	TOTAL					27.72	Cu.m
8		4	2	1.5		12	
	PLASTER	2	2	2		8	
		2	2	5.2		20.8	
		4	3		3.5	42	
		16	2		3.5	112	
		8	2		3.5	56	
		4	5.2		3.5	72.8	
	TOTAL					323.6	**SQ.M**
9							
	White wash per above					323.6	SQ.M
10							
	RCCWORKFORSLAB	1	19	18.4	0.15	52.44	CU.M
	L=19						
	B=18.4						
	H=0.15						

PUBLIC TOILET

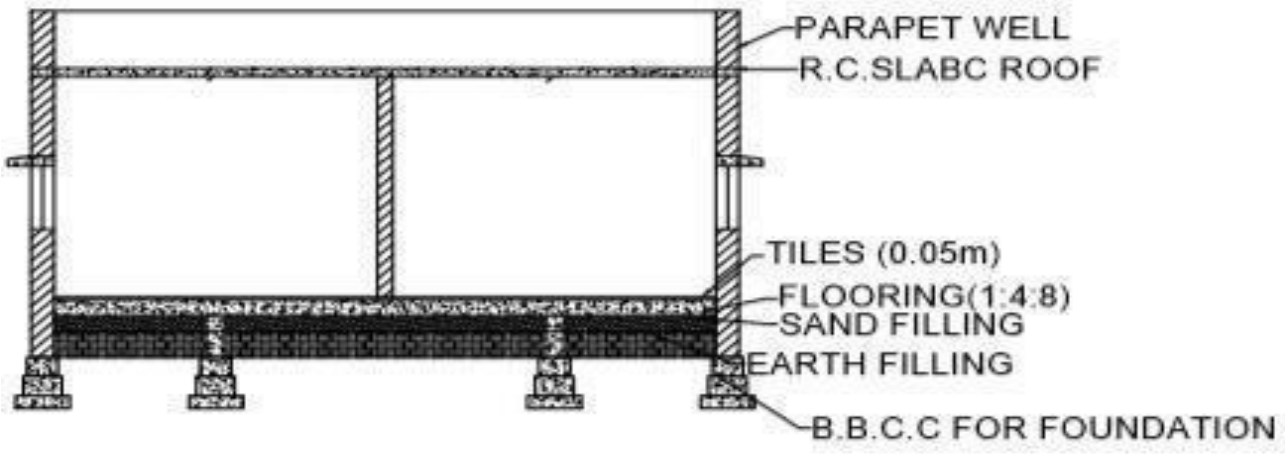
ABSTRASHEET

Sr.	Item description	Quantity	Rate	Per	Amount
1.	Excavation work	74.84	155	Cu.m.	11,600
2.	PC.C	12.47	3000	Cu.m.	37,410
3.	Brick work in foundation	26.42	3200	Cu.m.	84,544
4.	Brickwork Issue Per structure	74.58	3500	Cu.m.	2,23,740
5.	Brick work in steps	0.45	3200	Cu.m.	1,440
6.	D.P.Catplinthlevel	49.92	4900	Cu.m.	2,44,608
7.	Earth filling	27.72	50	Cu.m.	1,386
8.	Plastering	323.6	150	Sq.m.	48,540
9.	Whitewash	323.6	25	Sq.m.	8,090
10.	Rcc work for slab	52.44	8800	Cu.m.	4,61,472
				Total Rupees	11,22,830
				Conti 05.00%Rupees	56,141
				10%contractor charges	1,12,283
				2%water charges	22,457
				Total Amount Rupees	13,13,711
				Say Rupees	13,13,711

8.1.6 Public Library



PLAN



SECTION

Fig: (32):- Plan of Public Library

PUBLIC LIBRARY							
MEASUREMENTSHEET							
Sir no	**DESCRIPTION**	**NO**	**L (m)**	**B (m)**	**H (m)**	**QUANTIY**	**UNITS**
1							
	Excavation for Foundation L=52.51	1	52.51	0.9	1.2	56.71	Cu.m.
2							
	R.C.C. work in foundation L=52.51	1	52.51	0.9	0.2	9.45	Cu.m.

3							
	Brick masonry work in Foundation(L=37.10)						
	1st step						
	L=53.05–2*(0.6/2) =52.45	1	52.45	0.6	0.1	3.15	Cu.m
	2nd step						
	L=53.05–2*(0.5/2) =52.55	1	52.55	0.5	0.1	2.63	Cu.m
	3rdstep						
	L=53.05–2*(0.4/2) =52.65	1	52.65	0.4	0.1	2.11	Cu.m
	4th step	1	52.75	0.3	0.7	11.08	Cu.m
	L=53.05–2*(0.3/2) =52.75						
	Total Brick masonry work in foundation					18.97	Cu.m.
4							
	Brick masonry work in superstructure						
	L=50.20m	1	53.05	0.3	4	63.66	Cu.m.
	Deduction for door& Window						
	Door	1	1.5	0.3	2.1	0.95	Cu.m.
	Door1	1	1.2	0.3	2.1	0.756	Cu.m.
	Window	6	1.5	0.3	1.2	3.24	Cu.m.
	Deduction for lintel						
	Door	1	1.5	0.3	0.1	0.05	Cu.m.
	Door1	1	1.2	0.3	0.1	0.036	Cu.m.
	Window	6	1.5	0.3	0.1	0.27	Cu.m.
	Total Brick masonry Work = 53.05-0.356						
						52.69	Cu.m.
5							
	Brick masonry work in step						Cu.m.
	Step:1	1	4	0.6	0.25	0.6	Cu.m.
	Step:2	1	4	0.3	0.25	0.3	Cu.m.
					Total	0.9	Cu.m.
6							
	D.P.Catplinthlevel For300mmthick wall						
		1	53.05	0.9	0.9	42.97	cum
	Total					42.97	Cu.m
7							
	EARTHFILLING						
	Seating portion	1	10.6	8.72	0.6	52.46	Cu.m
	Book portion	1	5	6.51	0.6	19.53	Cu.m
	TOTAL					72.0	Cu.m
8							
	INTERNALPLASTER						
	Ceiling. Seating	1	10.60	8.72		92.43	
	Book portion	1	5	6.51		32.55	

	Walls. Seating	2	10.60		4	84.8	
		2	8.72		4	69.76	
		2	5		4	40	
		2	6.51		4	52.08	
	TOTAL					371.62	**SQ.M**
9							
WHITEWASHPERABOVE						371.62	SQ.M
10							
	RCC WORK FOR SLAB	1	15.6	8.72	0.15	20.40	CU.M
	L=15.6						
	B=8.72						
	H=0.15						

PUBLIC LIBRARY

ABSTRACTSHEET

Sr.	Item description	Quantity	Rate	Per	Amount
1.	Excavation work	56.71	155	Cu.m.	8,790
2.	PC.C	9.45	3000	Cu.m.	28,350
3.	Brick work in foundation	18.97	3200	Cu.m.	60,704
4.	Brick	52.70	3500	Cu.m.	1,84,450
5.	Brick work in steps	0.9	3200	Sq.m.	2,880
6.	DPC at plinth level	42.97	4900	Cu.m.	2,10,553
7.	Earth filling	72	50	Cu.m.	3,600
8.	Internal plaster	371.62	150	Sq.m.	55,743
9.	Whitewash	371.62	25	Sq.m.	9,291
10.	Rcc work for slab	20.40	8800	Cu.m.	1,79,520
				Total Rupees	7,43,881
				Conti ..... 05.00% Rupees	37194
				10%contractorcharges	74,388
				2%watercharges	14878
				Total Amount Rupees	8,70,341
				Say Rupees	8,70,341

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

Following points should be considered for Davada village in future prospects:

- Davada Village required a post office as they don‘t have a proper one in their village
- To facilitate good health amenities through building Maternity Home and dispensary. Currently there are no maternity facilities present in the village. Hence provision of a Maternity home and dispensary in the village will prove to be useful in the time of emergency and also day to day basic treatment.
- Chabutro can be provided to make the village aesthetically good.
- There is no Pick up stand or bus stand in this village so provision of bus stand or pick up stand provides ease to villagers.
- The existing Capacity of sump is not sufficient to meet and store water which can meet requirement of villager hence Provision of sump is prime requirement.
- There is no Public garden and Recreational Centre in Davada village; hence provision of public garden and Recreational will provide gathering and refreshing place to villagers.
- Most of villagers in Davada are engaged in agricultural activities like farming, Hence provision of Krishi Kendra will prove too beneficial to villagers. Farmers problems can be resolve in that Centre.

Chapter 10: CONCLUSION

With help of Gap analysis we conclude that some of different smart village facilities are required as basic or primary level which still lack in village. So according to Gap analysis of Davada village such as Anganwadi, Water tank for Human or animal, Road network, Solid waste management etc. Smart village can solve their problem itself can become a smart village example to other village too. According Urban Development Plans Formulation and Implementation (UDPFI) norms, lacking in basic amenities and smart amenities can be provided as Public library, Children's Play Ground, Community hall, Solid Waste Management system by providing required amenities to village, development of village can be possible. So, ultimately migration to the city from village will be reduced and livelihood of villagers will increase. So healthy and prosperous life can be possible for the villagers Ultimate growth of village and people is base step for the development of country. India is developing country and GDP is highly depended on farming. As the development of village would be possible, farming techniques will increase and percentage of GDP will increase.

This project is proved as very knowledge gaining and interesting for us. After doing this project we have understood that the development of villages is equally important as urban area for country‘s overall growth. The village needs some infrastructural facilities to make village a better place we have tried our best by applying our technical knowledge in this project by proposing designs for some basic amenities which required. By this project we have learned so many things and it was the great experience of village culture and environment.

We are proposing a design base on our survey, knowledge and Gap analysis to village for its development. Following are all design we propose for a village is:

1. Elevated Storage Reservoir(ESR)
2. Community Hall
3. Anganwadi
4. WI-FI Tower
5. Public toilet
6. Public library

Chapter 11: References

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Chapter 12: ANNEXURE ATTACHMENT

12.1 SURVEY FORM OF IDEAL VILLAGE

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

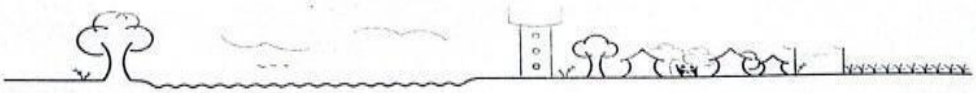
Name of Village:	Maktupur
Name of Taluka:	Unjha
Name of District:	Mehsana
Name of Institute:	L.C. Institute of Technology Bhandu.
Nodal Officer Name & Contact Detail:	Sumit B. Patel 9687637291
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Sarpanch : Patel Madhuben Mafabhai
Date of Survey:	

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001	–	–	–	–
ii)	2011	5997	2650	2507	1124

2. **Geographical Detail:**

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	1253
	Forest Area (In hect.)	–
	Agricultural Land Area (In hect.)	1072
	Residential Area (In hect.)	
	Other Area (In hect.)	
	Water bodies	
	Nearest Town with Distance:	



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

3. Occupational Details:

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

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	Treated Covered Hand Pump	yes yes yes		Good Good Good
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank 2 Nos	Capacity: 50,000	Yes		Good
	Underground Sump	Capacity: 1,00,000	yes		Good
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	Covered	yes		Good
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open	Closed			Good
	If Open than Pucca / Kutchcha				
	Whether drain water is discharged directly in to Water bodies/ Sewer plants	yes			
Suggestions if any:					

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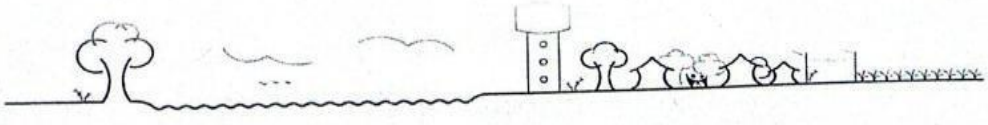
Vishwakarma Yojana: Phase VIII
Techno Economic Survey

E.	Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM				
	Village approach road	500 m	yes		
	Main road	500 m	yes		
	Internal streets	43 Nos	yes		
	Nearest NH/SH/MDR/ODR Dist. in kms.	SH (500 m)	yes		
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	NO 7 km			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	NO 7 km			
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Auto/Jeep Chhakda	yes		good
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	UGVCL (24 hrs)	yes		good
	Power supply for Domestic Use	24 hrs			good
	Power supply for Agricultural Use	8 hrs			good
	Power supply for Commercial Use	24 hrs			good
	Road/ Street Lights	yes			good



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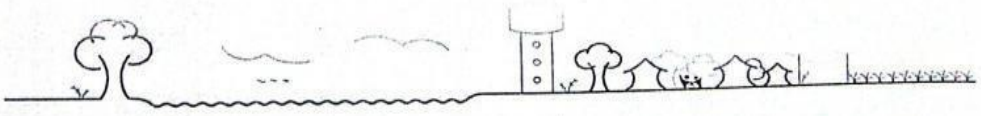
Techno Economic Survey

	Electrification in Government Buildings/ Schools/ Hospitals				
	Renewable Energy Source Facilities (Y/ N)	Solar Power in houses	yes		Good
	LED Facilities	yes	yes		Good
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	2			Good
	Location Condition	Bustand	yes		Good
	Community Toilet (With bath/ without bath facilities)				
	Solid & liquid waste Disposal system available	land fill	yes		Good
	Any facility for Waste collection from road		yes		Good
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Canal Tube well	yes		Good
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Pucca- 80% Kutchaa -20%			

5. Social Infrastructural Facilities:

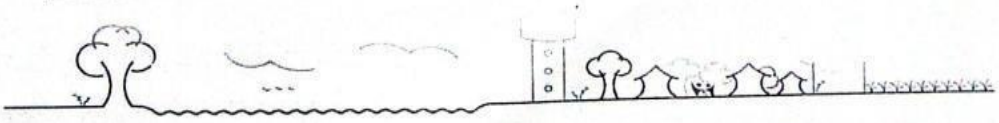
Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks



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

L.	Education Facilities:				
	Aaganwadi/ Play group	6			
	Primary School	2			
	Secondary school	1			
	Higher sec. School				
	ITI college/ vocational Training Center				
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	Science Collage			
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					

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



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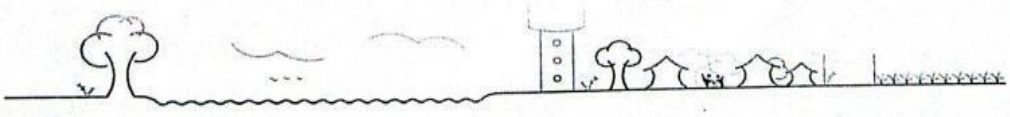
	Condition:				
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	✓	Yes		Good
	Public Garden Location: Condition:	Good	Yes		Good
	Village Pond Location: Condition:	Good	Yes		Good
	Recreation Center Location: Condition:				
	Cinema/ Video Hall Location: Condition:				
	Assembly Polling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



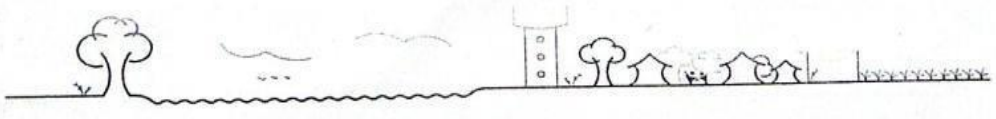
	General Market	Shop			
	Shops (Public Distribution System)				
	Panchayat Building	Yes			Poor
	Pharmacy/Medical Shop	Y.			
	Bank & ATM Facility	Mehsana Cop Syndicat			
	Agriculture Co-operative Society				
	Milk Co-operative Soc.	✓			Good
	Small Scale Industries				
	Internet Cafes/ Common Service Center/Wi 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	Solar Panels in house	Yes		Good
P.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System				
Q.	Any Other				

7. Data Collection From Village

Village Base Map Available: Hard Copy/Soft Copy	



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Vishwakarma Yojana: Phase VI
Techno Economic Survey

Recent Projects going on for Development of Village	Village road
Any NGO working for village development	

8. Additional Information/ Requirement:

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Repair & Maintenance of Existing Public Infrastructure facilities(School Building, Health Center, Panchayat Building, Public Toilets & any other)	· Panchayat building Renovation	Poor
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.

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

સરપંચ
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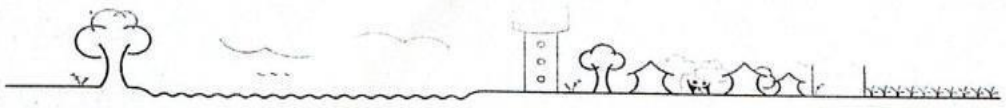

12.2 SURVEY FORM OF SMART VILLAGE

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

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

Name of District:	SabarKantha
Name of Taluka:	I
Name of Village:	Pumsari
Name of Institute:	L.C. Institute of Technology Bhandu
Nodal Officer Name & Contact Detail:	Sumit B. Patel 9687637291
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Talati cum Mantri :- Ashishbhai chaudhary Panchayat Member: kalash ben Desai sarojben Rathod Fulsinh Parmar
Date of Survey:	

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	-	-	-	-
2.	2011	5,900	2496	2221	

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	1531-65-76
2.	Forest Area (In hect.)	216-60-45
3.	Agricultural Land Area (In hect.)	640 hectares
4.	Residential Area (In hect.)	15-51-57
5.	Other Area (In hect.)	1015-03-62
6.	Distance to the nearest railway station (in kilometers):	

7.	Name of Nearest Town with Distance:	Prantij (31 km)
8.	Distance to the nearest bus station (in kilometers):	Prantij (31 km)
9.	Whether village is connected to all road for the any facility or town or City?	Yes

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1.	Farming
	2.	Dairy Farm
	3.	Labours
Major crops grown in the village:	1.	Cotton
	2.	Wheat
	3.	Millet

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
1.	**PIPED WATER**	yes	yes		
	Piped Into Dwelling				
	Piped To Yard/Plot				
	Public Tap/Standpipe				
	Tube Well Or Bore Well ✓	512	yes		
2.	**DUG WELL**				
	Protected Well ✓	73	yes		
	Un Protected Well				
3.	**WATER FROM SPRING**				
	Protected Spring				
	Unprotected Spring				
	Rainwater				
	Tanker Truck				
	Cart With Small Tank				
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/**	yes			
	Irrigation Channel				
	Bottled Water				
	Hand Pump ✓	3	yes		
	Other(Specify)**Lake/ Pond**				

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

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Power supply for Domestic Use		yes		
	Power supply for Agricultural Use		yes		
	Power supply for Commercial Use		yes		
	Road/ Street Lights		yes		
	Electrification in Government Buildings/ Schools/ Hospitals		yes		
	Renewable Energy Source Facilities (Y/ N)				
	LED Facilities	yes 24 watt	yes		
Suggestions if any:		(G Edd) Department Govt of Gujarat			
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	yes			
	Location Condition				
	Community Toilet (With bath/ without bath facilities)	yes	yes		
	Solid & liquid waste Disposal system available	yes	yes		
	Any facility for Waste collection from road	yes	yes		
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL. OTHER (SPECIFY)	yes			
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)	yes			
	Sub-Centre	~~ye~~			
	PHC	yes			
	BLOCK PHC	yes			
	CHC/RH	Yes			
	District/ Govt. Hospital				
	Govt. Dispensary				
	Private Clinic	yes			
	Private Hospital/ Nursing Home				
	AYUSH Health Facility				
	sonography /ultrasound facility				
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group	yes	yes		8 Aaganwadi
	Primary School	yes	yes		5 school
	Secondary school	yes			
	Higher sec. School	yes			
	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: .....kms.				

Suggestions if any:

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

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

Suggestions if any:

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

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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

Suggestions if any:

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

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VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

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

VII. DATA COLLECTION FROM VILLAGE

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

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

Sunanda Patel

12.3 SURVEY FORM OF ALLOCATED VILLAGE

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

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

Name of District:	Mehsana
Name of Taluka:	Mehsana
Name of Village:	Davada
Name of Institute:	L.C. Institute of Technology Bhandu
Nodal Officer Name & Contact Detail:	Sumit B. Patel 9687637291
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	SarPanch :- Chenaj Thakor.
Date of Survey:	17/08/2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	–	–	–	–
2.	2011	2,431	1670	1665	476

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	431.17 hectar
2.	Forest Area (In hect.)	0
3.	Agricultural Land Area (In hect.)	328
4.	Residential Area (In hect.)	430
5.	Other Area (In hect.)	3
6.	Distance to the nearest railway station (in kilometers):	Mehsana – 16.9 km

7.	Name of Nearest Town with Distance:	Mehsana (21 km)
8.	Distance to the nearest bus station (in kilometers):	Mehsana (21 km)
9.	Whether village is connected to all road for the any facility or town or City?	Yes

III. OCCUPATIONAL DETAILS:

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

Major crops grown in the village:	1. Wheat 2. Millet 3. Cotton

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

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	Other(Specify) **Lake/ Pond** ✓		yes		
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: 50000			✓
	Underground Sump	Capacity: 1,00,000			✓
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1			yes	Need total Reconstruction
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	All weather	yes		
	Main road	All weather	yes		
	Internal streets	WBM		yes	
	Nearest NH/SH/MDR/ODR Dist. in kms.	SH (4.5 km)	yes		
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No Mehsana (16.9 km)	yes		
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	yes Not good		yes	
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Auto / Private	yes		
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	yes Govt. More than 6 hrs	yes		

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	Power supply for Domestic Use	No Data in Village		Available	
	Power supply for Agricultural Use				
	Power supply for Commercial Use				
	Road/ Street Lights				
	Electrification in Government Buildings/ Schools/ Hospitals				
	Renewable Energy Source Facilities (Y/ N)	No			
	LED Facilities	yes	yes		

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	yes		yes	

Suggestions if any:

H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL ✓ WELL TUBE WELL. ✓ OTHER (SPECIFY)	yes yes		yes	Need More water Supply

Suggestions if any:

I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)				

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi) ✓ Sub-Centre ✗ PHC ✓ BLOCK PHC CHC/RH District/ Govt. Hospital Govt. Dispensary Private Clinic Private Hospital/ Nursing Home AYUSH Health Facility sonography /ultrasound facility	yes	yes	yes	Need total Reconstruction
	If any of the above Facility is not available in village than approx. distance from village: 21 ....kms. Mehsana				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group	yes		yes	
	Primary School	yes	yes		
	Secondary school				
	Higher sec. School				
	ITI college/ vocational Training Center				
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities				

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If any of the above Facility is not available in village than approx. distance from village: ....6.....kms. Bhandu

Suggestions if any:

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

If any of the above Facility is not available in village than approx. distance from village: ..21....kms. Mehsana

Suggestions if any:

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

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	Credit Cooperative Society Agricultural Cooperative Society Milk Cooperative Society Fishermen's Cooperative Society Computer Kiosk/ e-chaupal / Mills / Small Scale Industries				No
	Other Facility				

Suggestions if any:

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

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VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

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

VII. DATA COLLECTION FROM VILLAGE

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

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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	school Building is in good condition others are in Poor condition	toted Reconstruction
2.	Additional Information/ Requirement		
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?		

IX. Smart Village / Heritage Details

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

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

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સરપંચશ્રી
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તા.જી.મહેસાણા

12.4 GAP ANALYSIS OF THE ALLOCATEDVILLAGE

Table 5

Village Gap Analysis					
Village Facilities	**Planning Commission/UDPFI**	**Village Name**: Davada			
		Population: 2431			
	Norms	**Existing**	**Require as per Norms**	**Future Project Design**	**GAP**
Social Infrastructure Facilities					
Education					
Anganwadi	Each of per 2500population	2	2	-	0
Primary School	Each Per 2500 population	1	1	-	0
Secondary School	Per 7,500 population	0	0	1	-
Higher Secondary School	Per 15,000Population	0	0	1	-
College	Per 125,000Population	0	0	-	-
Tech. Training Institute	Per 100000Population	0	0	-	-
Agriculture Re- search Centre	Per 100000Population	0	0	-	-
Skill Development Center	Per 100000Population	0	0	-	-
Health Facility					
Govt./Panchayat Dispensary or Sub **PHC or Health Centre**	Each Village	1	1		**0**
Primary Health & Child Health Center	Per 20,000population	-	1	-	-
Child Welfare and Maternity Home	Per 10,000population	-	0	-	-
Multispecialty Hospital	Per 100000Population	-	-	-	-
Public Latrines	1 for 50 families (if toilet is not there in home)	2	**2**		**0**
Physical Infrastructure Facilities					
Pucca Village Approach Road	Each village	adequate	-	-	-
Bus/Auto Stand provision	All Villages connected by ST/Auto Rickshaw	adequate	**2**	**1**	**1**
Drinking Water (Mini. 70LPCD		adequate	-	-	-
Over Head Tank	1/3 of Total Demand	adequate		-	-
U/G Sump		adequate	-	-	-
Drainage Network covered		adequate	-	-	-
Drainage		adequate	-	-	-
Waste Management System		Inadequate	-	-	-

Socio- Cultural Infrastructure Facilities					
Community Hall	Per 10000 Population	**0**	**1**	**-**	**-1**
Community hall and Public Library	Per 15000 Population	**0**	**1**	**-**	**-1**
Cremation Ground	Per20,000population	**0**	**1**	**-**	**-1**
Post Office	Per10,000population	**1**	**1**	**-**	**0**
Gram Panchayat Building	Each individual/group	**1**	**1**	**-**	**0**
APMC	Per 100000Population	**0**	**0**	**-**	**0**
Fire Station	Per 100000Population	**0**	**0**	**-**	**0**
Public Garden	Per village	**1**	**1**	**-**	**0**
Police post	Per40,000Populati on	**0**	**1**	**-**	**-1**
Shopping Mall	Shops are available	**No**	**-**	**-**	**-**
Electrical design					
Electricity Network	**UGVCL**	Adequate	66 kv Substation		

12.5 Summary Details of All the Villages Designs

Table 6

L.C.Institute of technology ,Bhandu			
Sr.no	**Village name**	**Part 1**	**Part 2**
1	Davada	Water tank	Pickup stand
		Community hall	STP(Sewage treatment plant)
		WI-FI Tower	(PHC)Public health center
		Anganwadi	Post office
		Public toilet	Panchayat building
		Public library	Public garden
2	Motidau	Bank	(PHC) Public health center
		Pickup stand	Waste management& Disposal
			Community hall
			Public toilet
			Public garden

12.6 Drawings

All the images and drawings are attached in the chapter along with design**.**

12.7 Summary of Good Photographs

- **Allocated village**


આંગણવાડી કેન્દ્ર. દવા


દવાડા પ્રાથમિક શાળા

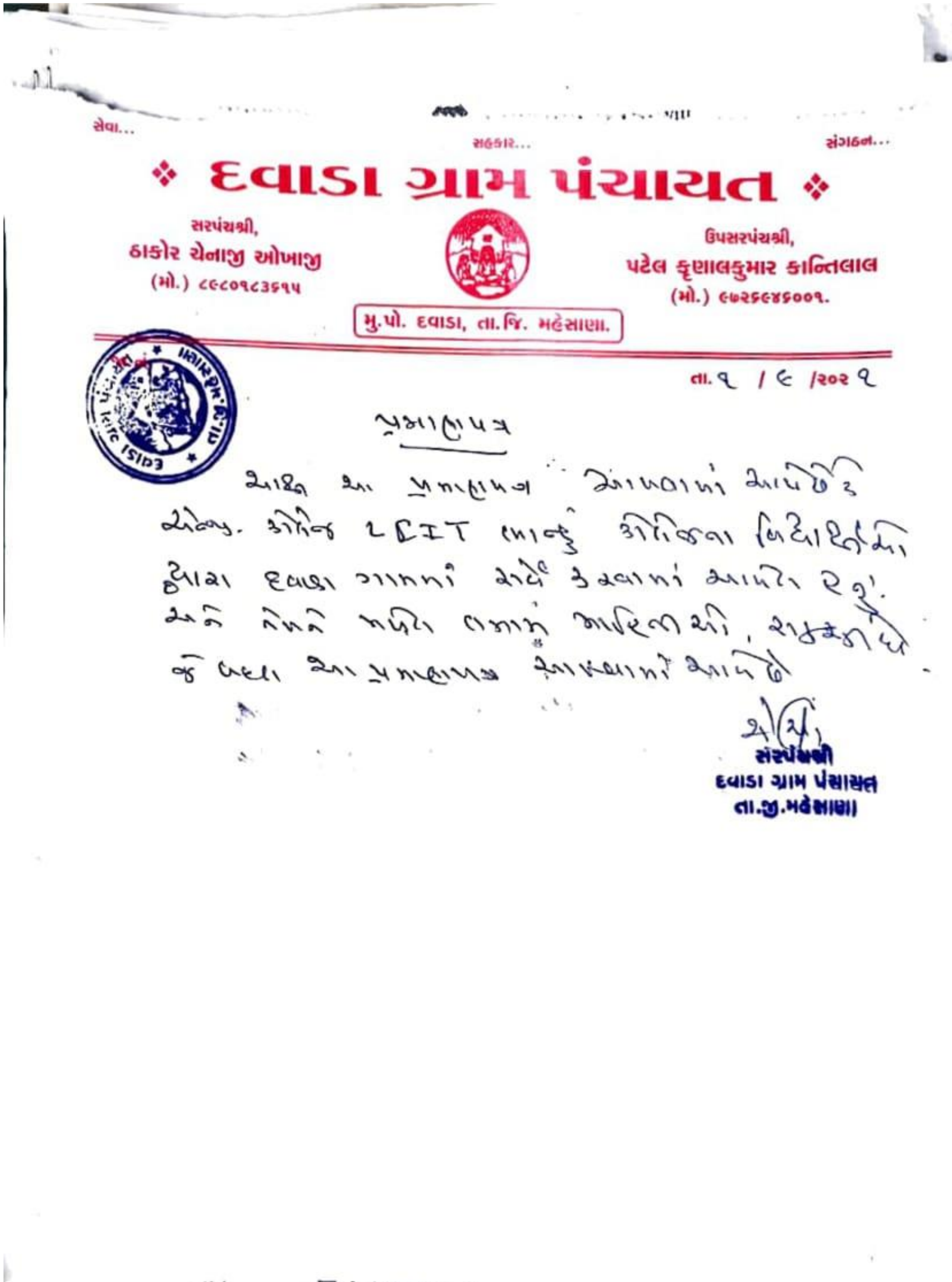
- **Smart village**

Fig (33) Summary of good photograph

12.8 Interaction with village sarpanch

Fig (34):- With Sarpanch

12.9 Sarpanch Letter giving information about the village development



સેવા... સહકાર... સંગઠન...

❖ દવાડા ગ્રામ પંચાયત ❖

સરપંચશ્રી,
ઠાકોર ચેનાજી ઓખાજી
(મો.) ૯૯૯૦૧૯૩૬૧૫

ઉપસરપંચશ્રી,
પટેલ કૃણાલકુમાર કાન્તિલાલ
(મો.) ૯૭૨૬૯૪૬૦૦૧.

મુ.પો. દવાડા, તા.જિ. મહેસાણા.

તા. ૧ / ૯ /૨૦૨૧

પ્રમાણપત્ર

સાક્ષી આ પ્રમાણપત્ર આપવામાં આવે છે કે સોલા. ઓપન LDIT માન્ય કોલેજના વિદ્યાર્થીઓ દ્વારા દવાડા ગામનો સર્વે કરવામાં આવેલ છે. અને તેમને મળેલ માહિતી [illegible] જે બદલ આ પ્રમાણપત્ર આપવામાં આવે છે.

સરપંચશ્રી
દવાડા ગ્રામ પંચાયત
તા.જી.મહેસાણા

Chapter 13: DESIGN PROPOSAL FOR VILLAGE DEVELOPMENT PART II

13.1 Design Proposals

There are some design proposals given from the Sarpanch and Talati:

1. Pickup stand
2. STP(Sewage treatment plant)
3. Avalo (Water tank for animals)
4. Post office
5. Skill Development Centre
6. Public garden

13.1.1 Pickup stand:-

Pickup stand is a very important in people life for transportation. Currently there has very poor Condition of Bus Stop is in Davada Village.

13.1.2 STP (Sewage treatment plant):-

Sewage treatment is Essential need for any village, the facilities and condition of sewage treatment plant is poor in Davada village.

13.1.3 AVALO (WATER TANK):-

Davada village does not have extra clean water facility tank for animal, so we propose water tank facilities in Davada village.

13.1.4 Post office:-

In Davada village the condition of post office is not good so we are providing a new design of post office to villagers with full facilities.

13.1.5 Skill development center:-

Poor quality of labour and farmer skills, less productivity, So skill development center has been provided.

13.1.6 Public garden:-

Public garden is an important in people life for to relax. And enjoying and playing for children‘s.

13.2 Reason for Students recommending this Design

- **Pickup stand:-** Is to provide transportation Facilities in village
- **STP (Sewage treatment plant):-**it is providing a safety and clean village to the people.
- **Avalo (Water tank): -**Is to provide clean water require for animal.
- **Post office: -** Is to provide courier facilities in village.
- **Skill Development center: -:-** To improve labour skill, farmer skill, Medical field skill etc.
- **Public garden: -**Public garden is an important in people life for to relax.

13.3 About designs Suggestions / Benefit of the villagers

- **Pickup stand :-** Currently there has poor Condition Bus Stop is in Davada Village, Thus we are proposing design of Bus Stop to reduce the travel time of villagers and to provide comfort and easy.
- **STP (Sewage treatment plant):-** A sewage system is important in culture for villagers; it is providing asafety and cleaning village for the people life.
- **Avalo: -** Source of clean water for animals.
- **Post office:-**If there is a post office in the village then the people of the village will not have to go to another village far away for courier.
- **Skill Development center: -**To increase skill of people by providing skill development center.
- **Public garden**:-Public garden is an important in people life for to relax. And enjoying and playing for children‘s.

13.1.1 PICK UP STAND

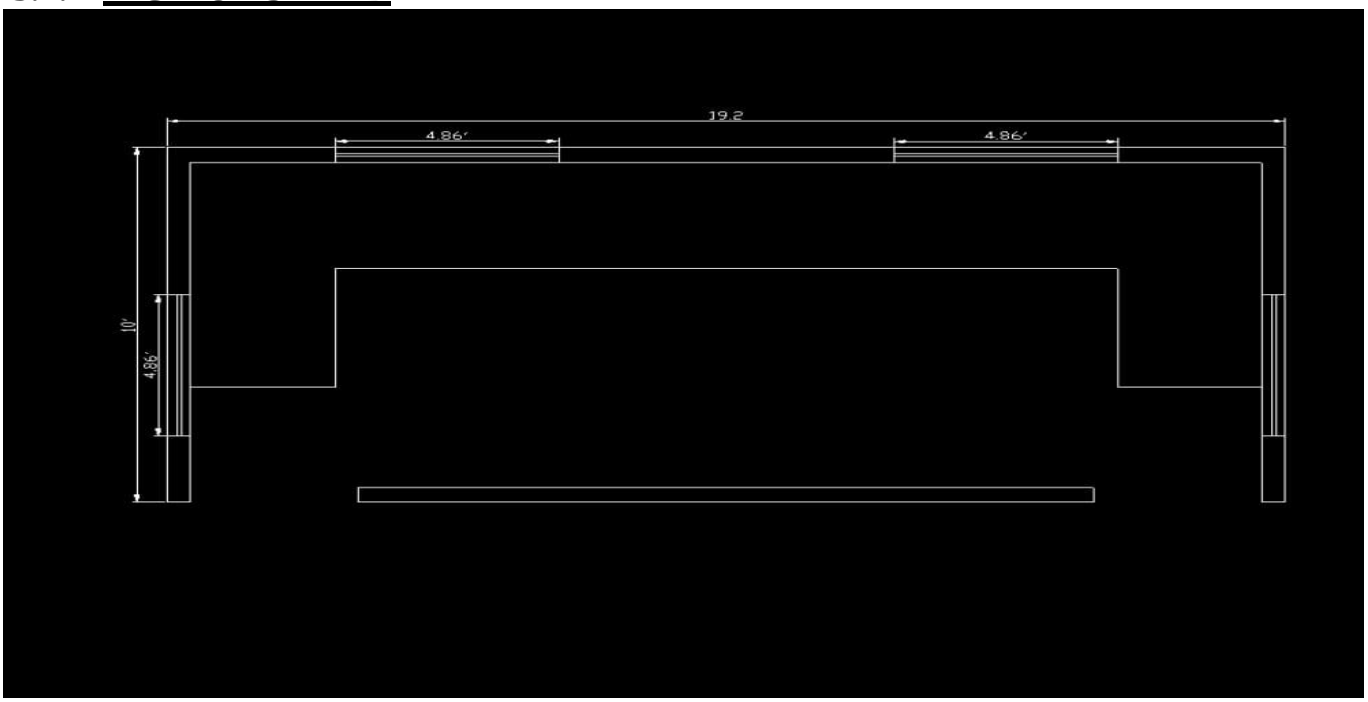


Fig (35) Pickup stands Plan

PICK UP STAND							
MEASUREMENT SHEET							
Item no.	**Item description**	**No**	**Length (m)**	**Breadth (m)**	**Height (m)**	**Quantity**	**Total Quantity**
1.	Excavation (0.9m×1.2m) Centre line method = 2*(6.3+3.3) =19.2	1	19.2	0.9	1.2	20.736	20.736m^3
2.	P.C.C.(1:4:8)	1	19.2	0.9	0.3	5.184	5.184m^3

3.	work up to plinth (plinth in C.M. : 1:6)	1 step 2 step 3 step	19.2 19.2 19.2	0.5 0.4 0.3	0.3 0.3 0.3	2.925 2.34 1.755	7.02m^3
4.	Brick masonry above plinth	1	19.2	0.3	3	17.55	9.89 m^3
5.	Deduction for door-window	D W Front side	1.8 1 4.86			7.66	
6.	R.C.C. Slab	1	6	3	0.12	2.13	2.13 m^3
7.	Plaster in C.M. :Ceiling Plaster	2 2 1	6 3 6	3	3 3	36 18 18	72 m^2

PICK UP STAND					
ABSTRACT					
Item no.	**Particulars of Item**	**Quantity**	**Per**	**Rate**	**Amount Rs.**
1.	Excavation	20.736m^3	m^3	300	6,220
2.	P.C.C.(1:4:8)	5.184m^3	m^3	2600	13,480
3.	work up to plinth (plinth in C.M. : 1:6)	7.02 m^3	m^3	3200	22,470
4.	Brick masonry above plinth	9.89m^3	m^3	6700	66263
5.	Plaster in C.M.	72 m^2	m^2	250	18000
6.	R.C.C. Slab	2.13m^3	m^3	4500	9585
7.	Earth filing	13.716m^3	m^3	310	4252
	TOTAL				**140270/-**

13.1.2 STP (Sewage treatment plant):-

➢ Process involved in Sewage Treatment plant:-

Sewage can be treated in different ways .Treatment process is often classified as:-

1. **Preliminary treatment**
2. **Primary treatment**
3. **Secondary (or Biological) treatment**
4. **Final treatment**

❖ PRELIMINARYTREATMENT:-

Preliminary treatment consists solely in separating the floating materials (like dead animals, tree branches, papers, pieces of rags, wood, etc.), and also the heavy settle able inorganic solids. It also helps in removing the oils and greases, etc. from the sewage. This treatment reduces the BOD of the wastewater, by about 15 to 30%. The process used are screening for removing floating papers, rags, clothes, etc., Grit chambers or Detritus tanks for removing grit and sand, and skimming tanks for removing oils and greases.

➢ Screening:-

Screening is the first unit operation used at wastewater treatment plants (WWTPs). Screening removes

objects such as rags, paper, plastics, and metals to prevent damage and clogging of downstream equipment, piping, and appurtenances. Some modern wastewater treatment plants use both coarse screens and fine screens.

- **Types of Screens:-**

Screens can be broadly classified depending upon the opening size provided as coarse screen (bar screens) and fine screens. Based on the cleaning operation they are classified as manually cleaned screens or mechanically cleaned screens. Due to need of more and more compact treatment facilities many advancement in the screen design are coming up.

- **Fine Screen:**

Fine screens are mechanically cleaned screens using perforated plates, woven wire cloths, or very closely spaced bars with clear openings of less than 20 mm, less than 6 mm typical. Commonly these are available in the opening size ranging from To 6 mm. Fine screens are used for pretreatment of industrial wastewaters and are not suitable for sewage due to clogging problems, but can be used after coarse screening. Fine screens are also used to remove solids from primary effluent to reduce clogging problem of trickling filters.

- **Coarse Screen:-**

It is used primarily as protective device and hence used as first treatment unit. Common type of these screens are bar racks (or bar screen), coarse woven-wire screens, and dominators. Bar screens are used ahead of the pumps and grit removal facility. This screen can be manually cleaned or mechanically cleaned. Manually cleaned screens are used in small treatment plants. Clear spacing between the bars in these screens may be in the range of 15 mm to 40mm.

➢ Grit Chambers

Grit chamber is the second unit operation used in primary treatment of wastewater and it is intended to remove suspended inorganic particles such as sandy and gritty matter from the wastewater. This is usually limited to municipal wastewater and generally not required for industrial effluent treatment plant, except some industrial wastewaters which may have grit. The grit chamber is used to remove grit, consisting of sand, gravel, cinder, or other heavy solids materials that have specific gravity much higher than those of the organic solids in wastewater. Grit chambers are provided to protect moving mechanical equipment from abrasion and abnormal wear; avoid deposition in pipelines, channels, and conduits; and to reduce frequency of digester cleaning. Separate removal of suspended inorganic solids in grit chamber and suspended organic solids in primary sedimentation tank is necessary due to different nature and mode of disposal of these solids. Grit can be disposed off after washing, to remove higher size organic matter settled along with grit particles; whereas, the suspended solids settled in primary sedimentation tank, being organic matter, requires further treatment before disposal.

- **Principle of Working of Grit Chamber**

Grit chambers are nothing but like sedimentation tanks, designed to separate the intended heavier inorganic materials (specific gravity about 2.65) and to pass forward the lighter organic materials. Hence, the flow velocity should neither be too low as to cause the settling of lighter organic matter, nor should it be too high as not to cause the settlement of the silt and grit present in the sewage. This velocity is called "differential sedimentation and differential scouring velocity".
The scouring velocity determines the optimum *flow through velocity.*

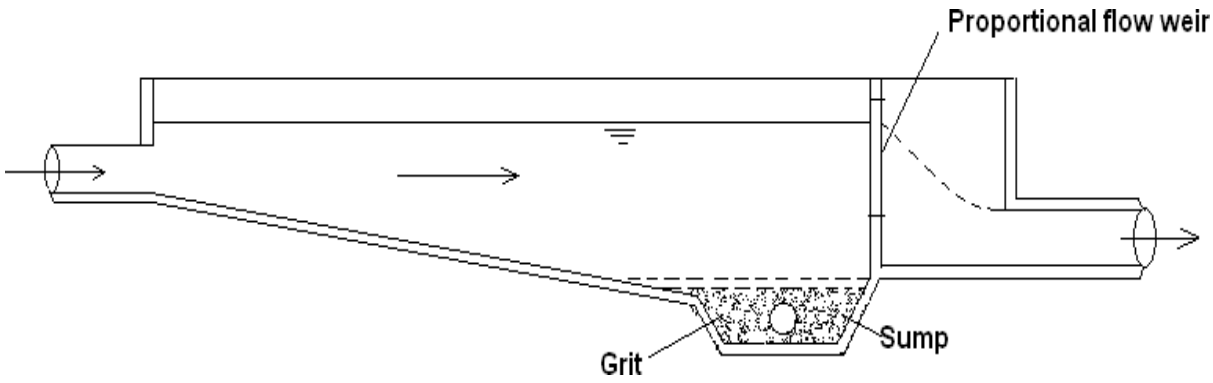


Fig (36) Horizontal flow Grit Chamber

❖ PRIMARY TREATMENT:-

Primary treatment consists in removing large suspended organic solids. This is usually accomplished by sedimentation in settling basins. The liquid effluent from primary treatment, often contains a large amount of suspended organic material, and has a high BOD (about 60% of original). Sometimes, the preliminary as well as primary treatments are classified together, under primary treatment.

The organic solids, which are separated out in the sedimentation tanks in primary treatment, are often stabilized by anaerobic decomposition in a digestion tank or are incinerated. The residue is used for landfills or soil conditioners.

The Primary Settlement or sedimentation tanks are designed to reduce the velocity of the wastewater flow, allowing heavier organic solids (called raw sludge) to settle. They are the first stage of treatment after the removal of rags and grit in the inlet works. Scrapers present in the tank move continuously along the floor of the tank to deposit the raw sludge in hoppers for removal. The scum which floats to the surface is directed by water jets or scum boards to the sludge sump. The raw, settled sludge is removed by pump or gravity feed to a sludge treatment process, either on site or via tanker to a larger processing centre. Approximately 60% of suspended solids and 35% of BOD removal efficiency can be achieved at this stage.

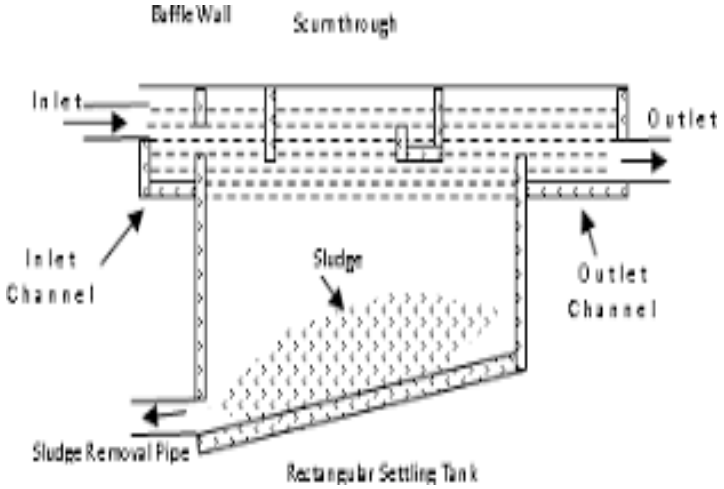


Fig (37) Primary sedimentation tank

❖ SECONDARY TREATMENT:-

Secondary treatment involves further treatment of the effluent, coming from the primary sedimentation tank. This is generally accomplished through biological decomposition of organic matter, which can be carried out either under aerobic or anaerobic conditions. In these biological units, bacteria will decompose the fine organic matter, to produce clearer effluent.

The treatment reactors, in which the organic matter is decomposed (oxidized) by aerobic bacteria are known as aerobic biological units; and may consist of Filters (intermittent sand filters as well as trickling filters), Aeration tanks, with the feed of recycled activated sludge (i.e. the sludge, which is settled in secondary sedimentation tank, receiving effluents from the aeration tank). Oxidation ponds and Aerated lagoons. Since all these aerobic units, generally make use of primary settled sewage, they are easily classified as secondary units.

➢ ACTIVATED SLUDGE PROCESS

The activated sludge process is a type of wastewater treatment process for treating sewage. The general arrangement of an activated sludge process for removing carbonaceous pollution includes the following items: An aeration tank where air (or oxygen) is injected in the mixed liquor. This is followed by a settling tank (usually referred to as "final clarifier" or "secondary settling tank") to allow the biological flocks (the sludge blanket) to settle, thus separating the biological sludge from the clear treated water.
The general arrangement of an activated sludge process for removing carbonaceous pollution includes the following items:

- Aeration tank where air or oxygen is injected in the mixed liquor.
- Settling tank (usually referred to as "final clarifier" or "secondary settling tank") to allow the biological flocks the sludge blanket to settle, thus separating the biological sludge from the clear treated water.
- Treatment of nitrogenous matter or phosphate involves additional steps where the mixed liquor is left in anoxic condition (meaning that there is no residual dissolved oxygen).

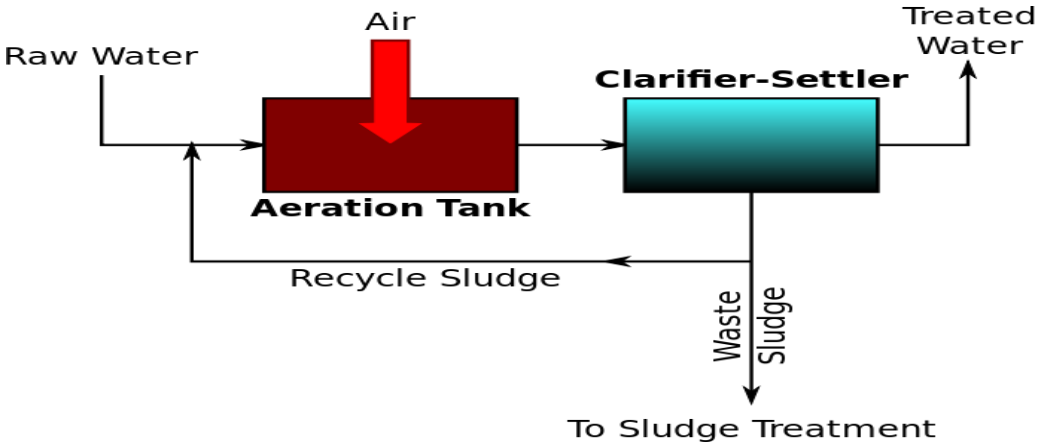


Fig (38) Activated Sludge Proce

➢ Sludge production:-

The amount of sewage sludge produced from the activated sludge process is directly proportional to the amount of wastewater treated. The total sludge production consists of the sum of primary sludge from the primary sedimentation tanks as well as waste activated sludge from the bioreactors. The activated sludge process produces about 70–100 kg/ML of waste activated sludge (that is kg of dry solids produced per ML of wastewater treated; one mega litter (ML) is 10^3 m^3). A value of 80 kg/ML is regarded as being typical. In addition, about 110–170 kg/ML of primary sludge is produced in the primary sedimentation tanks which

most - but not all - of the activated sludge process configurations use.

The general process control method is to monitor sludge blanket level, SVI (Sludge Volume Index), MCRT (Mean Cell Residence Time), F/M (Food to Microorganism), as well as the biota of the activated sludge and the major nutrients DO (Dissolved oxygen), nitrogen, phosphate, BOD (Biochemical oxygen demand), and COD (Chemical oxygen demand). In the reactor/aerator and clarifier system, the sludge blanket is measured from the bottom of the clarifier to the level of settled solids in the clarifier's water column; this, in large plants, can be done up to three times a day.

The SVI is the volume of settled sludge in milliliters occupied by 1 gram of dry sludge solids after 30 minutes of settling in a 1000 milliliter graduated cylinder. The MCRT is the total mass (lbs.) of mixed liquor suspended solids in the aerator and clarifier divided by the mass flow rate (lbs./day) of mixed liquor suspended solids leaving as WAS and final effluent. The F/M is the ratio of food fed to the microorganisms each day to the mass of microorganisms held under aeration. Specifically, it is the amount of BOD fed to the aerator (lbs./day) divided by the amount (lbs.) of Mixed Liquor Volatile Suspended Solids (MLVSS) under aeration. Note: Some references use MLSS (Mixed Liquor Suspended Solids) for expedience, but MLVSS is considered more accurate for the measure of microorganisms. Again, due to expedience, COD is generally used, in lieu of BOD, as BOD takes five days for results. Based on these control methods, the amount of settled solids in the mixed liquor can be varied by wasting activated sludge (WAS) or returning activated sludge (RAS).

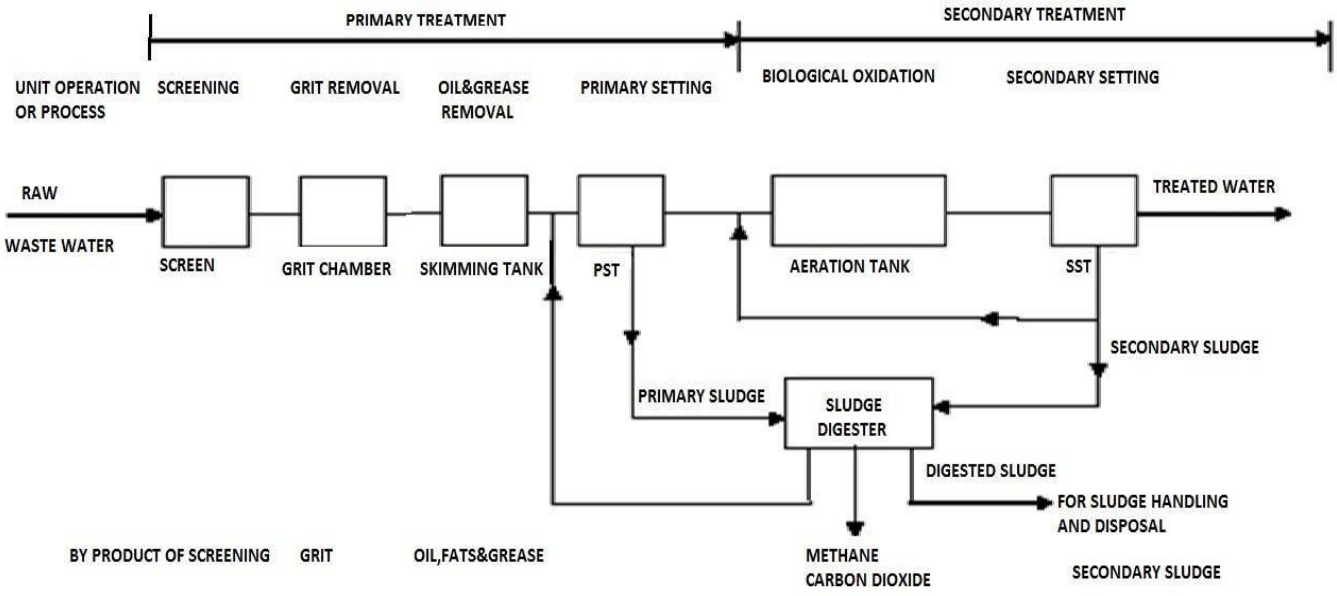
➢ Sludge Digestion Process

The residue that accumulates in sewage treatment plants is called sludge (or bio solids). Sewage sludge is the solid, semisolid, or slurry residual material that is produced as a by-product of wastewater treatment processes. This residue is commonly classified as primary and secondary sludge. Primary sludge is generated from chemical precipitation, sedimentation, and other primary processes, whereas secondary sludge is the activated waste biomass resulting from biological treatments. Some sewage plants also receive sewage or septic tank solids from household on-site wastewater treatment systems. Quite often the sludge is combined together for further treatment and disposal.

Treatment and disposal of sewage sludge are major factors in the design and operation of all wastewater treatment plants. Two basic goals of treating sludge before final disposal are to reduce its volume and to stabilize the organic materials. Stabilized sludge does not have an offensive odour and can be handled without causing a nuisance or health hazard. Smaller sludge volume reduces the costs of pumping and storage.

❖ THE FINAL OR ADVANCED TREATMENT

This treatment is sometimes called tertiary treatment, and consists in removing the organic load left after the secondary treatment, and particularly to kill the pathogenic bacteria. This treatment, which is normally carried out by chlorination, is generally not carried out for disposal of sewage in water, but is carried out, while using the river stream for collecting water for re-use or for water supplies. It may, however, sometimes be adopted, when the outfall of sewage is very near to the water intake.



FLOW DIAGRAM OF SEWAGE TREATMENT PLANT

Fig (39) Flow Diagram of sewage treatment plant

❖ DESIGN OF SEWAGE TREATMENT PLANT:-

➢ Design of screening:-

Maximum Flow = 30 MLD

= 0.347 m^3/sec Shape of bars = M.S Bars

Size =10x50mm^2 (10mm facing flow)

Clear spacing = 30mm (6-40mm for medium screens) Velocity of flow = 0.8m/s (0.6-0.9m/s)

Hence, net submerged area of screen openings=0.347/0.8=0.44m^2

Gross vertical area required = 0.44sin60=0.38m^2

providing a depth of 0.3m

Width of channel = 0.38 / 0.3 = 1.3m

The velocity of flow in screen chamber= 0.347 / 0.3×1.3 = 0.89m/s

This is greater than 0.42m/s (self-cleansing velocity) with spacing of 30mm.

No. of bars required = 1.3 / 0.03+0.01 =33bars

Actual width of screens = 33x0.4=1.32m

Actual depth of sewage flow = 0.38/1.32= 0.3m

Providing a free board of 0.5m Total depth of screen =0.3+0.5= 0.8m

Hence, size of screen = 1.32m x 0.8m

➢ Design of grit chamber

To prevent scouring of already deposited particles the magnitude of _sho u l d not exceed critical horizontal velocity V_C, and the above equation becomes

$$\frac{L}{H} = \frac{Vc}{Vo}$$

The critical velocity, V_C, can be given by the following equation (Rao and Dutta, 2007):-

$$V_C = \sqrt{\frac{8g}{f}} (G_s - 1)\, d$$

Where,
β= constant
= 0.04 for uniform granular sand
= 0.06 for non-uniform sticky material
f = Darcy –Weisbach friction factor = 0.03 for gritty matter g = Gravitational acceleration,
G_s = Specific gravity of the particle to be removed (2.65 for sand), and d = Diameter of the particle, m

$$V_C = \sqrt{8 \times 9.81 \times 0.06 (2.65 - 1) \times 0.2 / 0.03 \times 1000}$$

= 0.228m/s (0.17-0.26m/s)

The grit chambers are designed to remove the smallest particle of size 0.2 mm with specific gravity around 2.65. For these particles, using above expression the critical velocity comes out to be V_C = 0.228m/sec. Keeping horizontal velocity 0.2m/s (<0.228m/s) to prevent scouring and detention time 60 sec (vary from 40-60s).

To lower the velocity, hydraulic structures like Sutro weir and Parshalflume should be provided.Length of grit chamber = velocity of flow x detention time

=0.2x60

=12m

Volume of grit chamber = discharge x detention time

=0.347 x 60

=20.82m^3

Cross-section are of flow = volume/ length

= 20.82 / 12 = 1.735 m^2

Providing width of grit chamber = 3m Depth of grit chamber =1.735/3
=0.58m

Now assuming grit generation = 0.05m^3 per 1000m^3 of sewage
Even through grit is continuously raked, still 8hrs grit storage is provided for avg. flow

Storage volume required =30,000x8x0.05/(24x1000)=0.5m^3
Thus grit storage depth = 0.5/1.735= 0.3m
Also providing free board = 0.5m
Total depth of grit chamber = 0.5+0.3+0.58= 1.38m

~1.5m

Hence, *Size of grit chamber = 12mx3mx1.5m*

- **Design of skimming tank**

Detention time = 3 to 5 minutes

Compressed air required = 300 to 6000m^3 per million liters Surface area required,

= A = 0.0062 q/ Vr

Where,

q=Rate of flow of sewage in m/day

Vr = Minimum rising velocity of greasy material to be removed in m/minute

=0.25 m/minute in most cases.

A = 0.00622 x 30,000 / 0.25 = 746.4m2

Providing a square tank

Side of tank = 27m

Hence provide a skimming tank of size =27x27m^2

Actual area of tank = 27x 27 = 729m2

➢ Primary sedimentation tank

Continuous flow tank is to be provided,
Detention time = 2hrs (1-2hrs)
Quantity of sewage treated in 2hrs
V = 30,000x2/24 = 2500m3
Now, assuming the low velocity through the tank is 0.3m/minute.
The length of the tank required = Velocity of low x Detention period
= 0.3 x (2 x 60) m
= 36m
Cross-sectional area of the tank required = Capacity of the tank / Length of the tank
= 2500/36
= 70m2
Assuming the water depth in the tank (i.e. effective depth of tank) =
5.5mthe width of the tank required = Area of cross−section / Depth
= 70/5.5
= 13m
Since the tank is provided with mechanical cleaning arrangement, no space at bottom is required for sludge zone.
Now, assuming free-board of 0.5 m
The overall depth of the tank = 5+0.5 = 6 m.
Hence, a rectangular sedimentation tank with an overall size of 36x13x6 m3 can be used.

➢ Design of aeration tank

Providing conventional aeration process:-
The total BOD entering STP = 189 mg / L (known)
Assuming that negligible BOD is removed in screening and grit (since it mainly removes inorganic solids), the BOD of sewage aeration tank = 189 mg/L.
BOD left in the effluent = Y0 = 25 mg/L
BOD removed in activated plant = 189-25 = 164 mg/L
Minimum efficiency required in the activated plant =164/189
= 86.77% (85-92%)
Since the adopted conventional aeration process can remove BOD up to 85-92 % Volume of the Aeration Tank can be designed by assuming a suitable value of MLSS and, θc (or F/M ratio).
Let us assume MLSS =2500 mg/L; (between 1500-3000 mg/L)
F/M ratio = 0.3 (between 0.3 to 0.4)
Now, using equation = $F/$ M = Q/V x Y_0/ X_T
= 0.3 = 30000 x189 / (V x 2500)
V = 7500 m^3

Aeration tank design

Let us adopt an aeration tank of liquid depth = 5m
Width of tank = 20m
The length of tank = V / Bx D
= 7500 / 20 x 5
= 75m
Provide two aeration tanks, each of length 37m.
Check for volumetric loading = Q x Yo /V
=30,000×189 / 7500
= 0.7 (0.4-0.7)
Check for return sludge ratio = Qr / Q = X^T/ $10^6 – X^T$
= 2500 / 10000 – 2500
= 0.33 (0.25-0.5)
Check for sludge retention time (θc) = V. $X_T = ay\ (Yo - YE)$ Qθc / 1+$Ke\theta c$
Where, $ay = 1$ (which is constant for municipal sewage w.r.t MLSS
Yo = 189mg/l
YE = 25 mg/l
XT = 2500 mg/l
V = 7500m3 Ke
Q = 30,000 m3/day
As all the parameters of design are coming in range,

Hence design is okay.
By providing a freeboard of 0.5m
Thus aeration tank dimensions = 37m×20m×5.5m

➢ Aerator sizing

BOD applied to tank = 189 mg/l
Average flow in tank =30,000 m3/day
BOD to be removed in tank = 189×30000×1000 / 1000000
= 5670 kg/day = 236.25
kg/hr.Oxygen requirement = 1kg/kg
BOD applied Peak oxygen demand = 125 %
Oxygen transfer capacity of the aerator in standard conditions = 1.9 kg/kWh = 1.41 kg/HP/hr
Oxygen transfer capacity of aerators at field conditions = 0.7* 1.41 0.98 kg/HP/hr
Oxygen to be applied in tank = 1×236.25×1.25= 295.32kg
HP of aerator required = 295.32/0.98 = 300 HP
Thus, provide 10 generators of 30 HP each, with 1 generator at standby

➢ Design of secondary clarifier

No. of secondary clarifier = 1 No.
Average flow = 30,000m3/day
Recalculated flow, assuming 50 % = 15000 m3/day
Total inflow = 45000 m3/day
Provide hydraulic retention time = 2 hrs.
Volume of tank = 45000x2/24 = 3750 m3
Assume liquid depth = 5m
The Area is calculated as:-
Area = volume /depth = 3750/5 = 750m2

Surface loading rate of average flow = 30m3/m2/hr (25-35m3/m2/hr)
Surface area to be provided = 30000/30
= $1000m^2$
Taking area whichever is higher = 1000m2
Dia. of Circular tank (d) = $\pi/4 \times d^2 = 1000$
d = 35m
Check for Weir Loading = Average flow = 30000 m3/day
Recalculated flow = 15000 m3/day
MLSS in tank = 2500 mg/L
Thus, total solid in inflow = 45000×2500×1000 / 1000000
= 112500 kg/day
Solid loading = 112500/1000
= 112.5 kg/day/m2
providing freeboard of 0.5m
Size of secondary clarifier = diameter of 35m with an overall depth of 5.5m.

➢ Design of Sludge Digestion Tank:-

Avg. flow = 30 MLD
Total suspended solids = 428 mg/L
Mass of suspended solids in 30 MLD of sewage flowing per day = $30 \times 10^6 \times 428/10^6$
= 12840 kg/day

Assuming, that 65% (60-65%) solids are removed in primary settling tank = 65x12840/100
= 8346 kg/day
Assuming that the fresh sludge has moisture content of 95 % (95-98%)
means 5 kg of solids will make =100 kg of wet sludge = 8346
Will make = 100x8346/5
= 166920 kg/day of wet sludge
Assuming the sp. gravity of wet sludge as = 1.015
V1 = 166920/1015 = 164.45 m3/day
The volume of digested sludge produced per day at 75% moisture content is given by formula
= V2 = V1(100-P1)/(100-P)
= 164.45(100-95)/ (100-75)
V2 = 32.89 m3/day
Now, assuming the digestion period as 30 days,
Capacity of digestion tank required = V1t – 0.67(V1-V2)t
= 164.45×30 – 0.67(164.45 – 32.89) x30 =2302.3 m3
Now, providing 6.0 m depth of the cylindrical digestion tank
Cross-sectional area of the tank = 2302.3/6
= 383.72 m2
Dia of tank = $\pi/4 \times d2 = 383.72$
= 22m
Hence, provide a cylindrical sludge digestion tank 6 m deep and 22 m diameter, with an additional hoppered bottom of 1:1 slope for collection of digested sludge.

➢ Estimation of gas produced from Digester Tank:-

Total suspended solids in sewage = 428 mg/L
Assuming that 60% of suspended solids are removed in the primary sedimentation tank,
we have

The suspended solids removed as sludge = 60% of 428
=256.8 mg/L
Now, assuming that the volatile solids present are 70% of the suspended solids,
we have
Volatile solids removed = 70% of 256.8
= 180 mg/L
Further, assuming that the volatile matter is reduced by 65% sludge digestion,
Volatile matter reduced = 65 % of 180
= 116.84mg/L
Hence, volatile matter reduced in 30,000 cu m of sewage = 116.84×30000×1000 / 100000
= 3505.3 Cu.m
Now, assuming that 0.9 cu. m of gas is produced per kg of volatile matter reduced,

Total quantity of gas produced = 0.9x 3505.3
= 3154.79 cu m.
Assuming that the produced gas contains 65% methane and 30% CO2,
Methane Produced = 0.65 x 3154.79
= 2050.6 cu m.
Carbon dioxide produced = 0.30 x 3154.79
= 1104.18 cu m
Now, assuming that the methane in the sludge gas has a fuel value of 36000 kJ / m3
the fuel value = 36,000 x 2050.6
=73.82 MkJ

Now, assuming a boiler efficiency of 80 %, the amount of heat that can be furnished by the boiler
= 80% of 73.82
= 59.06 M.kJ
= 59.06 / 4.12
= 14.335 Million kilo Calories.

The gas collected may be utilized for operating engines, and for heating sludge to promote quick digestion.

❖ RESULTS & DISCUSSION -

After following the designing procedure, the size of different treatment units required are as follows-

- SIZE OF SCREEN – 1.32m x 0.8m
- SIZE OF GRIT CHAMBER – 12m x 3m x 1.50m
- SIZE OF SKIMMING TANK – 27m x 27m
- SIZE OF PST – 36m x 13m x 6m
- SIZE OF AERATION TANK – 37m x 20m x 5.5m
- SIZE OF AERATOR – 11 GENERATORS OF 30 HP
- SIZE OF SECONDARY CLARIFIER – DIA 35m with 5.5m DEPTH
- SIZE OF SLUDGE DIGESTION TANK – DIA 22m with 6m DEPTH
- GAS PRODUCED FROM DIGESTION TANK – 3154.79 cu. m

AS THESE PARAMETERS ARE COMING WITHIN SPECIFIED RANGE HENCE, THE DESIGN IS OKAY.

13.1.3 AVALO (WATER TANK FOR ANIMALS):

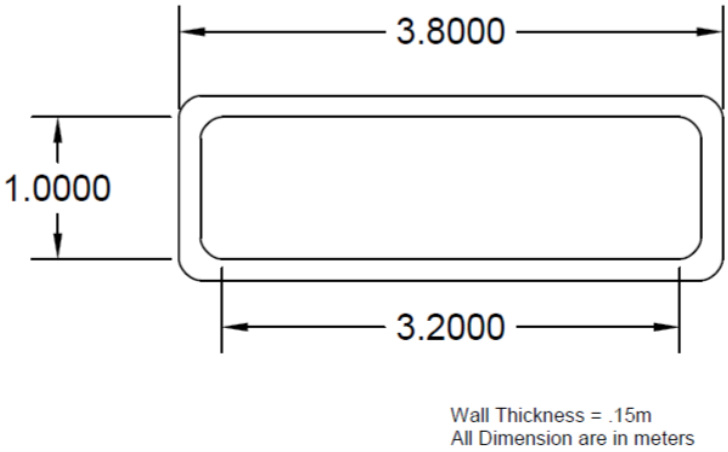


Fig (40) Avalo (Water tank for animals)

Avalo (Water tank for animals)								
MEASUREMENT SHEET								
CENTER LINE = 9.6M								
ITEM	**DESCRIPTION**	**UNITS**	**NO**	**L**	**B/W**	**H/D**	**QUANTIY**	**TOTAL Q**
ITEM NO.:- 1								
	Excavation for Foundation							2.3 m3
	Area = 3.9 * 1	Cu.m.	1	3.9	1	0.6	2.3	
ITEM NO.:- 2								
	B.B.C.C. work in foundation							0.37 m3
	Area = 3.5 * .7	Cu.m.	1	3.5	0.7	0.15	0.37	
ITEM NO.:- 3								
	Brick masonry work in foundation and	Cu. m	1	9.6	0.15	0.7625	1.1	1.1 m3
ITEM NO.:- 4								
	Exterior wall	Cu.m.	1	9.6		0.1625	1.56	
	Interior wall	Cu.m.	1	9.6		0.6125	5.88	
	Upon BBCC	Cu.m.	1	3.5	0.7		2.45	

Avalo (Water tank for animals)						
ABSTRACT						
Sr.	**Item Description**	**Quantity**	**Rate**	**Per**	**Amount**	**Remarks**
1	Excavation work	2.3	180	Cu.m.	414	
3	BBCC foundation	0.37	2100	Cu.m.	777	
4	Brickwork in superstructure and foundation	1.1	3900	Cu.m.	4290	
5	Total plaster	9.89	140	Sq.m.	1384.6	
	Total Rupees	6865.6				
	Contingency 5% Rupees	343.28				
	2% water charges	137.312				
	Total Amount Rupees	**7346.19**				
	Say Rupees	**7400.00/-**				

13.1.4 POST OFFICE:

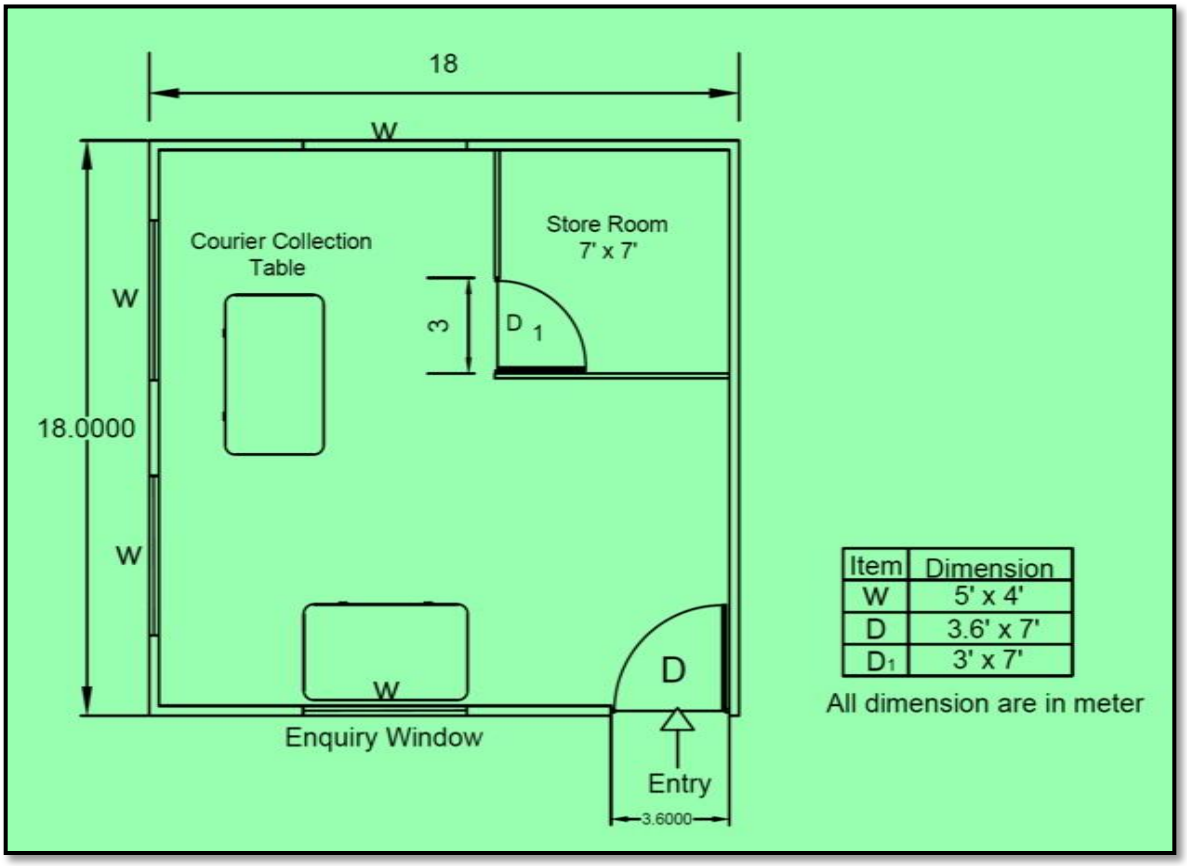


Fig (41) Post office

POST OFFICE							
MEASUREMENT SHEET							
Sr NO	**DESCRIPTION**	**UNITS**	**NO**	**L**	**B/W**	**H/D**	**QUANTIY**
1	Excavation for Foundation L=70.80	Cu.m.	1	69.9	0.9	1.1	69.20
2	C.C. work in foundation L=70.80	Cu.m.	1	69.9	0.9	0.2	12.58
3	Brick masonry work in foundation						
	1st step						
	L=70.8-2*0.6/2	Cu.m	1	70.2	0.6	0.3	12.63
	2nd step						
	L=70.8-2*(0.5/2)	Cu.m	1	70.3	0.5	0.3	10.54
	3rd step						
	L=70.8-2*(0.4/2)	Cu.m	1	70.3	0.4	0.9	25.31
	Total Brick masonry work in foundation	Cu.m .					48.49
4	Brick masonry work in						
	super structure						
	Outer wall	Cu.m.	1	70.5	0.3	3.7	78.25
	Partition wall		2	7	0.3	3	12.6
	Deduction for door & Windows						
	Door D	Cu.m.	2	1.2	0.3	2.1	1.51
	Windows W		1	2	0.3	1.5	0.9
	Windows W1	Cu.m.	3	1	0.3	1.5	1.35
	Total	Cu.m.					3.76
4	Deduction for lintel						
	Door D	Cu.m.	2	1.2	0.3	0.1	0.072
	Windows W	Cu.m.	1	2	0.3	0.1	0.06
	Windows W1	Cu.m.	3	1	0.3	0.1	0.09
	Total	Cu.m.					0.22
	Total Brick masonry Work	Cu.m.					86.87
5	Brick masonry work in step						
	Step: 1	Cu.m.	1	1.5	0.3	0.15	0.22
	Step: 2	Cu.m.	1	1.5	0.3	0.15	0.22
		Cu.m.				Total	0.45
6	D.P.C at plinth level						
	For 300mm thick wall	SQM	1	70.5	0.3	0.05	1.057

7	Earth filling						
		Cu.m		17.4	17.4	0.6	181.65
8	Plastering	SQ.M	4	17.4		3	52.2
		SQ.M	2	7		3	21
			1	17.4	17.4		302.76
	TOTAL	SQ.M					375.96
	Deduction for door & Windows						
	Door D	SQ.M	2	1.2		2.1	5.04
	Windows W	SQ.M	1	2		1.5	3
	Windows W1	SQ.M	3	1		1.5	4.5
	Total	SQ.M					12.54
	Total Paltering	SQ.M					363.42
9	White wash	SQ.M					363.42
	(Same as Plastering)						
10	RCC Work for	CU.M	1	18	18	0.15	48.6
	Slab						

POST OFFICE

ABSTRACT SHEET

Sr. No.	**Item description**	**Quantity**	**Rate**	**Per**	**Amount**
1	Excavation work	69.20	155	Cu.m.	10726
2	P C.C	12.58	3000	Cu.m.	37740
3	Brickwork in foundation	48.49	3200	Cu.m.	155168
4	Brickwork in superstructure	86.87	3500	Cu.m.	304045
5	Brickwork in steps	0.45	3200	Cu.m.	1440
6	D.P.C at plinth level	1.057	4900	Cu.m.	5179.3
7	Earth filling	181.66	50	Cu.m.	9083
8	Plastering	363.42	150	Sq.m.	54513
9	Whitewash	363.42	25	Sq.m.	9085.5
10	Rcc work for slab	48.6	8800	Cu.m.	427680
	Total Rupees				1014659.8
	Contingency 05.00%				50732.99
	10% contractor charges				101465.98
	Total Amount Rupees				1166858.77
	Say Rupees				**1167000.00**

13.1.5 SKILL DEVELOPMENT CENTRE

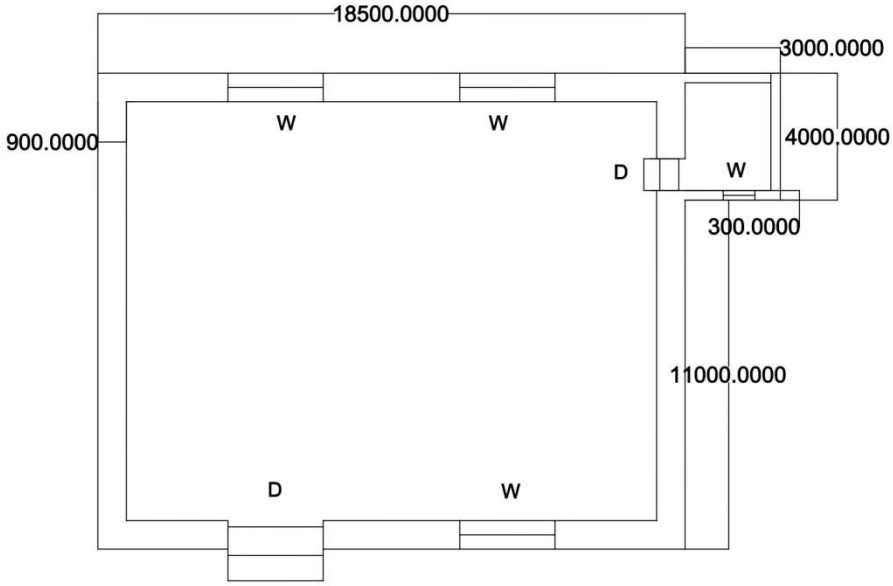


Fig (42) Plan of Skill Development center

SKILL DEVELOPMENT CENTRE							
MEASUREMENT SHEET							
Item No	Design of work	No	L	B	H	Quantity	total
1	Excavation for foundation						
	Long wall	2	6.20m	0.90m	1.00m	11.16	17.5
	Short wall	2	3.40m	0.90m	1.00m	6.12	
	Steps In front of door	1	1.30m	0.75m	0.15m	0.15	
2	Cement concrete in foundation(1:6:18)						
	long wall	2	6.2	0.9	0.3	3.35	5.34
	Short wall	2	3.4	0.9	0.3	1.84	
	Steps	1	1.3	0.75	0.15	0.15	
3	Reinforced cement concrete(1:2:4)lintels						
	Door	2	1.3	0.3	0.15	0.6	0.78
	Window	3	1.3	0.3	0.15	0.18	
	Sunsheds						
	Door	1	1.3	0.38	0.12	0.6	0.78
	Window	3	1.3	0.38	0.12	0.18	
	Roof Slabs						
	Room	1	5.9	4.9	0.15	4.33	4.33
4	Dumps proof course						
	long wall	2	5.7	0.35	0	3.99	6.79
	Short wall	2	4	0.35	0	2.8	

5	Brick work for foundation and plinth						
	longwall1ststep	2	5.9	0.6	0.2	1.41	11.12
	2nd step	2	5.8	0.5	0.2	1.16	
	3rdstep	2	5.7	0.4	0.9	4.1	
	Shortwall1ststep	2	3.7	0.6	0.2	0.89	
	2nd step	2	3.8	0.5	0.2	0.76	
	3rdstep	2	3.9	0.4	0.9	2.8	
	Steps in Front of						
	1st step	2	1	0.6	0.2	0.12	0.18
	The door 2nd step	2	1	0.3	0.2	0.06	
	DeductD.P.C.wideitem4above	1	6.5	0.04	0	0.26	0.26
6	Brick work in cement mortar In super structure						
	Long wall	2	5.6	0.3	3.5	11.76	20.16
	Short wall	2	4	0.3	3.5	8.4	
	Deduct Door						
	Window	1	1	0.3	2	0.63	1.98
	RCC lintel	3	1	0.3	1.5	1.35	
7	Conglomerate Floor						
	Room Trapping	1	5	4	0	20	20
	Door	1	1	0.35	0	0.5	0.35
8	woodwork						
	Door	1	1	0	2.1	2.1	3.6
	window	3	1	0	1.5	1.5	
9	Cement plaster1.25cmthick						
	Inside room	1	18	0	3.5	63	145
	outside room	1	20	0	4.1	82	
	Ducat						
	Door	1	1	0	2.1	2.1	5.1
	Window	3	1	0	1	3	
10	Painting chocolate painting Do Or and window	2	6.6	1.3	17.16	17.16sqm	

SKILL DEVELOPMENT CENTRE

ABSTRACT SHEET

Sr.no	Particular items	Quantity	Per	Rate	Amount
1	Earth work excavation for foundations	17.5	CuM	292	5110
2	CONCREATE Cement Concrete in Foundation	5.34	CuM	250	1335
3	Reinforced cement concrete	4.81	CuM	5000	24050
4	Dump proof course for cement concrete	6.5	Sq.m.	340	2210
5	BRICK WORK B.B. In mud mortar in foundation and plinth	11	CuM	310	3410

6	un mortar in superstructure	18	CuM	320	5760
7	FLORING conglomerate flooring4cm.Thickover	20	Sq.m.	500	10000
8	WOOD WORK Deodar wood door and window	6.6	Sq.m.	2500	16500
9	FINISHING Cement plaster 1.25thick	140	Sq.m.	100	14000
10	Painting chocolate painting To door and window of a nap proved quality	17.16	Sq.m.	70	1201
	Total construction Cost			Rs.83,576/-	
	10%ContractorProfit			Rs.8,357.6/-	
	5%PainterProfit			Rs.4,178.8/-	
	Overall Cost			Rs.96,112.4/-	

13.1.6 PUBLIC GARDEN:-

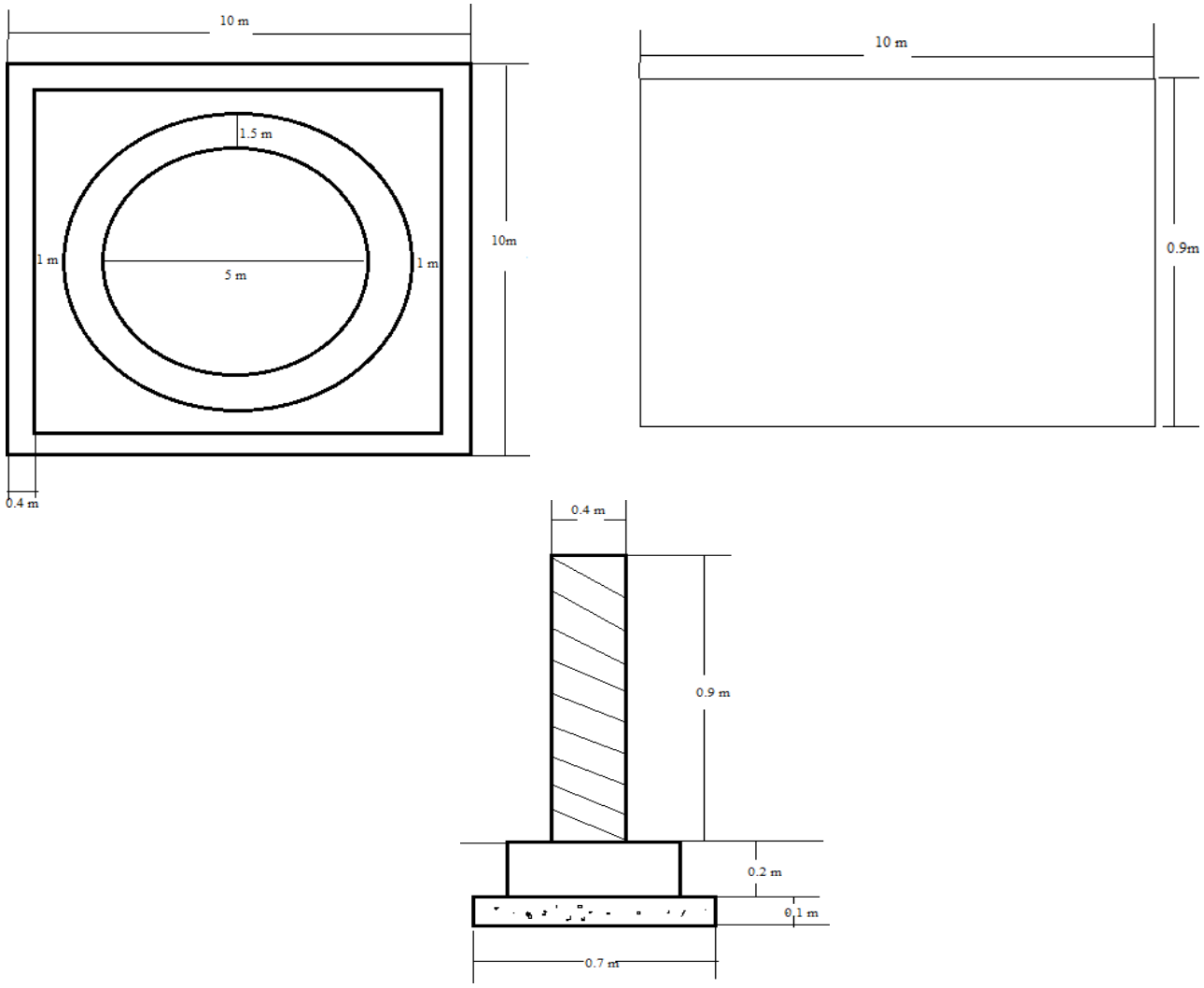


Fig (43) Plan Elevation and Section of Public Garden

PUBLIC GARDEN						
MEASUREMENT SHEET						
Item No.	**Item description**	**No.**	**Length**	**Breadth**	**Height**	**Quantity**
Total centerline length: = (2*10.4) + (2*10.4) =41.6m						
1	Excavation	1	41.6	0.7	0.3	8.736m3
2	PCC	1	41.6	0.7	0.1	2.912 m3
3	First step	1	41.6	0.5	0.2	4.16 m3
4	Wall	1	41.6	0.4	0.9	14.976m3
Deduction :	Gate	1	1	0.4	0.9	(-)0.36m3

PUBLIC GARDEN					
ABSTRACT SHEET					
Sr. No.	**Item description**	**Quantity**	**Rate**	**Per**	**Amount**
1	Excavation work	8.736	155	Cu.m.	1354.08
2	P C.C	2.912	3000	Cu.m.	8736
3	First step	4.16	150	Cu.m.	624
4	Wall	14.62	200	Cu.m.	2924
5	Brick	9385	5	Cu.m	46925
6	Sand:	5.31	800	Cu.m	4248
7	Cement:	25 bags	280	bag	7000
8	Plastering	41.6	150	Sq.m	6240
9	Labour charge	8	200	day	1600
	Total Rupees				79651
	Contingency 05.00%				3982.55
	10% contractor charges				7965.1
	2% Water charge				1593
	Total Amount Rupees				93191.65
	Say Rupees				**93200.00/-**

Chapter 14: Technical Options with Case Studies

14.1 Civil Engineering:-

14.1.1 Advanced Earthquake Resistant:-

14.1.1.1 ABSTRACT:

Earthquakes are the indication of transformation in the earth‘s internal structure. Seismic activity is common in most parts of the world, though the frequency of its occurrence is a function of local tectonic setup. The past earthquake experiences have demonstrated huge loss of life and building stock, affecting the social and economic conditions of a country. Though it is not possible to prevent an earthquake, the least that can be achieved in reducing the damage is to make the buildings earthquake resistant. With the advancement in our understanding of the earthquakes, most of the countries have mandated the incorporation of seismic provisions in building design and architecture.

Apart from the modern techniques which are well documented in the codes of practice, there are some other old traditional earthquake resistant techniques which have proved to be effective for resisting earthquake loading and are also cost effective with easy constructability. Consequently, a combination of innovative seismic retrofitting methods appeared to be more effective, achieving a more resistant building under seismic hazards, by improving the stability and ductility of the structure. This gives rise to further researches and investigations for future solutions regarding seismic retrofitting applications and methodologies.

14.1.1.2 INTRODUCTION:-

Disasters are unexpected events which have adversely affected humans since the dawn of our existence. In response to such events, there have been attempts to mitigate devastating effects of these disasters. Results of such attempts are very encouraging in developed countries but unfortunately and miserably poor in developing countries including ours. Earthquakes are one of the nature‘s greatest hazards on our planet which have taken heavy toll on human life and property since ancient times . The sudden and unexpected nature of the earthquake event makes it even worse on psychological level and shakes the moral of the people. Man looks upon the mother earth for safety and stability under his feet and when it itself trembles, the shock he receives is indeed unnerving. Mitigation of the devastating damage caused by earthquakes is of prime requirements in many parts of the world. Since earthquakes are so far unpreventable and unpredictable, the only option with us is to design and build the structures which are earthquake resistant. Accordingly attempts have been made in this direction all over the world. Results of such attempts are very encouraging in developed countries but miserably poor in developing countries including our country India.

Earthquakes are a crucial problem worldwide since it leads to disastrous damages such as failure and collapse of buildings, loss of human lives and loss of homes. In addition, earthquakes lead to a massive economy including loss of built structures and recovery costs of damaged buildings and infrastructure, the effects that earthquakes cause to structures.

❖ **Understanding of earthquake and Basic Terminology**

Earthquake is defined as a sudden ground shaking caused by the release of huge stored strain energy at the interface of the tectonic plates.

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

earthquake.

- **Focus**: - It is the point within the earth from where the seismic waves originate.
- **Focal Depth**: - It is the vertical distance between Focus and epicenter.

Fig (44): Bridge collapse due to earthquake

Fig (45): Building Collapse due to earthquake

In addition, the earth consists of three layers; the first one is the crust layer which is the surface of the earth the second one is the mantle layer which is the second inner part of the earth and last one the core layer which is the most inner part of the earth. When the surface of the earth creates a sudden movement, this in turns creates an earthquake, and strain energy is released causing the seismic waves through the crust. The earthquakes are largely concentrated to limited seism genic zone, which Sweden does not lay close to that zone. Although the Swedish territory can be classified as a very low seismicity, an earthquake magnitude of 5 Richter in Sweden would be expected about once per 100 years, due to the fact that geodetic and paleoseimologic data which according to some researchers indicates continues active uplift and deformation of Fennoscandia. However, in 2008 a moderately strong earthquake recorded in southern Sweden 5 km south-west of the town of with the magnitude of 4.3 Richter.

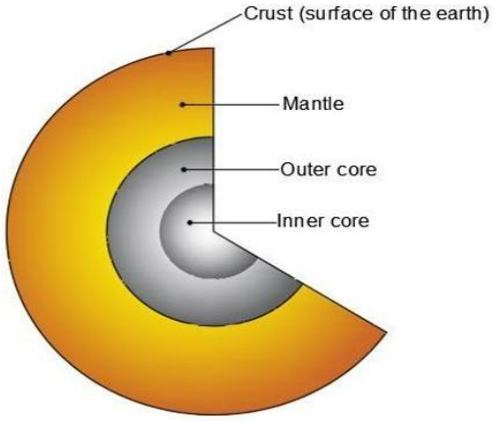


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Fig (46): The structure of the earth

Throughout the years, investigations have been made regarding the capacity of the buildings against seismic effects; which demonstrated that damages occur to buildings that do not fulfill the requirements of sustainable structures regarding seismic resistant design. Therefore, regulations and standards have been developed to improve the behavior of buildings regarding ductility and stiffness, to resist seismic actions. Therefore, the seismic design has been applied to design and construction of buildings and civil engineering works in seismic regions in Europe through Euro code 8 Part1 (EC8:1), where the regulations and method of analysis for seismic design are included. Moreover, the development of existing structures can be completed through Euro code 8 Part 3 (EC8:3). EC8:3 provide assessment and retrofitting of buildings, where the

performance of the building can be improved to fulfill the requirements of seismic design reducing the seismicvulnerability of buildings with no significant additional costs.

❖ **Proposed designed earthquake resistant techniques:**

Combination of Triangular building designed Structure (withstand large pressure) along with cross bracing. (Two steel rods connected in the walls of the unction are used). It is avoid the vibration and collapsing. Move less during earthquake than rectangular building (increased Resistance). Triangular frameworks are provided. Provide high performance concrete wall construction. Fundamental core delivers the tensional resistance of the building.

❖ **Earthquake resistant design and Euro code 8:-**

The seismic waves cause the shaking of the ground surface; where this ground shaking is the most crucial concern for the structural engineers. By using these data they can construct new structures which can be resisted against earthquakes. Although, the main data sources to estimate the ground shaking or the seismic level at a specific location; is taken from previous geological and historical records. The main difference between the structural and earthquake response considering the loadings is that the structural response is static and earthquake response is dynamic.

Today, most of the buildings in Europe are designed in order to be resisted against earthquakes; where the designer controls the building response by using engineering software programs based on Euro code 8. This is an advantage; since engineers can modify and control the structure in a proper way in order to obtain the proper design.

The earthquake response in the structure is considered above ground level, and the forces are generated by the inertia of buildings when they respond to earthquake induced ground shaking. Moreover, in designing, the structure‘s response against earthquake is predicted from a design spectrum; and the first step of creating a design response spectrum is to determine the maximum response of the structure to a specific ground motion. Normally, this first step is prepared from the seismologists and geotechnical engineers where they are presenting a response spectrum such as displacement, acceleration or velocity against the response period.

The role of earthquake resistant design is to prevent buildings from collapse during an earthquake event, and minimizing the injuries to people. The seismicity differs from place to place due to the morphology of ground; thus, low seismicity has less effect on injuries and collapse of structures.

Furthermore, in earthquake design the structure is permitted to undergo beyond the elastic limit which is called inelastic; this is mostly common for severe earthquakes which can cause inelastic deformations and it relies on the ductility and energy dissipation capacity of the structure in order to avoid the collapse.

❖ **Multi-storey building:-**

Fig (47) Collapsing of building

Fig (48) Multi-storey building

In this project, a seismic safety evaluation and retrofitting of a new office building (see Figure 1.2.1), which is located in Stockholm, has been performed

The building is 73m long, 19m wide and it has a total height of 29.7m above ground. Furthermore, it consists of 7 floors above ground. The frame consists of steel and prefabricated concrete columns, hollow-core slabs, steel beams, and prefabricated walls above ground, glass façade and composite façade elements. Existing walls in the ground floor are cast on site.

In the south side of the building there is the main street and traffic road; from the north side the building is mounted on top of another structure, this can be seen in the Figure. Therefore, from the model of the building, it has been observed that at the ground level from the south side, the building has pinned supports, where only the rotations are allowed at the *x*-, *y*-, and *z*-axis (coordinates of the model). From the north sideof the building where it is positioned on top of another structure; the supports are roller types since only the movement in z-axis is locked but the rotation is free, the movements and rotations at the other axis are free as well.

The building will be described more in detail later on in Chapter 3 as well as, all the materials used and their properties. Moreover, what calculations have been performed and what it has been taken into consideration regarding its boundary conditions. All these information are important and will be considered for the seismic retrofitting of the building and the seismic analysis of the model using the structural software MIDAS GEN.

❖ Problem definition

Most of the buildings in Sweden, consisting of steel and precast elements, are normally constructed to resist static loads without considering seismic actions. However, this leads to deficiencies in the design of thestructures. Typical deficiencies for the studied structure in this project are the following:

- The boundary conditions of the supports, It is important to have proper supports, especially when considering seismic actions since a ductile behavior of the structure is required.
- Combination of elements in the structure, for example, when combining steel and precast elements the overall behavior of the structure changes regarding, among other things, its continuity and strength.
- Irregularities in mass and stiffness. The choice of material and element types is important since they affect the weight and strength of the structure. Another type of irregularity is the geometry of the structure, the more complex the structure is the more irregularities it tends to get. Moreover, the combination of different types of elements and their distribution in the structure affect the overall stiffness and behavior of the structure.

❖ Scopes and objectives of the project

This project aims at evaluating an existing multi-storey building against seismic loads and suggesting retrofitting techniques to decrease the total displacement of the building and increase the frequency of seismic vibrations, using the structural engineering software, MIDAS GEN. Procedure for application of a seismic retrofitting methodology has been experienced. However, the goal is to achieve a sustainable and efficient structure with approved functionality and increased ductility. To guarantee this achievement, there are a number of important objectives that have to be accomplished:

- By assessing building capacity with regard to seismic loads and studying the performance and weaknesses of the structure like general displacements and undesired brittle failures.
- By performing a global analysis, the overall behavior of the structure can be assessed regarding safety, efficiency and ductility. Moreover, the weak points of the structure can be checked by studying the resultsof the frequencies and by collecting the critical displacements.
- By modifying the structure with a suitable seismic retrofitting technique according to EC8:3. The chosen technique will consider the structural behavior building and its current capacity.

Moreover, achieving these goals can aid to understand more the concept of seismic retrofitting of structures, which method can be applicable or repeatable for future purposes. The scope of this research has few limitations. A part of the building is supported on a neighboring structure; therefore, a limitation is made by eliminating the existence of the neighboring structure and by considering that the building is entirely built on the ground. The second limitation is the functionality of the features in the used software, MIDAS GEN; as an example the ability to apply loads on more complex geometries. This limitation leads to additional application of undefined beams, so called dummy beams to build up simpler geometry.

14.1.1.3 LITERATURE REVIEW

In this Chapter, some of the previous former studies on seismic retrofitting methods are presented and described briefly, where also some of their achievements are mentioned as well, and the main retrofitting method that has been used for this thesis project. It is reasonable to see the differences between each retrofitting method and in which type of structure they are mostly suitable. Moreover, in order to evaluate the performance of the tested building, it is reasonable to check the criteria for each retrofitting method.

- **Background**

In the past, a large number of building structures in Europe have been damaged by earthquakes and some of these structures have been repaired and strengthened. The strengthening of existing structures is required in cases where the buildings are constructed according to the old regulations, and they do not fulfill any morethe requirements of the recent regulations.

Recent structures which have been properly designed and constructed with the latest regulations are able toresist severe earthquakes without collapse. However, the same earthquakes have shown that old buildings can be seriously damaged or collapsed causing many problems to the communities since; their design does not fulfill any more the recent requirements concerning seismic design. Moreover, studies such as in structural performance have demonstrated that structural systems must not fulfill only a sufficient strength to resist lateral forces, but also must have a sufficient ductility, or maintaining their integrity when stressed beyond their yield point in order to be called as safe towards human lives. In order to fulfill requirements of seismic safety, the retrofitting of existing buildings serves catastrophe prevention and reduces the seismic risk.

In general, different methods of seismic retrofitting that have been used according to each characteristic method can be seen from the below Figures depicts local and global seismic modifications that can be performed in order to obtain the desired result. For instance, to increase the strength of the structure it is recommended a global modification of structure by applying infill walls, externally attached to the structural system which is an external structure (specific design), steel or concrete bracings and by adding reinforced wing walls. Additionally, if strength and ductility are required it can be performed both global and local analysis for the seismic modification of the building. For global modification, the four methods mentioned above can be applied. However, for the local modification, it is recommended jacketing of reinforced concrete or steel elements or for composite materials.

Last, to increase only ductility it is recommended to perform the global and local modification. For instance, for global seismic modification, it is recommended the application of reinforced concrete wing walls. For local seismic modification, jacketing of reinforced concrete and steel elements or composite materials is recommended as well.

Figure presents the effectiveness of structural walls and bracings; strengthening methods used for seismic retrofitting. The y-axis presents the lateral force of the structure and *x*-axes the lateral drift in percentage (%)(Displacement). It can be seen from Figure 2.1.2 that each seismic modification method has a different effect on lateral force and lateral drift (Displacement). Therefore, every seismic modification method can be used according to each specific parameter.

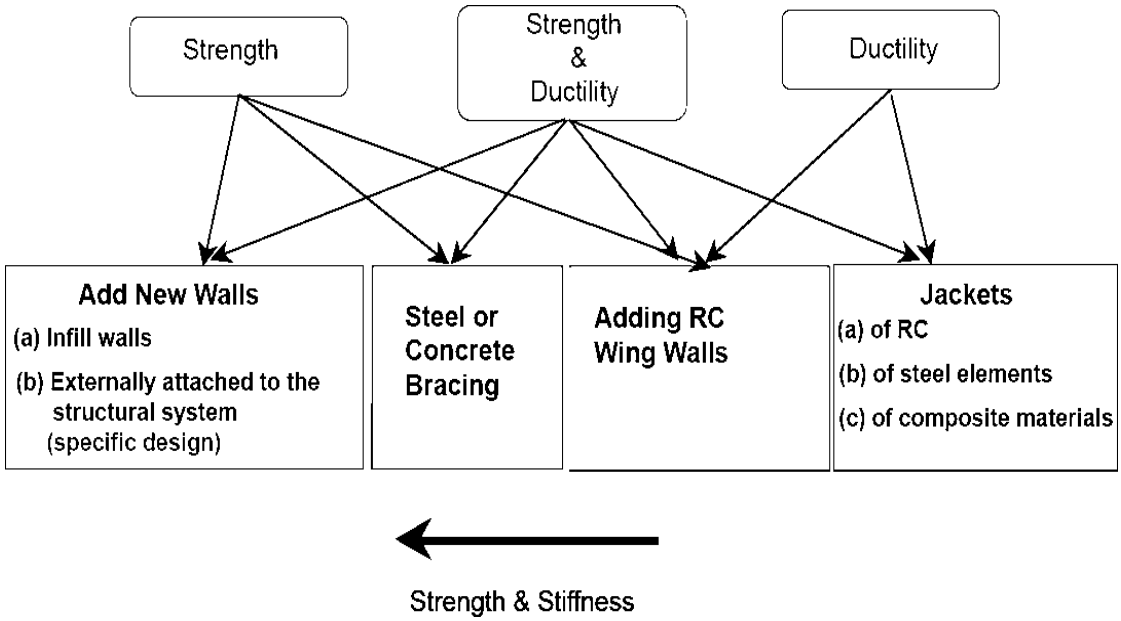


Fig (49) Different seismic strengthening methods

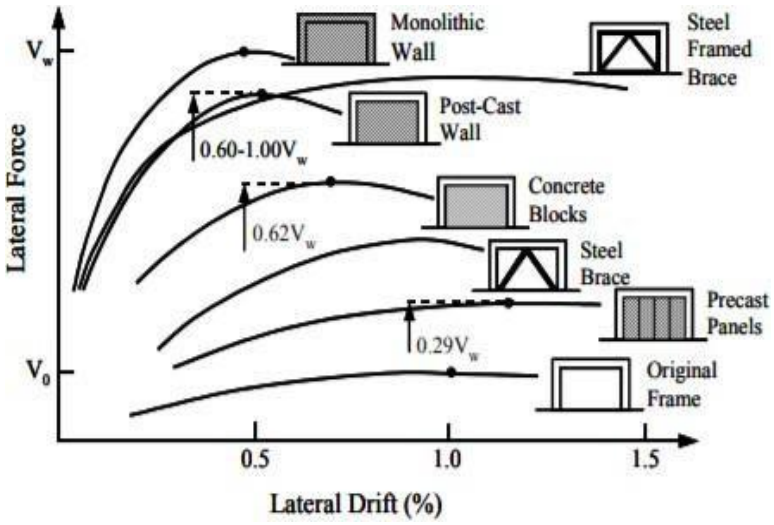


Fig (50) Effectiveness of structural walls and bracing

Some of the retrofitting methods that have been put into practice can be seen from Figure. In Figure (a), it can be seen that a reinforced concrete wall which can be used to increase the strength and ductility of the structure. Figure (b) shows a concrete column jacketing to increase the strength of the column while Figure
(c) Illustrates diagonal steel bracings of the one entire side of the building.

The modifications in Figure (a) and (c) can be used for both local and global analysis since in the local analysis the testing is more detailed where the reinforcement has to be calculated and connections are examined; these modifications can also be used for global analysis and check the behavior of the building entirely without going into much detailed analysis. However, Figure (b) can be used only for local modification since; the application of the external reinforced concrete around the column requires the calculation of the reinforcement that must be placed.



(A) (B) (C)

Fig (51) Seismic retrofitting using
(a) Reinforced concrete shear wall, (b) column jacketing and (c)steel diagonal bracings

❖ **Seismic retrofitting techniques**

Strengthening of buildings that do not fulfill the requirements for seismic resistance can be made by retrofit techniques, through experimental and analytical studies. There are different seismic retrofitting techniques available in EC8:3, depending on the characteristics and condition of the building. Additionally, the financial and sociological aspects impact the choice of technique depending on various factors such as the importance and significance of the structure, the level of damages of structural and non-structural components and the abnormality of strength, stiffness and ductility of the structure.

The retrofitting techniques can be divided into two levels: structural and member levels. The first mentioned level is commonly used in existing structures which need to enhance their lateral resistance, by including additional elements. On the other hand, the member level is frequently used in existing structures inwhich some components need to be improved for seismic resistance. Therefore, this makes member level more cost-effective than structural level. Different levels of retrofitting techniques are represented in Sections2.1.1-2.1.4.

➢ **Steel bracing**

Steel bracing is a retrofitting method in structural level. The steel bracing is considered as one of the most effective methods to enhance the stiffness, decrease the lateral displacements and improve the global strengthening of existing structures with unstable performance during earthquakes. Additionally, this method does not require any intervention of the ground because the steel bracings are usually installed between existing structural elements in some bays.

In concentric bracing frames, the existence of compression and tension braces results in lateral stiffness above that of the moment resisting frames, caused by buckling of existing compression struts and softening/strain hardening due to the Bauschinger effect; which makes concentric bracing frames inconvenient. To improve the behavior of the concentric bracings (CB) frames, different reliable design techniques of bracing members are introduced; the configurations include V or inverted V bracings, X, K and diagonal bracings as seen in Figure 1. Although these techniques, the V and inverted V bracings are not recommended being used; because of buckling of compressed braces due to existing horizontal compressive forces or by forces in tension braces that increase by reaching the yield strength and strain-hardening monotonically. These actions tend to an unbalanced force concentration in the beam-brace connections which lead to failure in the beam mid-span.

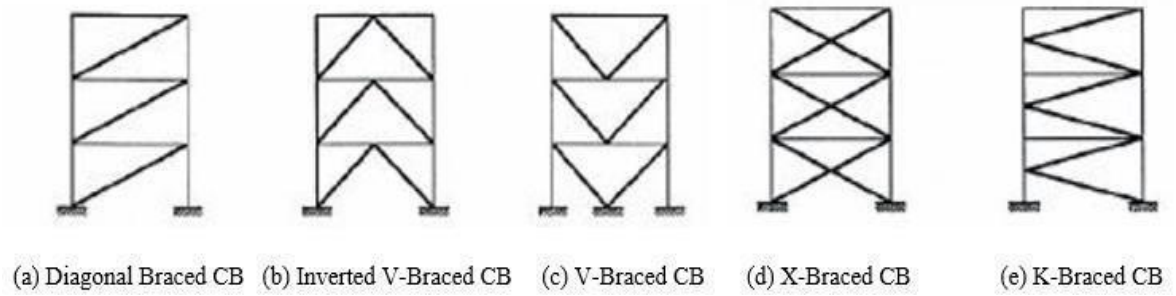


Fig (52) Configurations for common concentric bracing frame

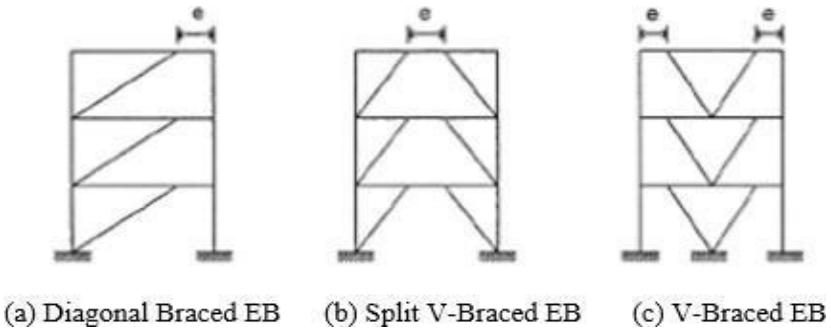


Fig (53) Configurations for common eccentric bracing (EB) frames

The benefits of this retrofitting method are that the system has easy access for simpler quality control and execution, the less additional applied load on the structure, better load distribution and is flexible since it is possible to use door and window openings. Although that the steel bracing is a desirable retrofitting method, the experimental tests show that the braced members uphold a post-buckling compressive strength of about 30% of the initial compressive strength. Therefore, it is advised to do checks regarding the beam capacity at mid-span for the load combinations and later choose the proper steel bracing scheme to prevent buckling.

- **Shear walls**

One of the most common structural levels retrofitting method is adding shear walls. It is an effective method that controls the overall global lateral drifts of existing structures. The method involves infilling additional shear wall members in bays that have to be strengthened; the infilling walls can be of concrete, steel and precast panels. The advantages of this method are that it reduces time and cost but also, after many researches, shows that it has a huge impact on the increment of the base shear and on the decrement of the lateral displacements of the structure [4, 18]. Moreover, the shear walls lead to strengthening improvements in the foundations where the infill‘s are added and in the overall structure.

The wall section can be of different shapes and thicknesses depending on the characteristics of the existing structure. In L- shaped wall section is used. The L- shaped wall is effective since it increases the stiffness remarkably and decreases the number of maintenances over the years. Furthermore, it reduces the amount of reinforcement to be used in the member and the stress ratio in the elements.

The shear panels enhance the energy dissipation capacity of the connected frames and provide additional strength and stiffness in the structure. For the steel panels, the weight of the structure decreases which makes the behavior of the structure more ductile compared to other infill shear walls and prevents column instability because of its thin thickness. The steel shear walls are also effective to use on medium-to-high-rise buildings with high wind speed since they are more efficient and can be constructed faster than other systems by welded bolted elements.

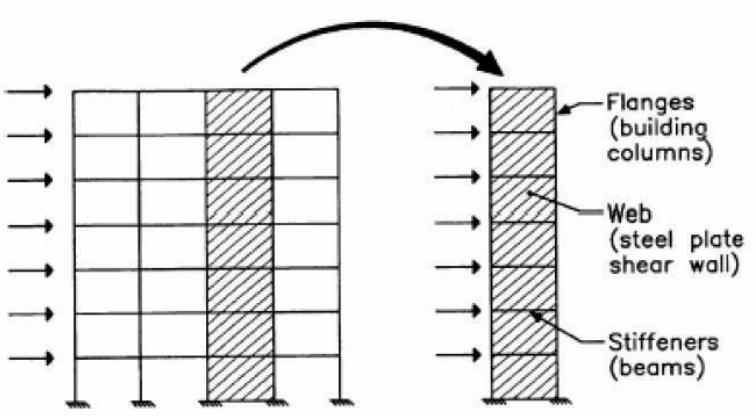
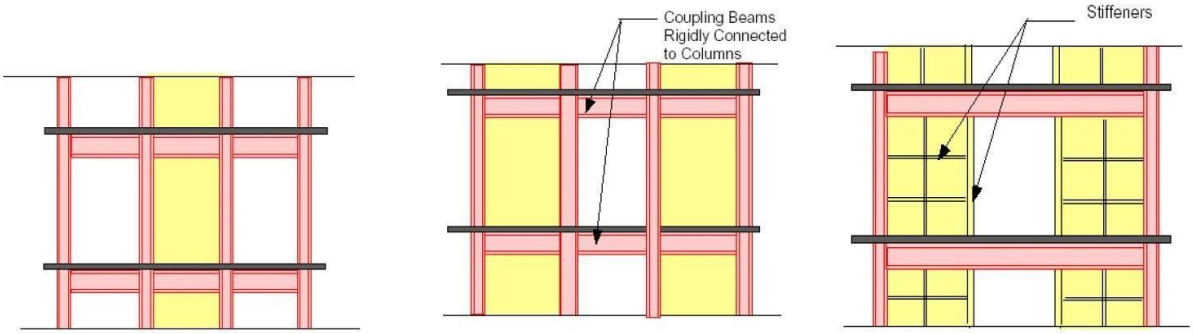


Fig (54) Steel shear walls and plate girder analogy



(a) (b) (C)

Fig (55) Steel shear walls with openings:
(a) Single unstiffened panel with coupling beams on both sides, (b) two unstiffened panels with coupling beams and (c) stiffened panel

- **Masonry infill walls**

Another structural level retrofitting is masonry infill walls. It is an effective method for reparation of unsteady structures by adding brick masonry walls between solid frames. The main feature of this method is that the capacity of the structure can be evaluated to check its effectiveness regarding strength and ductility. The advantage of this method is that it provides stiffness and resistance to the structure; analytical studies show an increment of 15 to 40 times in stiffness and 2.75 to 9 times in strength compared to bare steel frames due to changes in the lateral load transfer mechanism as seen in Figure.

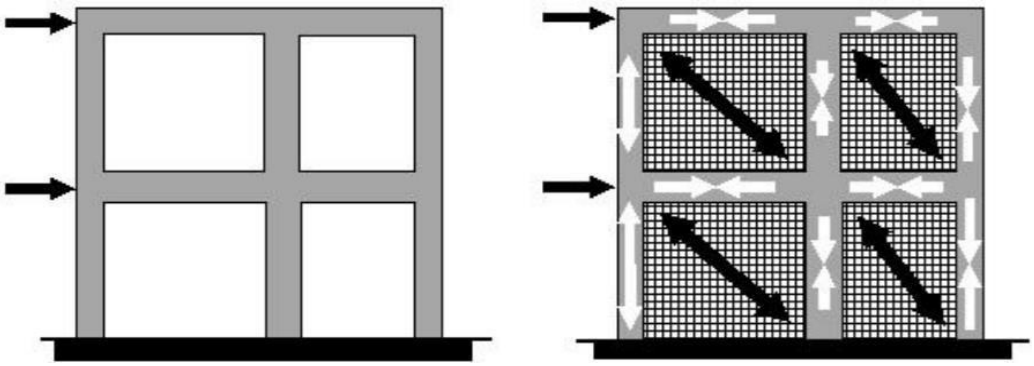


Fig (56) Change in the lateral load transfer mechanism

(a) Frame action in the bare frame and (b) predominant truss action in the unfilled frame.

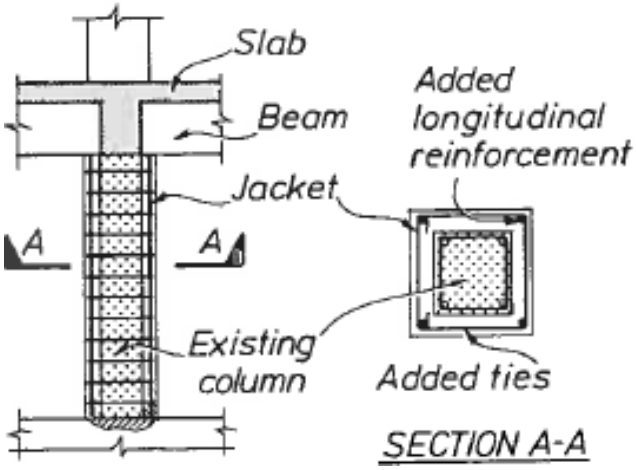
Masonry infill walls require precise and careful application since they tend to fail due to inadequate shear and flexural strength. When masonry infill walls with steel frames are exposed to small deformations,

They behave as a composite flexural system. Higher deformations lead to cracks within the masonry bricks and later spreading in the panel; which results in degradation of the walls lateral resistance. Hence, the loads are to be carried primarily by the steel frames.

Additionally, the shear resistance in window and door openings can be influenced by the imposed deformations and lead to significant degradation in the shear strength. It is recommended to avoid slender masonry panels since they are unable to develop bending and are generally susceptible to loss of stability under seismic loads [8]. Furthermore, out-of-plane anchors and ties tend to localized failures which decrease the overall strength of the infill, therefore their use is not recommended.

- **Column Jacketing**

Column jacketing is a member level retrofitting method which improves the strength and ductility of insufficient structure elements of beams and columns. During earthquakes, it is very important to not have weak column components in the structure, since they can result in failure mechanisms. The columns are controlled by axial load and shear and flexural strenḡth, therefore column jacketing is considered to be a proper local strengthening and repairing method to improve them [4, 1]. Column jacketing is used around existing columns by adding concrete, longitudinal reinforcement and transverse reinforcement as seen in Figure.



Different types of materials and schemes can be used when retrofitting, depending on the structures condition and capacity and the desired earthquake resistance. For example, the fiber reinforced polymer material can be used when retrofitting columns. Jacketing can be added to one, two, three or four sides of the member according to the available space conditions around the columns; to achieve greater bonding between the members, sufficient performance during future earthquakes and improved results, a four sided jacketing ismost desirable to use, because of its performance as one symmetrical stiff rigid body.

Lateral load testing of four full-scale un-strengthened interior beam-column assemblages has been undertaken by using jacketing as a retrofitting method. After jacketing with longitudinal and transversal reinforcement around the columns, an increment in strength and stiffness were observed compared to the original specimen. Moreover, no significant improvement in the ductility capacities was observed. However, it has been shown that jacketing of columns is an effective local retrofitting method; that improve the strength of the structure and the convergence of the mechanisms of the beam and column elements in the structure.

- **Design seismic load**

The seismic vulnerability is an event which is strongly considered but is not an absolute concept. This means that the same construction it might not be vulnerable to one class of earthquakes; however, it might be

vulnerable to another. Thus, the seismic action which will affect a given construction should be fully specified before attempting a seismic vulnerability evaluation of that construction.

The seismic codes determine the seismic action by means of one or more design spectra, for example the elastic design spectrum according to EC8:1. These are a synthetic and significant representation of the seismic action, which is depending on the characteristics of the different ground motions; depends on inherent characteristics of the building structure such as the fundamental mode of vibration and its dissipation capacity.

In cases where low seismicity occurs, reduced or simplified seismic design processes for certain types or categories of structures may be used. The selection of the categories of structures, ground types and seismic zones in a country for which the provisions of low seismicity apply may be found in its National Annex. However, there is no need of observation of the provisions in cases of very low seismicity; the provisions of EC8 do not need to be observed.

The structure shall be designed and constructed to withstand the design seismic action defined in EC8:3 without local or global collapse, thus retaining its structural integrity and a residual load bearing capacity after the seismic events. Euro code 8 is a new and modern document. It is aligned with the recent trends and current standards regarding the performance of requirements and check of compliance in terms of displacements; providing a flexibility to cover the large variety of situations that appear in practice. The extended use of EC8:3 will provide suggestions for improvements in the future.

14.1.1.4 METHODOLOGY

The present project aims to provide knowledge based on seismic retrofitting on buildings that have not been designed considering Euro code 8 and for those that have been designed with regulations and standards which they are not any more applicable. Particularly buildings in Sweden do not consider Euro code 8. Hence, it is a profitable way of learning on how these specific buildings can be modified incases of an earthquake rather than demolish them. Moreover, this study is also undertaken for future applications and further researches.

In more detail, the particular method that is used for this project is to analyze the building globally and check the entire behavior of the structure; focusing mainly on reducing the displacements of the structure after using the methodology seismic retrofitting, which is introduced by Euro code 8. It is important to mention that for the seismic retrofitting which is basically a modification technique concerning the structure‘s capacity and strength; there are many ways to perform it.

An extensive amount of data such as scientific articles, journals and previous theses, have been collected and studied thoroughly in order to gain knowledge about common seismic retrofitting methodologies regarding the performance of the structure and features of the methods applied, in case of seismic hazards. Different methodologies of seismic retrofitting have been considered; such as masonry infill walls, prefabricated reinforced concrete walls (shear walls) and steel bracings separately.

By using, for instance, bearing walls such as masonry infill walls, they are not reasonable for this specific structure since the building has an asymmetric geometry and the bearing walls are not able to resist in both *x*- and *y*-axes of the seismic waves. In case the bearing walls were reinforced, they could provide shear resistance; however, this is not preferable since this retrofitting technique is time-consuming. Concerning the steel bracings, they are considered to be flexible since the bracings allow displacements on the structures under seismic vibration without arising early stage failures. Although, they do not have enough mass to stabilize unstiffened parts of the structure. In this case the prefabricated reinforced concrete walls are more useful since they can provide higher stiffness and shear resistance. However, since, the shear walls are not preferable to be used as seismic retrofitting method because they tend to overweight the structure and brittle failure will possibly occur.

Consequently, the selected method for this case is a combination of prefabricated reinforced concrete

Walls and steel bracings. By using wisely the construction materials for both methods, a desirable result for the current structure will be achieved. This method will be discussed more in Chapters 4 and 5.

The building model is a simplification of an actual seven-storey building in Stockholm. It was designed for gravity, wind and snow loads, using the Euro codes and Swedish Standards without specific provisions for earthquake resistance.

The standards and handbooks that have been taken into consideration from the company Sweco when the building was first constructed are presented below:

BBR 19 (BFS 2011:6 with changes even BFS 2011:26)
EKS 8
SS-EN 1990
SS-EN 1991
SS-EN 1992
SS-EN 1993
Svensk Betong ‖Bygga med Prefab‖ (Swedish Concrete ‖Construct with Prefabricated‖)
S-EN 1090-2
However, for this particular study, EC8:1 [12] is used for seismic design and Euro code 1-1990 (EC1) for application of seismic load combinations.

➢ Model of the building

The structural analysis and design software for buildings MIDAS GEN [19] was used to create a three-dimensional model of an existing building located in Stockholm by the company Sweco. The model consists of seven floors; with 73 m long, 19 m wide and a total height of 29.7 m above ground level.

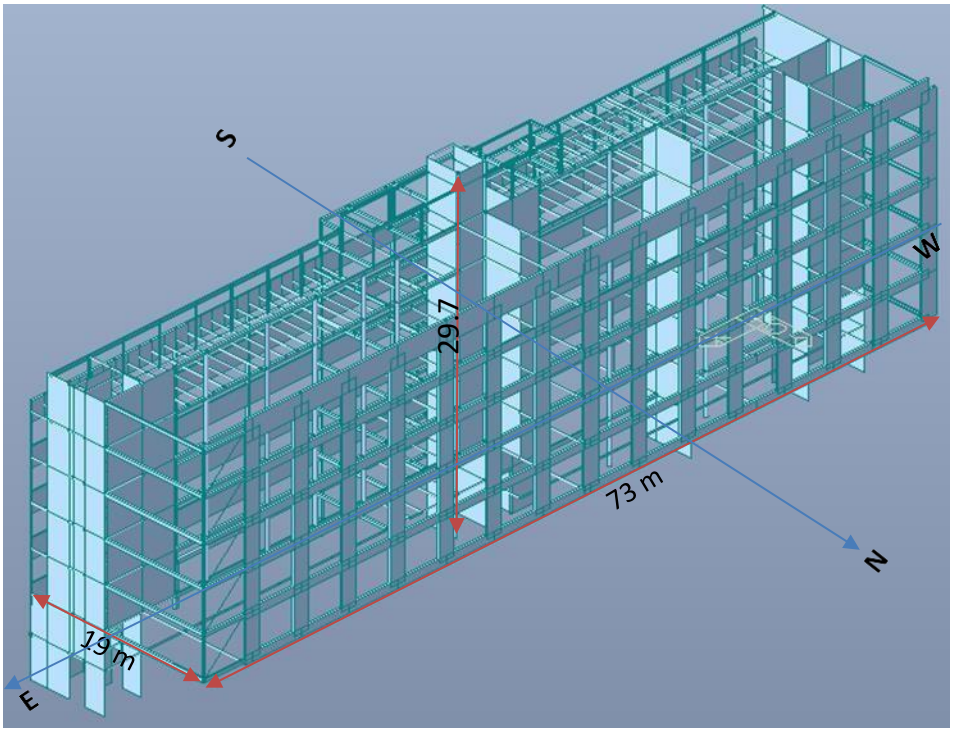


Fig (57) 3D view of the numerical model that given by the company Sweco.

The building consists of a combination of steel and concrete structural elements for the main skeleton and brick walls for the facades. It is asymmetrical having the longest side in longitudinal direction (*x*- axes) and the shortest in transverse direction (*y*-axes). Half of the building consists of a cantilever part that is supported on top of another structure. The other half is supported on the ground level.

A pile foundation was used for this building which is not considered in this study. Due to lack of information, it was not possible to define the exact soil type since soft clay and hard clay are the dominating soil types where the building located. No further researches have been made regarding the characteristics of the soil type since the main focus of the project is on investigating the structure.

- **Supports and beam end releases**

From the given model, there are two different types of supports which are defined as pinned and roller supports; the first mentioned support is at the ground level of the structure at +0.0m, the second is at +3.75m and +7.0m respectively. Illustrations of the support types are given in Figure.

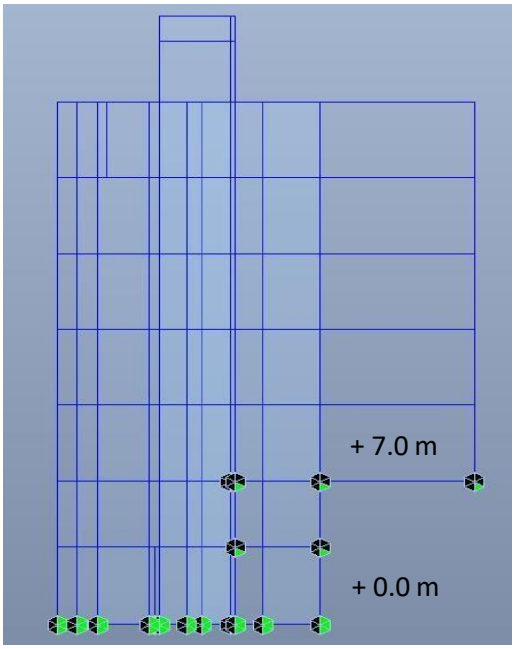


Fig (58) Side view of the structure

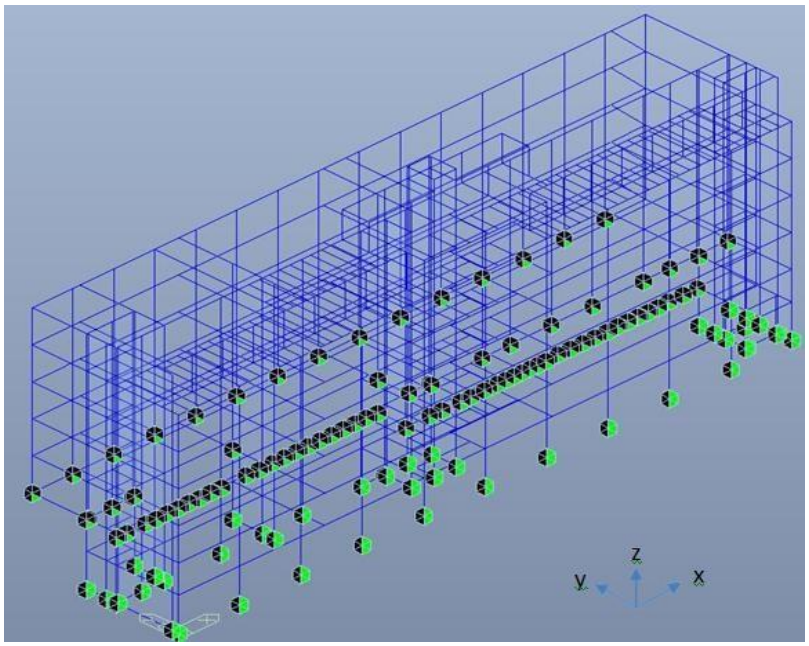


Fig (59) 3D South-west view of the structure

As for the structural elements in the modeling, the beam end releases allow translation along one or several local axis or rotation at either one end of a beam or at both beam ends.

Two different types of beam end releases are used in this model. The first beam end release type (Type 1) is of two degrees of freedom which allows moment in *y*- and *z*-direction only at one end of the beam. The second type (Type 2) is of two degrees of freedom and allows moment in *y*- and *z*-direction at each end of thebeam, see Appendix A.

Design loads

The loads which have been used for the modeling are as follows:

- Dead loads including self-weight.
- Live loads according to the usage of the building.
- Wind load according to Stockholm Region.
- Snow load according to Stockholm Region.
- Complementary loads such as loads of glass-plates.
- Accidental loads regarding fire, robustness, landslide and collisions.
- Imperfection loads.

The load calculations for the building have been done by the company Sweco according to each regulation. The load types, floor plans, floor loads and load combinations for the assessment analysis are given in Appendix B.

➢ Limitations and Assumptions

During the performance of the seismic analysis there are some important limitations and assumptions that are taken into consideration to accomplish an adequate performance of the structural analysis. The limitations and assumptions are presented below:

- Change of the supports type as fixed at the bottom level +0,0m of the structure. The fully green dots in Figures represent fixed supports.
- Creation of two additional supports at level +7,0m :
- The first one is a roller type that allows rotations and movements except for a vertical movement, *Dz*. The second one allows only rotation in *x*- and *y*-direction. These assumptions have been made due to abnormal displacements on the structure after running the analysis including the seismic loads. The additional supports can be seen in Figures, and highlighted with orange arrows.
- Modifications have been made for six roller supports by restraining and allowing them rotation in the *x*- and *y*-direction. These supports are shown in Figure and highlighted with red arrows.
- Soil type B is chosen due to lack of information regarding the soil type.

- The National Annex does not provide enough information regarding seismic actions in Sweden. Therefore,a recommended design response spectrum is selected from the program to perform the seismic analysis according to Euro code.

➢ Retrofitted Model

A thorough study of the model is important to proceed with the modification of the structure. The main idea of the seismic retrofitting is to modify the weakest parts of the building by improving its characteristics such as strength and elasticity, and by achieving desirable structural performance. A number of experimental methods is performed in order to study which method is suitable for this building taking into consideration different factors such as the performance of the structure and aesthetic aspects. Performing different trials is away to select the most appropriate method of seismic retrofitting. The experiments that are used to obtain the desired method are those using shear walls, steel bracings and a combination of those two.

14.1.1.5 RESULTS AND EVALUATION

All the results have been obtained after successfully completing the seismic analysis of the model, once before applying the seismic retrofitting and another after applying the seismic retrofitting. The aim of the project, as mentioned before, is to analyze only the global behavior without taking into consideration the local behavior of the model. Therefore, there will not be any analysis regarding the connections between the structural elements, material properties and steel design of the elements. Therefore, evaluation of the forces and moments will not be considered since, it is not much relevant to study the structural members in the global behavior.

Our goal is to strengthen the building under seismic vibration; hence, the main focus will be on the frequencies and the displacements of the structure before and after modifying the structure with a retrofitting method. Improving the frequencies and minimizing the displacements will give rise to a more stable structure, which behaves as one rigid body.

➢ Results before seismic retrofitting

After the analysis has been performed, evaluation of the structure under seismic action has been made by observing the vibration mode shapes of the structure. It appeared that one side of the building is weak due to lack of structural elements; the weak area is marked in a red rectangle in Figure. The insufficient design leads to high displacements and abnormal behavior at the highlighted side of the building compared to the other side, which has a stiff and ductile behavior, as seen in Figures which illustrate the global behavior of the two first vibration mode shapes.

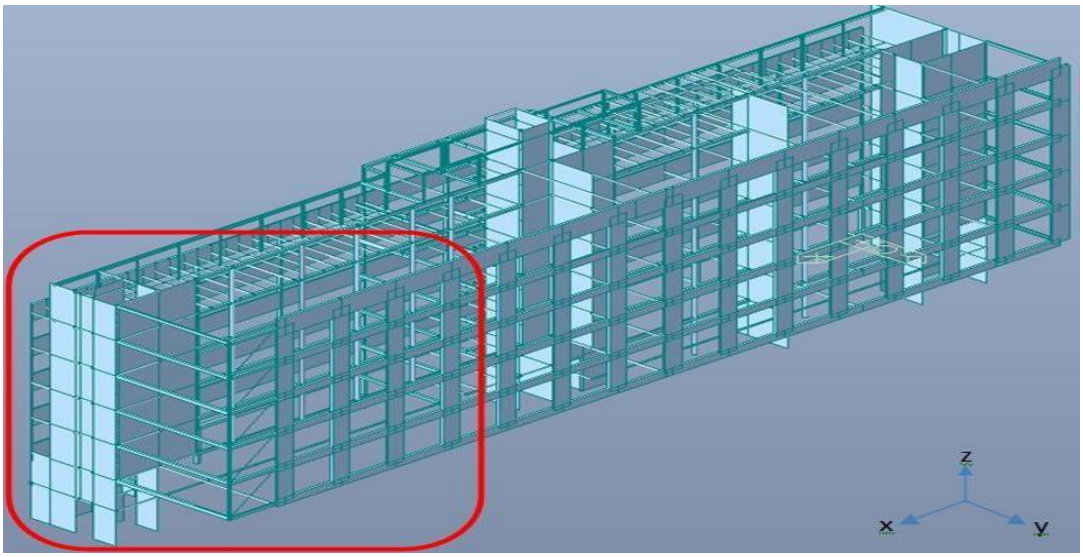
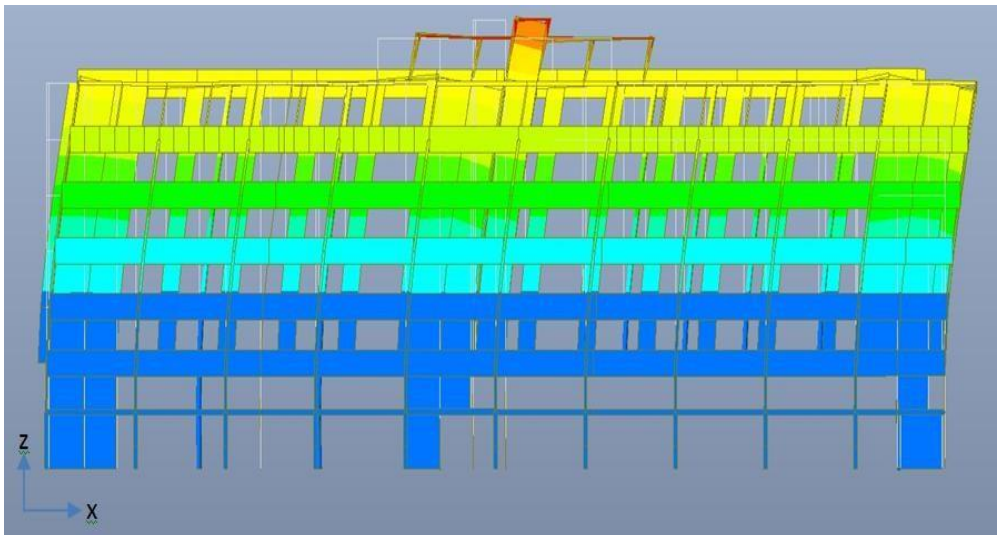


Fig (60) 3D view of the building, with a red square highlighting the critical side of the structure.



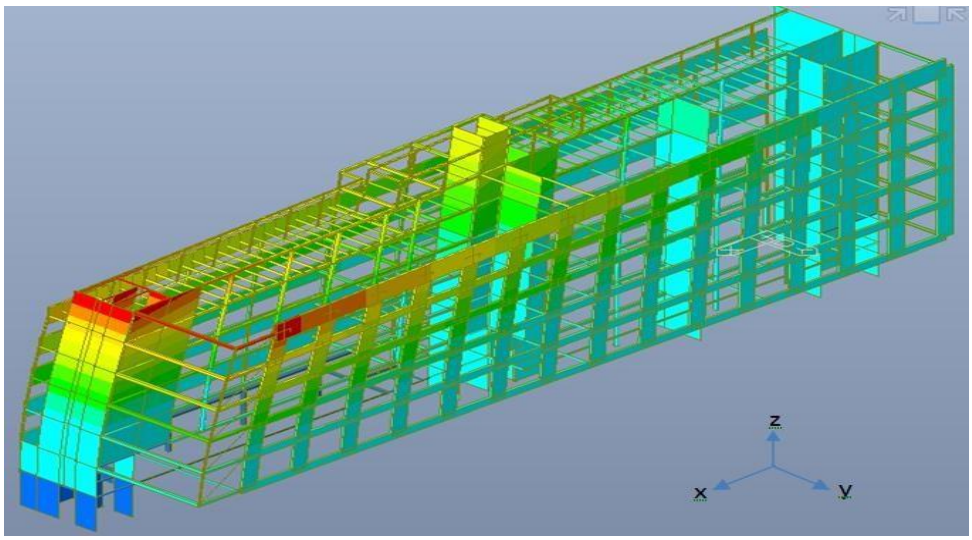


Fig (61) 3D view of the un-retrofitted model‘s translational vibration mode

➢ Results after seismic retrofitting

As can be seen from the previous section, the building is insufficiently earthquake resistant so that retrofitting measure is required. To achieve stabilization it is important to increase the stiffness from onside of the building which is more flexible than it normally should be, in order to have a uniform movement in both *x*- and *y*-directions, where the seismic load is applied. The stabilization of the weakest side of the buildingis going to be achieved by applying the prefabricated concrete walls (shear walls), where they are able to increase the stiffness and in turn, can make that side less flexible.

However, it is important also to use the diagonal steel bracings where they can provide more flexibility tothe structure in general without causing any failure of the members, for example, beams or columns etc. Also, steel bracings can provide the possibility of increasing the stiffness of the structure but not totally as much as the shear walls.

It displays that combining the two retrofitting methods as a modification of the building is a great solution to optimize the performance of the structure and improving the stiffness by using each methods advantage. The final design of the building after modifying with this combination is by adding five prefabricated concrete walls at the east edge of the structure and by adding X-bracings and diagonal bracings in the middle of the structure perpendicular in the direction compared to the shear walls, as shown in Figure.

Combining these two methods provides a reasonable stabilization and movement of the building as it behaves as a rigid body in both *x*- and *y*-direction during earthquake actions. Furthermore, by increasing the frequencies, fewer displacements are achieved. Thus, the combined method leads to an optimized design for structures under seismic actions.

Since verifications have been made regarding the frequencies and displacements in Section 4.1.1 and 4.1.2, an evaluation of the results has been done to choose either to include or to exclude variable loads. It hasbeen concluded to include the variable loads along with the permanent loads during the seismic analysis; a discussion regarding this decision can be found in Section 5.1.

The Figures below depicts the modified positions done on the structure. Where Figure presents the steel bracings and Figure the prefabricated reinforced concrete walls (shear walls).

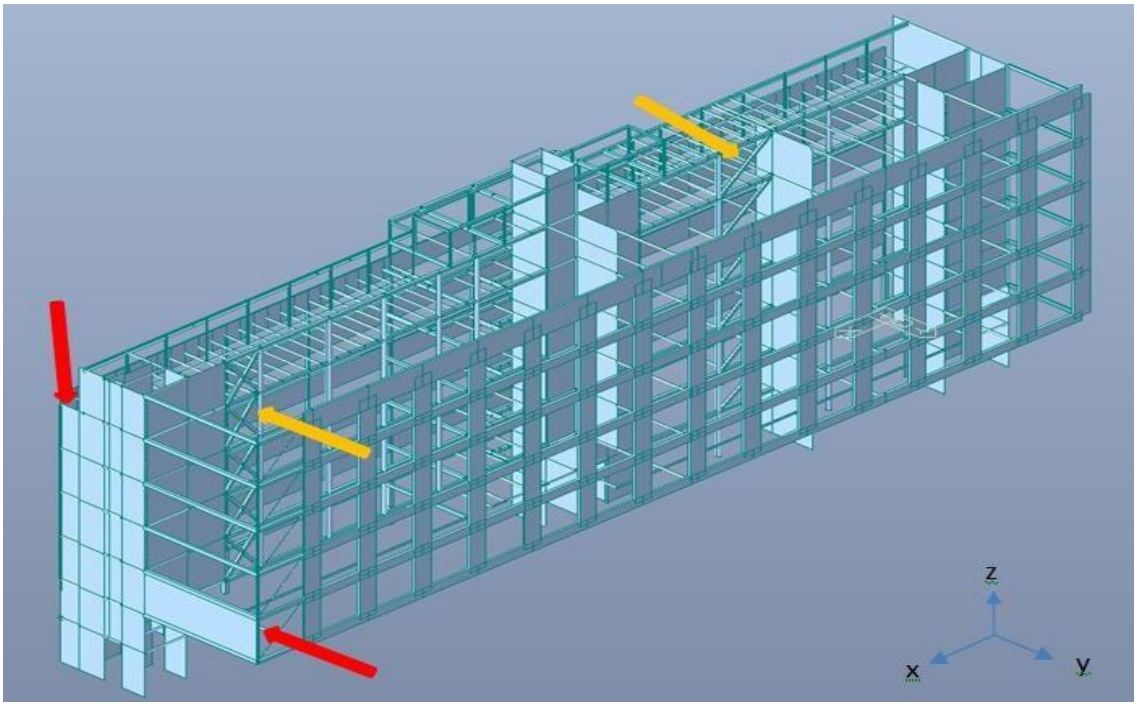


Fig (62) 3D view of the seismic retrofitted structure with the modified positions, the red arrows target theshear walls and the orange the steel bracings.

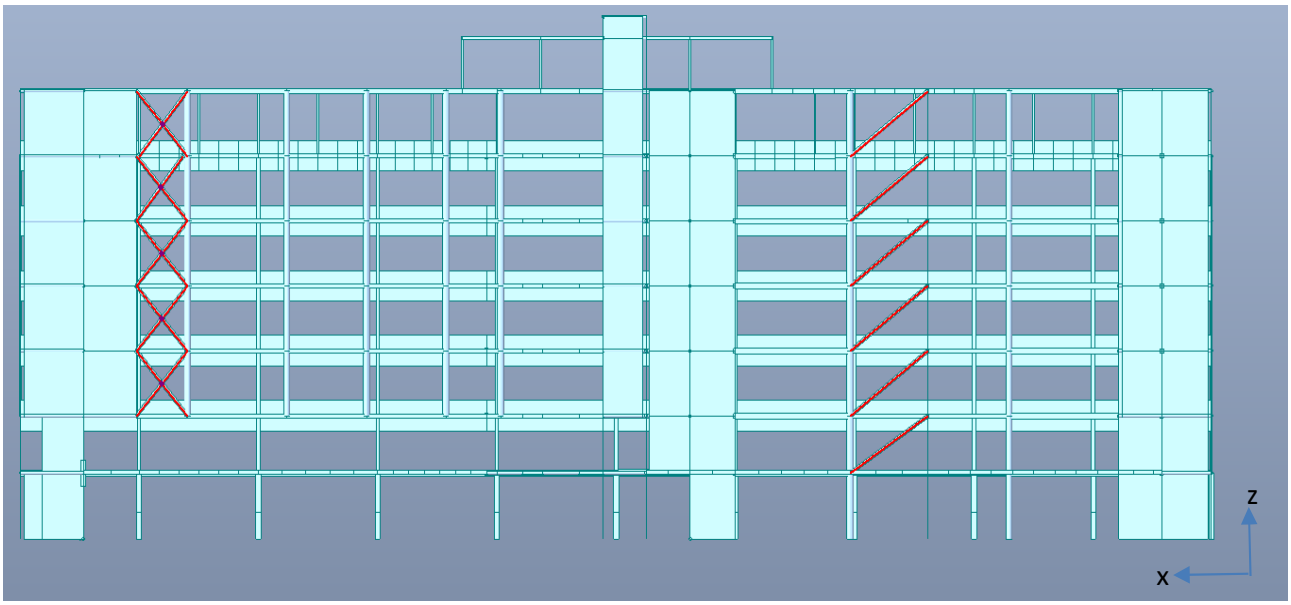


Fig (63) Side view of the retrofitted structure highlighted in red the steel bracings.

➢ Effective role of civil and earthquake engineers

This is not the earthquake which extinguishes the societies, but it is in the insecure buildings which is accountable for the destruction. Keeping in opinion the huge loss of being and things in modern tremors, it has become a warm issue and worldwide lot of study is successful on to understand the purposes of such failures and understanding suitable lessons to ease the repetition of such destruction. The professionals complicated in this project and construction of these responsible structures is civil engineers. Who are liable for the building construction the earthquake resistant buildings and retain the society in a safe environment.

➢ Strategies for earthquake resistant construction

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

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

14.1.1.6 CONCLUSIONS

➢ **General research**

A general overview of the results showed that a better structural seismic performance of the model after the seismic retrofitting was accomplished, and prove that the chosen structural methodology of this

Modification is a sufficient optimized design for this existing building.

More detailed, applying steel bracings and prefabricated concrete walls (shear walls) improved the structure's characteristics such as stiffness, strength and ductility. The stiffness was mainly enhanced by the added steel bracings in the longitudinal direction, which increased the frequency remarkably. Moreover, the structure became more ductile primarily because of the steel bracings applied; hence, an improved of the capability to undergo plastic deformation before fracture is achieved. After performing the seismic retrofitting, the strength of the structure was developed by both applied retrofitting techniques; however the shear walls had the largest contribution for the stabilization of the accomplished structural performance. Another aspect that leads to these achieved improvements is the choice of material and section properties for seismic retrofitting.

This research study provides gaining more knowledge concerning the strengthening of existing structures under seismic vibrations. Moreover, understanding more the concept of seismic retrofitting methods and how they can be properly applied in practice in order to obtain an appropriate retrofitting with sufficient results that fulfill the requirements of the building regulations and standards.

- **Future research**

This research study is giving rise for future investigations and improvements in seismic retrofitting techniques and seismic damage control; which are of high importance since; they have an extensive contribution to the present state of development.

Moreover, it constitutes a reasonable base for further investigation of local analysis of the structure. Since, we were studying the global behavior of the structure the main purpose was to improve the strengthening of the structure by examining the frequencies and displacements of the structure and not going into detail such as studying the sections and reinforcement of the structural elements, and forces at each connection of the building. These can be investigated thoroughly in future researches. Furthermore, by performing a global analysis it is a reasonable start and an effective procedure for evaluating the most criticalfeatures of the structures which provides a great aid for further local seismic analysis.

New innovative methods can be used in the future, by using a combination of seismic retrofitting techniques to optimize the functionality of the structure under seismic hazards. This is an advantageous way of combining different retrofitting strategies, where they strengthen and improve the structures characteristics, by taking benefit of their merits and demerits.

14.1.1.7 REFERENCES

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14.1.2 Seismic Retrofitting of Buildings

Seismic retrofitting is the modification of existing structures to make them more resistant to seismic activity, ground motion, or soil failure due to earthquakes. These codes must be regularly updated; the 1994 Northridge earthquake brought to light the brittleness of welded steelframes.

Performance objectives

In the past, seismic retrofit was primarily applied to achieve public safety, with engineering solutions limited by economic and political considerations. However, with the development of Performance-Based Earthquake Engineering (PBEE), several levels of performance objectivesare gradually recognized:

- Public safety only. The goal is to protect human life, ensuring that the structure will not collapse upon its occupants or passersby, and that the structure can be safely exited. Under severe seismic conditions the structure may be a total economic write-off, requiring tear-down and replacement.
- Structure survivability. The goal is that the structure, while remaining safe for exit, may require extensive repair (but not replacement) before it is generally useful or considered safe for occupation. This is typically the lowest level of retrofit applied to bridges.
- Structure functionality. Primary structure undamaged and the structure is undiminished inutility for its primary application. A high level of retrofit, this ensures that any required repairs are only "cosmetic" – for example, minor cracks in plaster, drywall and stucco. This is the minimum acceptable level of retrofit for hospitals.

Structure unaffected. This level of retrofit is preferred for historic structures of highcultural significance.

Techniques

Common seismic retrofitting techniques fall into several categories:

(A) External post-tensioning

The use of external post tensioning for new structural systems have been developed in the past decade. Under the PRESS (Precast Seismic Structural Systems), a large-scale U.S./Japan joint research program, unbounded post-tensioning high strength steel tendons have been used to achieve a moment-resisting system that has self-centering capacity. An extension of the sameidea for seismic retrofitting has been experimentally tested for seismic retrofit of California bridges under a Caltrans research project and for seismic retrofit of non-ductile reinforced concrete frames. Pre-stressing can increase the capacity of structural elements such as beam, column and beam-column joints. External pre-stressing has been used for structural upgrade for gravity/live loading since the 1970s.

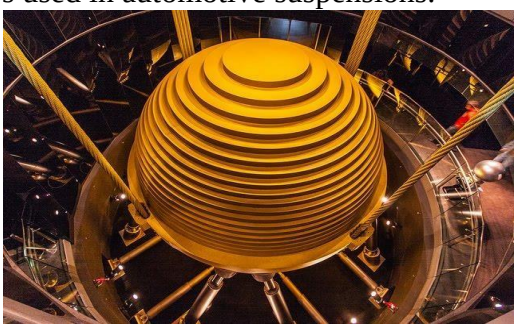
(B) Supplementary dampers

Supplementary dampers absorb the energy of motion and convert it to heat, thus dampingresonant effects in structures that are rigidly attached to the ground. In addition to adding energy dissipation capacity to the structure, supplementary damping can reduce the displacement and acceleration demand within the

structures. In some cases, the threat of damage does not come from the initial shock itself, but rather from the periodic resonant motion of the structure that repeated ground motion induces. In the practical sense, supplementary dampers act similarlyto Shock absorbers used in automotive suspensions.

(C) Tuned mass dampers

Tuned mass dampers (TMD) employ movable weights on some sort of springs. These are typically employed to reduce wind sway in very tall, light buildings. Similar designs may be employed to impart earthquake resistance in eight to ten story buildings that are prone to destructive earthquake induced resonances.



(D) Slosh tank

A slosh tank is a large container of low Viscosity fluid (usually water) that may be placed at locations in a structure where lateral swaying motions

Are significant, such as the roof, and tuned to counter the local resonant dynamic motion. During a seismic (or wind) event the fluid in the tank will slosh back and forth with the fluid motion usually directed and controlled by internal baffles – partitions that prevent the tank itself becoming resonant with the structure, The net dynamic response of the overall structure is reduced due to both the counteracting movement of mass, as well as energy dissipation or vibration damping which occurs when the fluid's kinetic energy is converted to heat by the baffles. Generally, the temperature rise in the system will be minimal and is passively cooled by the surrounding air. One Rincon Hill in San Francisco is a skyscraper with a rooftop slosh tank which was designed primarily to reduce the magnitude of lateral swaying motion from wind. A slosh tank is a passive tuned mass damper. In order to be effective, the mass of the liquid is usually on the order of 1% to 5% of the mass it is counteracting, and often this requires a significant volume of liquid. In some cases, these systems are designed to double as emergency water cisterns for fire suppression.

(E) Infill shear trusses

Shown here is an exterior shear reinforcement of a conventional reinforced concrete dormitory building. In this case, there was sufficient vertical strength in the building columns and sufficientshear strength in the lower stories that only limited shear reinforcement was required to make it earthquake resistant for this location near the Hayward fault

Fig (64) Infill shear trusses

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

Advancements in Concrete

A) High Performance Concrete

Lafarge has developed a whole new family of concretes called Ductile. These concretes have high compressive and flexural strength, and their special characteristics enable the achievement of outstanding architectural feats. Ductile concrete incorporates

Fig (65) High performance concrete

strengthening fibers and opens the horizon to ultra-high performance due to its special composition which provides it with outstanding strength, six to eight times greater than traditional concrete (under compression). "Fiber-reinforced" means that it contains metal fibers which make it a ductile material. Highly resistant to bending, its great flexural strength means it can withstand significant transformations without breaking. Ductile also comes with organic fibers for applications with less load and for advanced architectural applications.

B) Light Transmitting Concrete

The days of dull, grey concrete could be about to end. A Hungarian architect has combined the world's most p optical fiber from Schott to create a new type of concrete thattransmits light. A wall made of "Litra Con" allegedly concrete but thanks to an embedded array of glass fibers can display a view of the outside world, such As the silhouette of a tree, for example. "Thousands of optical glass fibers forma matrix and run parallel to eac surfaces of every block," explained its inventor, Aron Losonczi. "Shadows on the lighter create the general imp weight of a concrete wall will disappear. "The hope is that the new material will transform the interior appear making them feel light and airy rather than dark and heavy.

Fig (66) Light transmitting concrete

C) Pervious Concrete

Pervious pavement is a cement-based concrete product that has a porous structure which allows rainwater to pass directly through the pavement and into the soil naturally. This porosity is achieved without compromising the strength, durability, or integrity of the concrete structure itself. The pavement is comprised of a special blend of Portland cement coarse aggregate rock, and water. Once dried, the pavement has a porous texture that allows water to drain through it at the rate of 8 to 12 gallons per minute per square foot. Tests conclude that a square foot of Bahia sod drains at the rate of 2 1/2 to 3 gallons per minute. According to the manufacturer, this rapid flow-through ratio inspired the phrase "the pavement that drinks water."

Fig (67) pervious concrete

D) Aerated Concrete

It was discovered in 1914 in Sweden that adding aluminum powder to cement, lime, water, and finely ground sand caused the mixture to expand dramatically. The Swedes allowed this "foamed" concrete to harden in a mold, and then they cured it in a pressurized steam chamber an autoclave. Autoclaved aerated concrete is produced by about 200 plants in 35 countries and is used extensively in residential, commercial, and industrial buildings. At a density of roughly one-fifth that of conventional concrete and a compressive strength of about one-tenth, AAC is used in load-bearing walls only in low-rise buildings. In high-rises, AAC is used in partition and curtain walls.

Fig (68) Aerated concrete

E) Floating Concrete

By replacing sand and gravel with tiny polymeric spheres, University of Washington materials scientists have created a concrete stronger than traditional concrete but so light it floats in water. The team won the regional American Society of Civil Engineers Concrete Canoe Competition last year.

Fig (69) Floating concrete

Foamed Aluminum

"Light-as-air, stronger-than-steel materials are just beginning to shape our world. Foamed aluminum first emerged from the lab in the frame of a1998 Karman concept car. Ten times stronger than traditional aluminum at just one tenth the weight, the material allows a more fuel-efficient vehicle. Its isotropic cellular structure helps the frame absorb shock and serves as an insulating firewall between the engine and the rest of the car. The foaming process can also be applied to steel, lead, tin, and zinc." The product is a high strength, extremely light weight material that possesses high durability, excellent finish and lasting value. The foam comes in an assortment of densities and sizes up to five feet wide and up to fifty feet long. It has numerous applications including architectural, automotive, marine, military, aviation, transportation, electronics, appliances, and signage.

Woven Stainless Steel

K5 New York is now offering woven stainless steel in 18 different weaves, produced in Switzerland by G. Bopp. This product has been used in projects as diverse as railing systems and furniture components. Custom weaves and patterns are also possible.

Creative Weaves Metal Mesh

Metal meshes have been known as decorative and functional design elements in architecture for only a few years. During the continuous product development along with ordinary use such as a fence element it became clear that metal meshes also have considerable technical advantages which are extremely relevant in the field of architecture. Today, the architect has a wide range of mesh samples at hand, with weaving widths up to eight meters, which allow for great design flexibility. Woven metallic meshes used as partition elements convey a new dimension to any space. They can be used as projection screens, and, taking into account their acoustic characteristics, are suitable for the use in publicbuildings, opera houses and concert halls.

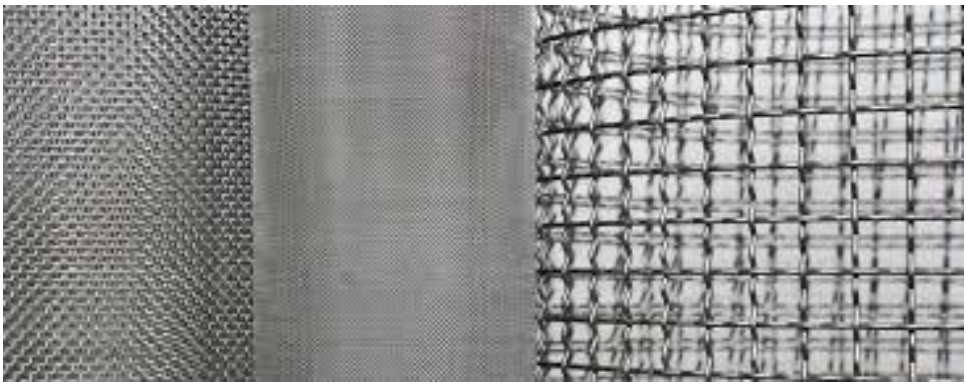


Fig (70) Creative weaves metal mess

Laminated Thermo Plastic Panels

Blizzard Composite GmbH manufactures high- tech plastic composites for the architectural field aswell as the trucking industry. Their core expanding machinery heats up and vertically expands solidthermoplastic sheets, which are then processed into sandwich panels by lamination equipment. Due to the unique geometry of the Pep Core, the panels are of low weight and provide an excellent combination of high stiffness and compressive strength.

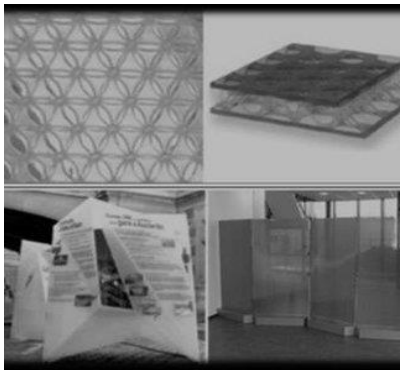


Fig (71) Laminated thermo plastic panel

Other Super Performing Multi Purposed Material

- **Geoweb:** Cellular confinement system for vertical vegetation for green walls.

- **Aero Foamed Aluminum:** Tightly corrugated aluminum sheets as in bamboo mats.
- **Flexible Framing Track:** For flexible outlining and fencing. A fence framed in metallicframe.
- **3D Molded Plywood:** Fast manufacturing furniture.
- **Corrugated Glass:** For inside esthetic and thermal insulation.
- **Braille Tiles:** Exclusively for people with weak eye sight or completely blind when itcomes to universal design.

Some Repurposed Materials and techniques

Rubber Sidewalks: Sidewalks or walkways made using used tires and hard boardingsheets.
Strawboard: Made from agro waste mainly

- **Biogases Boards:** Boards made of material left from sugarcane after extracting juice.
- **Natural Fiber Insulation:** Insulation panels made out of used cloths.
- **Frit:** Fine powdered glass from waste with ceramics remolded for reuse.
- **Acoustic-cell:** Boards made for acoustics from rubber shredding.
- **Asphalt:** Plastic blended with asphalt on roads for waste management.
- **Fly-Ash Concrete:** Using Fly-ash residue as strengthening material with cement

Table 7

Materials	Uses	Advantages
High Performance Concrete	Beam	On long span structures like bridges and halls
Light Transmitting Concrete	Interior Walls	Energy Saving
Pervious Concrete	Paving, Parking, Walkways	Will be permeable for water supporting water table recharge
Floating Concrete	Marine architecture	Will save construction cost
Weave Metal Mesh	Half walls, Fences, Acoustic walls	Cost and time effective
Aero gel	Skylight, Thermal panels	Heat resistive, transparent
Super Black	Paints, Varnishes and Finishes	Less Reflective, absorptive
Banner Work	Shading device, Landscape element	Time, Cost, Energy efficient
Geoweb	Vertical Gardening, Green walls	Energy conserving, Water conserving
Framing Track	Flexible boundaries and Fences	Quick and versatile
3D Molded Plywood	Furniture, Formworks	Time Saving, Repetitive design
Braille Tiles	On Floor or Walls	Signage for Blinds
Rubber Side Walks	Foot path, Walkways	Waste managing, Time saving, Eco-Friendly
Natural Fiber Insulation	Thermal Panels, Blocks	Re-Used Technique i, Repurposed
Fly Ash Concrete	Beams, Columns, Slab	Repurposed, Provides strength to base material

14.1.4 Engineering Aspects of Soil mechanics - Environmental Impact Assessment

What is Environmental Impact Assessment?

- It is the process or study which identifies the effects of a proposed industrial/infrastructural project on the environment.

- It prevents a proposed activity/project from being approved without proper impact assessment and attempts to compare various alternatives proposed for a project, preferring the alternative that best represents both economic and environmental interests.
- EIA is statutorily backed by the Environment Protection Act, 1986 which contains the framework for EIA methodology and process.

History of EIA in India

- India is a signatory to Stockholm Declaration (1972) on environment, and subsequently enacted laws to control pollution in water (Water act of 1974) and air (Air act of 1981).
- Following the Bhopal gas tragedy in 1984, India legislated an umbrella act -The environment (protection) act of 1986
- In 1994, India set up a legal framework: The first EIA notification, under the Environment (Protection) act 1986 for regulating projects that access, utilize, and affect the environment.
- The second EIA notification was legislated in 2006 which mandated obtaining environmental clearance for multiple categories of Projects/Industries.

Process of EIA:

The assessment process is carried out by an Expert Appraisal Committee (EAC) which comprises of experts in environmental sciences and Project Management Experts.

Procedure:

- **Scoping:** The project's potential impact on the environment, impact on nearby population is listed along with mitigation possibilities.
- **Preparation of Initial EIA Draft:** After Scoping the initial report is prepared listing out the baseline data gathered along with various alternatives available.
- **Public Consultation:** The initial EIA draft is then legally required to be presented to the concerned public for gathering their inputs. Concerned public meaning anyone that falls under the impact zone of the project.
- **Preparation and Appraisal of final EIA Draft:** After gathering and assessing the public input, the final EIA draft is prepared and goes through appraisal.
- **Grant or rejection of Environmental Clearance:** The Final EIA draft is then forwarded to the regulatory authority which in this case is the Ministry of Environment, Forests and Climate Change (MOEFCC).Ordinarily the ministry accepts the report sent by the Expert

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

The system is responsible for supplying water to the house 24/7. In order to achieve it, people install different equipment for pumping, storing, cleaning, limiting and supplying water to the house.

The first step is to choose **the source of drinking water** - it can be a borehole, a well, or a general city water supply. A well is easier and cheaper to implement, but a borehole can provide us with pure water (in other words, artesian). In addition, a borehole provides mostly unlimited supply of water, which cannot be said about a well. If to count in a very general numbers, we can say that a borehole in just one hour of time can provide you with such amount of water, which for a well will take a day to provide. Well, we are good with the sources of water, now it is a high time to take a look at the equipment for supplying water to the house - the pumps

Pumps can be of two types: surface mounted or submersible. Even from the names themselves we can figure out their principles of work – surface mounted pumps supply water from the upper layers, submersible ones – from more significant depths.

Another absolutely necessary element of the water supply system is a water supply network, which includes wiring and final destination points.

Sewerage

Sewage system is responsible for the diversion of wastewater into special treatment facilities (septic tanks) and its purification there. When installing a sewage system, it is highly important to take into account the location of the equipment, as well as the distance between the water pipe and the sewage system itself. Since the sewage system affects the state of the environment, its misplacement can be prosecuted. Therefore, in order to protect you from any risks, it is better to leave this work to professionals who will take into account all the important moments and even minor details.

What is wastewater?

Wastewater is any water that has been contaminated by human use. It is "used water from any combination of domestic, industrial, commercial or agricultural activities, surface runoff or storm water, and any sewer inflow or sewer infiltration".

We consider wastewater treatment as a water use because it is so interconnected with the other uses of water. Much of the water used by homes, industries, and businesses must be treated before it is released back to the environment.

If the term "wastewater treatment" is confusing to you, you might think of it as "sewagetreatment." Nature has an amazing ability to cope with small amounts of water wastes and pollution, but it would be overwhelmed if we didn't treat the billions of gallons of wastewater and sewage produced every day before releasing it back to the environment. Treatment plants reduce pollutants in wastewater to a level nature can handle.

Why Treat Wastewater?

It's a matter of caring for our environment and for our own health. There are a lot of good reasons why keeping our water clean is an important priority:

Fisheries: Clean water is critical to plants and animals that live in water. This is important to the fishing industry, sport fishing enthusiasts, and future generations.

Wildlife habitats: Our rivers and ocean waters teem with life that depends on shoreline, beaches and marshes. They are critical habitats for hundreds of species of fish and other aquatic life. Migratory water birds use the areas for resting and feeding.

Recreation and quality of life: Water is a great playground for us all. The scenic and recreational values of our waters are reasoning many people choose to live where they do. Visitors are drawn to water activities such as swimming, fishing, boating and picnicking.

Health concerns: If it is not properly cleaned, water can carry disease. Since we live, work and play so close to water, harmful bacteria have to be removed to make water safe.

Effects of wastewater pollutants

If wastewater is not properly treated, then the environment and human health can be negatively impacted. These impacts can include harm to fish and wildlife populations, oxygen depletion, beach closures and other restrictions on recreational water use, restrictions on fish and shellfish harvesting and contamination of drinking water. Environment Canada provides some examples of pollutants that can be found in wastewater and the potentially harmful effects these substances can have on ecosystems and human health:

- Decaying organic matter and debris can use up the dissolved oxygen in a lake so fish and another aquatic biota cannot survive;

- Excessive nutrients, such as phosphorus and nitrogen (including ammonia), can cause eutrophication, or over-fertilization of receiving waters, which can be toxic to aquatic organisms, promote excessive plant growth, reduce available oxygen, harm spawning grounds, alter habitat and lead to a decline in certain species;
- Chlorine compounds and inorganic chloramines can be toxic to aquatic invertebrates, algae and fish;
- Bacteria, viruses and disease-causing pathogens can pollute beaches and contaminate shellfish populations, leading to restrictions on human recreation, drinking water consumption and shellfish consumption;
- Metals, such as mercury, lead, cadmium, chromium and arsenic can have acute and chronic toxic effects on species.
- Other substances such as some pharmaceutical and personal care products, primarily entering the environment in wastewater effluents, may also pose threats to human health, aquatic life and wildlife.

Waste water treatment

The major aim of wastewater treatment is to remove as much of the suspended solids as possible before the remaining water, called effluent, is discharged back to the environment. As solid material decays, it uses up oxygen,which is needed by the plants and animals living in the water.

Fig (72) WTP

"Primary treatment" removes about 60 percent of suspended solids from wastewater. This treatment also involves aerating (stirring up) the wastewater, to put oxygen back in. Secondary treatment removes more than 90 percent of suspendedsolids.

Sustainable Development Techniques

It is the practice of using guidelines for environmentally responsible and energy savingsto create new development projects and to maintain and retrofit older projects.

It can include using green materials in new construction, designing projects that can harvest their own energy to reduce the load on a power grid, or that incorporate green space in order to counterbalance the green space removed to build the onsite facilities. Sustainabledevelopment involves satisfying the needs of the present population without endangering the capability of the future population to satisfy its own needs. It's about improving the wellbeing of everyone wherever they are and achieving this milestone collectively. Sustainable development also digs deeper.

Techniques:

1. Eradication of poverty across the world

These organizations primarily focus on the least developed and low-income countries where poverty is rife. They aim to eradicate poverty across the board by expanding social protection programs like school feeding, cash transfers, targeted food assistance, social insurance and labor market programs such as skill training, old-age pensions, wage subsidies, unemployment insurance, disability pensions and so on.

2. Promotion of good health and well being

This sustainable development goal seeks to ensure good health and well-being for all at each stage of life. The goal takes into account all the main health priorities such as maternal and child health, reproductive health, environmental, communicable and non-communicable diseases, universal health coverage, and access to quality, safe, effective, and affordable vaccines and medicines. It also advocates for enhanced health financing, increased research and development, strengthening the capacity of every country engaged in health risk prevention and management.

3. Provision of Quality Education for All

These bodies have realized that the level of child school dropout is at an all-time high. This gap must be closed to ensure sustainable future development even as international community's work to ensure quality and equity in the education sector. In a nutshell, this goal seeks to ensure equitable and inclusive quality education and promotion of long-life learning opportunities.

4. Provision of Clean Water and Sanitation

Water and sanitation are on top of the chart regarding sustainable development. They are critical to the survival of humans and the planet. This goal aims to address aspects relating to sanitation, hygiene, drinking water and the quality and sustainability of water resources acrossthe globe.

5. Building up Strong Infrastructure, Supporting Inclusive and Sustainable Industrialization and Incubating Innovation

This goal takes into account three aspects of sustainable development: industrialization, infrastructure, and innovation. Infrastructure is vital because it offers the basic framework necessary to smooth the running of enterprise and society at large. Industrialization drives up economic development, yield job opportunities, hence, reducing levels of poverty. Innovation enhances the technological abilities of industrial sectors and triggers the development of innovative skills.

6. Enabling Access to Affordable and Clean Energy

Energy is the most critical resource to achieving most of the sustainable development goals. Energy plays a vital role in mitigating poverty through advancements in industrialization, education, water supply and health and fighting climate change. This sustainable development goal focuses on developing and expanding renewable energy resources such as sun, wind,hydropower, liquid and solid befouls, biogas and geothermal. These renewable sources of energy don't emit greenhouse gasses to the atmosphere and therefore are ideal for the environment and human health.

7. Achieving Gender Equality

In the past few decades, gender equality and women empowerment have been agendas for most governments for long-term sustainable development. Access to education for girls has since improved, the percentage of child marriage has plummeted, and huge leaps have been taken in the domain of sexual and reproductive health and rights such as the dramatic reductionin maternal health. Although there is still a long way to go to reach this milestone, organizations are using every ounce of their energy and throwing in resources to ensure the dream is realized.

There are other sustainable development goals set by these bodies including decent jobs and economic growth, sustainable cities and communities, conservation of sea, ocean and marine resources, combating climate change, sustainable consumption and production patterns and muchmore.

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

Table 8

Sr No	Design name	Period	Amount Expenditure (Rs.)	Benefit
1	Elevated Storage Reservoir(ESR)	Immediately	4720000	to provide desired quantity of water
2	Community Hall	Long term (3 Years)	460000	Provides a Meeting Space.Promotes Exercise.
3	Anganwadi	Within 1 year	270000	is to provide for children to learn new things
4	WI-FI Tower	Within 1 year	300000	WI-FI tower is connecting people to theunpeople and with digital Knowledge.
5	Public Toilet	Within 1 year	131371	It is providing a safety and hygiene tothepeople.
6	Public library	Within 1 year	870341	To education purpose & increase knowledge of students.
7	Pickup stand	Immediately	140270	It provides comfortable, safe, and well-lighted transportation.
8	STP(Sewage treatment plant)	Immediately	Design ok	It is providing a safety and hygiene tothe people.
9	Avalo (Water tank for animals)	Immediately	7400	Is to provide clean water require for animal.
10	Post office	Within 1 year	116700	Is to provide courier facilities in village
11	Skill Development Centre	Long term (3 Years)	96112	To improve labour skill, farmer skill,Medical field skill etc.
12	Public garden	Within 1 year	93200	Public garden is an important in peoplelife for to relax.

Chapter 16: Survey by Interviewing With Talati And /Or Sarpanch

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Survey with Interviewing

SURVEY BY INTERVIEWING WITH TALATI AND/OR SARPANCH

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

CHAPTER- 16

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

Nodal officer and students can add more questions. This is a sample. Having Minimum requirement.

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

સરપંચશ્રી
દાવડા ગ્રામ પંચાયત

Chapter 17: Irrigation / Agriculture Activities and Agro Industry, Alternate Techniques and Solution

Irrigation helps to grow agricultural crops, maintain landscapes, and vegetate disturbed soils in dry areas and during periods of less than average rainfall. Irrigation also has other uses in crop production, including frost protection, suppressing weed growth in grain fields and preventing soil consolidation.

Fig (73) irrigation in Gujarat

❖ Irrigation in Davada village

Irrigation is the practice of purposely providing land with water by artificial means for crop production. Head of the distributor refers to the last point in the distributor at which the flow of water to the village is controlled by irrigation authorities

Water table, also called groundwater table, upper level of an underground surface in which the soil or rocks are permanently saturated with water. The water table separates the groundwater zone that lies below it from the capillary fringe, or zone of aeration, that lies above it.

Agro-based industry would mean any activity involved in cultivation, under controlled conditions of agricultural and horticultural crops, including floriculture and cultivation of vegetables and post-harvest operation on all fruits and vegetables.

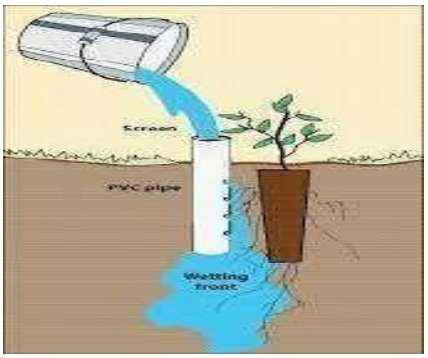
❖ Alternate Techniques:

1. Buried Clay Pot Irrigation

- One of the most studied, and very effective systems uses a buried clay pot full of water to irrigate plants
- The capillary flow of water through the clay walls of the pot is regulated by demand - so little water is wasted
- Highly recommended! For restoration, gardens, landscaping, farming
- Clay pots worked well even in the lowest, hottest desert
- Excellent for seedlings or for starting seeds or cuttings
- Pot rim painted white to reduce evaporation

Fig (74) Clay Water pot

2. Deep Pipe Irrigation



- This method of irrigation was suggested by a traditional system from India - where water was placed in the hollow stem of a dead plant to water deeper in the soil
- Subsequent research found one study and one report from India
- This has been our best system for restoration work -- cheap, durable and very effective

❖ Irrigation Problems and Solution

1. Irrigation systems turning on during rainy weather

It‘s always best when nature is happy to water the garden for you, but what happens when it starts raining at the exact time the irrigation system is set to start watering the garden? It’s not necessary or ideal to give the garden a double dose of water, especially when the aim of the game is to save water and money.

2. Water pressure issues

High, low and fluctuating water pressure can become an issue when your irrigation system is in use because it can prevent your garden from getting watered properly. Water pressure issues can result in misting, which is not effective hydration for your garden.

The solution is to install and adjust a valve pressure regulator at the valve and pressure regulation at the point of water distribution, both of which are features of the Rain Bird irrigation system.

3. Over-watering and under-watering

No two gardens are the same, so a one-size-fits-all irrigation system is not effective because it is likely to result in over-watering and under-watering. It is important to assess the areas in your garden that get a lot of sun versus a lot of shade. The parts of your garden that are exposed to more sun will need more water to compensate for the inevitable increased water loss, whereas the shady sections will require less watering. In addition, different areas of your garden will require more or less water depending on the plants in each area. Some plants demand more water, while others can survive on much less. But how can watering the garden be regulated in a way that considers all these factors?

4. Awkward garden designs

As we have said, each garden is unique and there is bound to be some interesting garden features that your irrigation system has to contend with. Your garden probably has one or more of the following characteristics: small or tight areas, odd shapes, long strips, crazy corners, various buildings, winding paths and weird obstacles.

5. Water run-off and pooling

The ultimate goal is to get the water to where it needs to go and to avoid as much water wastage as possible. The problem is that certain parts of the garden may have more compact soil, which means the water is not always absorbed and it begins to run-off onto areas that don‘t need the water. Similarly, water can begin pooling in areas below slopes or where run-off water settles, and these puddles can be damaging.

Chapter 18: Social Activities – Any Activates PlannedBy Students

In this CORONA Pandemic we planned to aware people to be a safe we provide guidelines to the school principal and village people






Fig (75) Activity done by student

Chapter 19: <<ALLOCATED VILLAGE>> SAGY Questionnaire Survey form with the Sarpanch Signature

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Davada Gram Panchayat: Dawada Ward No. —

Block: — District: Mehsana

State: Gujarat L S Constituency: Mehsana

1. Family Identity and Size

Name of Head of Household	Thakor Mukeshbhai Manilal							Male/ ~~Female~~	M
SECC Survey ID:	—	Family Size	5	Over 18	4	6 to 18	1	Under 6	

2. Category & Entitlement Details (Tick as appropriate)

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

2. Adults (above 18 years)

Name	Age	Sex M/F / O	Disability Status Y/N	Marital Status[3]	Education Status[4]	Adhaar Card (Y/ N)	Bank A/C (Y/N)	Social Security Pension[5]
Thakor manilal	57	M	N	2	7th	Y	Y	—
Thakor Mukesh	39	M	N	2	12th	Y	Y	—
Thakor hiraben	35	F	N	2	10th	Y	Y	—
Thakor kantaben	54	F	N	2	7th	Y	Y	—

3. Children from 6 years and up to 18 years

Name	Age	Sex M/F/O	Disability Y/N	Marital Code*	Level of Education: Code#	Going to School /College (Y/N)	Current Class	Computer Literate Y/N
Thakor Chirag	11	M	N	1	Primary	Y	6th	N

4. Children below 6 years

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

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

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

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

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

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

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

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

6. Use of Mosquito Net
Children: Yes / ~~No~~ Adults: Yes / ~~No~~

7. Do members take Regular Physical Exercise

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

8. Consumption of Tobacco

	Smoking	Chewing
Adults	No	No
Children	No	No

9. House & Homestead Data

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

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

Source of Water		Distance
Piped Water at Home	Yes / ~~No~~	0.5 Km
Community Water Tap	Yes / ~~No~~	0.1 Km
Hand Pump (Public / Private) ~~Yes~~ / No		
Open Well(Public / Private) ~~Yes~~ / No		
Other (mention):		

11. Source of Lighting and Power

Electricity Connection to Household: Yes / ~~No~~
Lighting: Electricity/~~Kerosene~~/~~Solar Power~~
Mention if Any Other: _____
Cooking: LPG/~~Biogas~~/~~Kerosene~~/Wood/~~Electricity~~
Mention if Any Other: _____
If cooking in Chullah: Normal/ Smokeless

12. Landholding (Acres)

1. Total	21	2. Cultivable Area	17
3. Irrigated Area	2	4. Uncultivable Area	1

13. Principal Occupations in the Household

Livelihood	Tick if applicable
Farming on own Land	✓
Sharecropping /Farming Leased Land	–
Animal Husbandry	✓
Pisciculture	–
Fishing	–
Skilled Wage Worker	–
Unskilled Wage Worker	–
Salaried Employment in Government	–
Salaried Employment - Private Sector	✓
Weaving	–
Other Artisan(mention)	
Other Trade & Business (mention)	

14. Migration Status
Does any member of the household migrate for Work: ~~Yes~~ / No. If Yes Entire Year / Seasonal
Does anyone below 18 years migrate for work: ~~Y~~/N

15. Agriculture Inputs

Do you use Chemical Fertilisers	Yes/~~No~~
Do you use Chemical Insecticides	~~Yes~~/No
Do you use Chemical Weedicide	~~Yes~~/No
Do you have Soil Health Card	~~Yes~~/No
Irrigation: ~~None~~/ ~~Canal~~/ ~~Tank~~/ Borewell/~~Other~~	
Drip or Sprinkler Irrigation: ~~Drip~~ /Sprinkler / ~~None~~	

16. Agricultural Produce in a normal year (Top 3)

Name	Unit	Quantity
Cotton	–	–
Wheat	–	–
Vegetable	–	–

17. Livestock Numbers

Cows: –	Bullocks: –	Calves: –
Female Buffalo: 2	Male Buffalo: –	Buffalo Calves: –
Goats/ Sheep: –	Poultry/ Ducks: –	Pigs: –
Any other: Type –		No. –
Shelter for Livestock: ~~Pucca~~ / Kutcha / ~~None~~		
Average Daily Production of Milk(Litres): 20/20		

18. What games do Children Play : Cricket and Kho-Kho

19. Do children play musical instrument (mention) = No

Schedule Filled By: Nachiket Pandya
Principal Respondent:
Date of Survey: 2/5/21

3

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

I. Basic Information

a. Gram Panchayat: Davada

b. Block: _____

c. District: Mehsana

d. State: Gujarat

e. Lok Sabha Constituency: Mehsana

f. Number of Wards in the Gram Panchayat: 1

g. Number of Villages in the Gram Panchayat: 1

h. Names of Villages: Davada

Demographic Information

Number of Households 476 Total Population 2431 Male 1266 Female 1165

SC HHs 56 ST HHs - OBC HHs - Other HHs -

I. Access to Infrastructure / Facilities / Services

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
a.	ANM/ Health Sub Centre	N	15 KM
b.	Nearest Primary Health Centre (PHC)	Y	
c.	Nearest Community Health Centre (CHC)	N	15 KM
d.	Nearest Post Office	Y	
e.	Nearest Bank Branch (Any)	N	4 KM
f.	Nearest Bank with CBS Facility	N	15 KM
g.	Nearest ATM	Y	
h.	Nearest Primary School	Y	
i.	Nearest Middle School	N	10 KM
j.	Nearest Secondary School	N	10 KM
k.	Nearest Higher Secondary School / +2 College	N	8 KM
l.	Nearest Graduate College	Y	
m	Nearest ITI / Polytechnic Centre	N	17 KM
n	Kisan Seva Kendra	N	15 KM

4

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
o	Agriculture Credit Cooperative Society	Y	
p	Nearest Agro Service Centre	N	15 KM
p	MSP based Government Procurement Centre	N	15 KM
q	Milk Cooperative /Collection Centre	Y	
r	Veterinary Care Centre	N	10 KM
s	Ayurveda Centre	N	15 KM
t	E – Seva Kendra	N	10 KM
u	Bus Stop	Y	
v	Railway Station	N	10 KM
w	Library	Y	
x	Common Service Centre	Y	

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total 1 Public 1 Private 0

b. Mini Stadium : N Yes(Y) /No (N) *(Playground with equipment and sitting arrangement)*

V. Education, ICDS

a. Number of Angan Wadi Centres: 2

b. Number of villages without Angan Wadi Centres 0

Names of such villages: —

c. Schools (Number)

Primary Private: N Primary Govt.: Y

Middle Private: N Middle Govt.: N

Secondary Private: N Secondary Govt.: N

Higher Secondary Private: N Higher Secondary Govt: N

VI. Public Distribution System

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

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire 5

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

VII. Coverage of Villages under different Facilities & Services

	Parameter	Villages Status[1]	Names of Villages Covered	Names of Villages not Covered
a.	Piped Water Supply Coverage to Villages	Covered ✓ Not Covered	BokasVada-Navapura Gosad, Vista, Bhandu Davada	
b.	Hand Pump Coverage in Villages:	Covered - Not Covered		
c.	Coverage under Covered Drains:	Covered Not Covered ✓	Bokasvada, Gosad Navapura, Bhandu Vista	
d.	Coverage under Open Drains:	Covered Not Covered ✓	Davada, Navapura Vista, Gosad	
e.	Villages with Household Electricity Connection (Numbers)	Connected ✓ Not Connected	476.	

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	1072 H	d.	Pasture / Grazing Land	-	g.	Check Dam	-
b.	Irrigated Land	-	e.	Forests/ Plantations	-	h.	Wells/Bore Wells	-
c.	Un-irrigated Land	-	f.	Other Common Land	235 H	i	Tanks /Ponds	7 H

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

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

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

IX. Parameters relating to Households & Institutions

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

Name and Signature of Surveyor and Respondent'

Surveyor	PRI Respondent (Preferably Gram Panchayat Chairperson)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey
A.P. Chauhan	સરપંચશ્રી દાવડા ગ્રામ પંચાયત		2/5/2021

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

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SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

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

I. Basic Information

a. Village: Davada
b. Ward Number: _____
c. Gram Panchayat: Davada
d. Block: _____
e. District: Mehsana
f. State: Gujarat
g. Lok Sabha Constituency: Mehsana
h. Number of Habitations / Hamlets in the Gram Panchayat: –
i. Names of Habitations / Hamlets: Davada

Demographic Information

Number of Households 476 Total Population 2431 Male 1266 Female 1165

SC HHs 56 ST HHs – OBC HHs – Other HHs –

II. Access to Infrastructure/Amenities etc.

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
a.	Nearest Primary School	Y	
b.	Nearest Middle School	N	10 KM
c.	Nearest Secondary School	N	10 KM
d.	Kisan Seva Kendra	N	15 KM
e.	Milk Cooperative /Collection Centre	Y	
g.	Health Sub Centre	Y	
h.	Bank	N	8 KM
i.	ATM	Y	
j.	Bus Stop	Y	
k.	Railway Station	N	10 KM

[1] While filling this the surveyor must collect the information from the Ward Member/s and relevant government officials

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SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
l	Library	Y	
m	Common Service Centre	Y	
n	Veterinary Care Centre	N	10 KM

ii. Road Connectivity

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

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

iii. Drinking Water Facilities

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

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

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

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

iv. Coverage of Habitations under Waste Management System

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

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

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

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

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

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

v. Coverage of Habitations under Electrification

a. Coverage under Household Connections: *(1-All 2-None 3-Some)*

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

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

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

vi. Sports Facilities in the Village

a.Number of Play Grounds in the Village (minimum size 200 square meters): N

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

vii. Education, ICDS

a. Number of Anganwadi Centres: 2

c. Schools (Number)

Primary Private: 0 Primary Govt.: 1

Middle Private: 0 Middle Govt.: 0

Secondary Private: 0 Secondary Govt.: 0

Higher Secondary Private: 0 Higher Secondary Govt: 0

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

viii. Land Category	Area in Acres		Land Category	Area in Acres		Irrigation Structure	No.
a. Cultivable Land	1072H	d.	Pasture / Grazing Land		g.	Check Dam	
b. Irrigated Land		e.	Forests/ Plnatations		h.	Wells/Bore Wells	
c. Unirrigated Land		f.	Other Common Land	257H	I	Tanks /Ponds	7H

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

Name and Signature of Surveyor and Respondent'

A.R.Chaudhari Surveyor	સરપંચશ્રી દાવડા ગ્રામ પંચાયત તા.જી.મહેસાણા PRI Respondent (Preferably a ward member from a ward that is fully or partially covered under the Village)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	2/5/2021 Date of Survey

Chapter 20: TDO-DDO-Collector email sending Softcopy attachment in the report

Gmail

Nachiket Padhya <nachiketpadhya2020@gmail.com>

Vishwakarma yojana Phase 8 Project report

Nachiket Padhya <nachiketpadhya2020@gmail.com> Tue, Aug 31, 2021 at 8:01 PM
To: tdo-visnagar@gujarat.gov.in, ddo-mehsana@gujarat.gov.in
Cc: Vishwakarma Yojana <rurban@gtu.edu.in>

Respected Sir/Madam

Please find the attached file Report
We are students from L.C.Institute of Technology, Bhandu affiliated to Gujarat Technological University-GTU. GTU has been assigned to Vishwakarma Yojana- VY in which students survey various villages and Design Various Amenities to deliver it to them making them ideal for living better life as per requirements & village Problem statements.

As a part of Vishwakarma Yojana's guidelines, we have been asked to inform all the Respected officers about the our project in which we will shortly notify about Davada Village profile of issues for development and our design work for them which is as below

DAVADA FINAL.pdf
13799K

Chapter 21: Comprehensive report for entire village

Vishwakarma Yojana is provides special scheme for development of rural area by GTU and Government of Gujarat in which students work together and collect data and information regards Rural area development with the help of gram panchayat, Talati, villagers and stake holders. Our selected village Davada have some basic facilities likes drinking water, electricity, drainage system, Pucca road, are sufficient so that village can develop. So, we will give proposal regarding sustainable energy sources and solution related to infrastructure problems.

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

It is one of the strategies to reduce urban city pressure and lower the migration rate by developing village with a "rural soul" but with all urban amenities that a city may have. In this project the students meet the relevant citizens of village and survey the existing facilities. Then design of the sustainable infrastructure which is to be modified is carried out for the village. This includes implementation of engineering skills to prepare detailed project reports for village as a part of the final year project work.

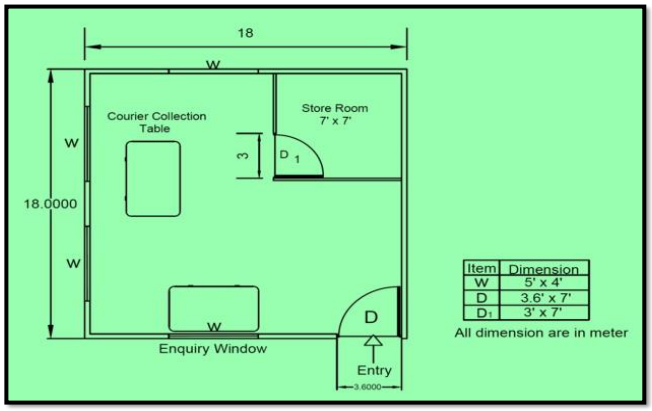
By this project certain experiences recreates a real work and need of application of an individual technical knowledge on any existing problems. Based on survey we tried to give design of basic facilities to fulfil their needs. By providing basic facilities like Solid waste management system, School renovation, Community hall, Vermicomposting method, Anganwadi, for reduce urban city pressure and decrease migration rate, which is ultimate aim of Vishwakarma Yojana.

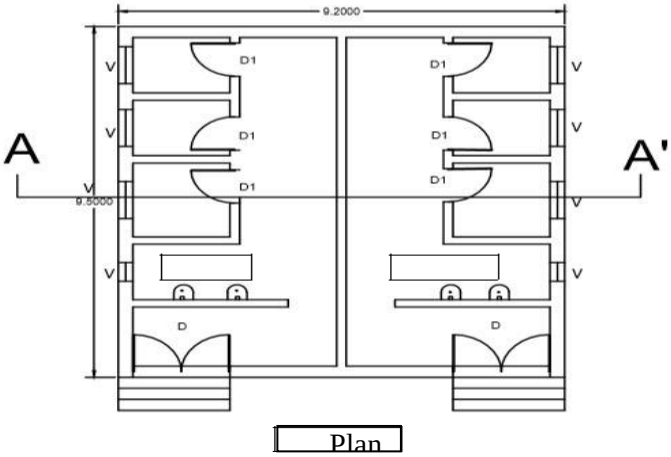
Vishwakarma Yojana would provide "Design to Delivery" solution for development of villages in 'Rurban' areas. The developmental work in villages that could undertake as per the need of the village in particular includes Physical infrastructure facilities (Water, Drainage, Road, Electricity, Solid waste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

Under this scheme, the villages of "Rurban" area will be adopted by the engineering colleges under the Gujarat Technological University. The Engineering colleges would study the identified villages and make the recommendations on the application of technology to achieve integrated and comprehensive development, through project preparation and management.

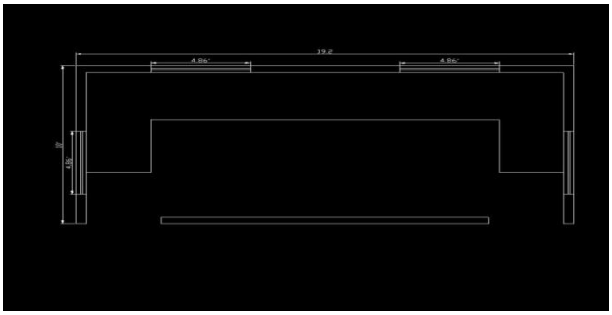
Vishwakarma Yojana is one of the approaches to reduce urban city Pressure and lower the migration rate by developing village with a 'rural soul' but with all urban amenities that a city may have. The developmental work in villages that could undertake as per the need of the village in particular includes Physical, Social and Renewable infrastructure Facilities. It is also proposed to frame "Vishwakarma Yojana" to provide the benefit of real work experience to engineering students of Gujarat Technological University and simultaneously apply their technical knowledge in the development of infrastructure in rural development.

- Some provided designs





Plan



❖ Nodal officer statement

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

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

Nodal Officer
Mr Sumit B Patel Prof
L.C.Institute of Technology, Bhandu