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Study Of Modern Sanitation System For Mandav(Ghorad) Village, Ta. Hingna, Dist-Nagpur(Maharashtra)

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ABSTRACT: *Most people in India lives in rural areas, the most important factor due to which sanitation is not affordable is economy but we are introducing modern as well as economical sanitation by which we improved sanitary condition in rural area (i.e. common septic tank method) by adopting such method we achieve healthy environment and improving living standard of people in rural area which is also help in developing the nation. Same of the village panchayats have suggested individual pits for collection of waste and its disposal by intermittent sprinkling on large areas, either in the courtyard or on the streets the villager adopt this practice for some times, but their enthusiasm dies with time. The international community has set the provision of sanitation part of the millennium development goals, aiming to reduce the number of those without adequate sanitation facilities to half by the year 2015. To achieve this, various strategies are designed by government of India and state government.*

KEYWORDS- *Common septic tank, disposal, healthy environment, improving living standard, development.*

I. INTRODUCTION

A large section of Indian population lives in villages and is mainly engaged in agriculture. They belong to weaker section of the society. There is a definite trend of rural population migrating to the urban areas due to lack of employment opportunities, low earnings, insufficient means of transport and insanitary living conditions. The latter is mainly responsible to repel the educated youth from working in rural areas. One source of insanitary condition in rural areas is the drainage of waste water from bathing and cooking areas of dwellings over the kutcha roads and lanes having inadequate slopes. The situation is further aggravated due to the movements of carts and animals which result in the creation of pot holes and ditches that gets filled up with dirty stagnant water. The mosquitoes and flies find good breeding centers in these places and spread diseases.

The most important factor due to which sanitation is not affordable is economy but we are introducing modern as well as economic sanitation by which we improved sanitary condition in rural area (i.e. common septic tank method). By adopting such method we achieve health environment and improved living standard of people in rural area. By adopting such type of project we get the improved and longer life of sanitation system resulting healthy environment in rural area and improved living standards of people in rural areas. Providing sanitation to people requires a systems approach, rather than only focusing on the toilet or wastewater treatment plant itself. The experience of the user, excreta and wastewater collection methods, transportation or conveyance of waste, treatment, and reuse or disposal all need to be thoroughly considered.

II. OBJECTIVE

- To give suggestion to adopt modern as well as economical sanitation system to improve sanitary condition of village (i.e. common septic tank method)
- To study the design of common septic tank & sewer line.
- To create awareness among the villagers by organising the awareness programme to achieve healthy environment and improve living standard.

III. GOVERNMENT INITIATIVES

Government of India has been running many schemes since last many years.Let us analyse these schemes.

1)Central Rural Sanitation Programme (CRSP)

Central Rural Sanitation Programme (CRSP)was launched in 1986 with the objective of improving the quality of life of the rural people and also to provide privacy and dignity to women by providing proper sanitation facilities in rural areas.

2)Nirmal Bharat Abhiyan and Total Sanitation Campaign

The concept of sanitation was further expanded to include personal hygiene, home sanitation, safe water, garbage and excreta disposal and waste water disposal with the name "Total Sanitation Campaign" (TSC) with

effect from 1999. Individual toilets, community sanitation complexes, institutional toilets and solid and liquid waste water systems are constructed under the scheme. The key feature of this scheme is role of CSOs, Community Based Organisations (CBOs) and Panchayati Raj Institutions (PRIs) is very important. .
It has been recently allowed that certain component of the toilet construction can be taken from Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) with a maximum ceiling of 4500 Rupees per unit only. Whereas Rupees 3200 Rupees comes from central Government and 900 Rupees is beneficiary's share. States usually give amount of approximately half of the amount provided by central Government. This is sufficient only to build basic structure (substructure) of individual two pit pour flush toilet.

3)Nirmal Gram Puraskar

To add motivation to this scheme, GOI launched an award based Incentive Scheme for fully sanitized and open defecation free Gram Panchayats, Blocks, Districts and States called "Nirmal Gram Puraskar" (NGP) in October 2003. Till the date many villages have been awarded to bring in motivation among the people specially PRI functionaries at village level to make NBA a success.

IV. METHODOLOGY

Preliminary study on various villages and to investigate about sanitation problems existing in those areas.

- Selection of a suitable rural area for the study of available sanitation facilities.
- The additional requirements necessary to fulfill the needs of people are to be assessed.
- Complete study on existing sanitation facilities in the area and to identify problems associated with sanitation.
- Planning of suitable sanitation scheme in the area so as to provide a better living standard in terms of public health and also environmental protection.

4.1:-Case Study Area:-

1. Name of village: Mandav (Ghorad)Th-Hingna.Dist-Nagpur
2. Population of village: 1143
3. Male population : 587
4. Female population: 556
5. Water condition: Good
6. Water source :60000 & 30000 litre capacity water tanks (ESR) , 4 tube wells
7. Condition of road: 70% concrete road, 30% WBM road
8. Slope of ground towards north side
9. Public toilets exist, but condition of toilets is very poor.
10. Literacy Rate of village is about 90%.

FIG. 1 :-TOPOGRAPHIC MAP OF MANDAV

4.2:-Design of septic tank

As per the field condition of selected village Mandav (Ghorad),we are designing septic tank for which data is to be collected as follows:
Data collected:

1. No of users =150
2. Water supplied =200 lpcd
3. Assuming detention period = 24 hrs (1 day)
4. Assuming cleaning sludge = 3 years

Solution,

Space required for settling zone = $\frac{150\times200}{1000} = 30\ m^3$/day

Volume of settling zone = Q x DT

= 30 x 1

= 30 □^{3}

Assume liquid depth =2.0m L:B =3:1 (assumed)

L=? B=?

Surface area of septic tank = Volume of settling tank/depth of liquid= 30/1.5=20m^2

L x B = 20 □^{2}

3B x B = 20 □^{2}

3B^2= 20 □^{2}

B = 2.58 m ≅**2.6 m**

L = 3 x 2.6 = **7.8 m**

Depth of septic tank=?

Assume free board = **0.4 m**

Depth =2.0 + 0.4 = **2.4 m**

Breadth =**2.6 m,** Length = **7.8 m** ,Depth = **2.4 m**

4.3:- Determination of gradient for sewer line by tacheometeric survey.

We found gradient for sewer line by using tacheometer,

Gradient=(RL of staff station A-RL of staff station B)/Distance AB

=102.349-100.293/100.283

=0.020

Gradient=1 in 50

4.4:- Design of sewer line

1. Data to be collected to design sewer line

1. Actual present population: 60
2. Future population to be assumed: 150
3. Rate of water supply : 200 lit/day/capita
4. Assume self cleaning velocity : 0.75 m/sec
5. Cast iron pipe :manning value: N =0.012
6. Gradient: 1 in 1200

2. Design Of Sewer Line:

$$\text{Total dishcharge} = \frac{150\times200}{24\times60\times60} = 0.347\frac{\text{lit}}{\text{sec}}$$

Total Discharge = 3.47 × 10^{-4} cumec

According to manning formula,

$$V = \frac{1}{N}\times R_3^2\times S_2^1$$

$$V = \frac{Q}{A} = \frac{3.47\times10^{-4}}{\frac{\pi}{4}\times D^2}$$

$$\frac{3.47\times10^{-4}}{\frac{\pi}{4}\times D^2} = \frac{1}{0.012}\times\left(\frac{D_3^2}{4_3^2}\right)\times\frac{1_2^1}{1200_2^1}$$

.

$$3.47\times10^{-4} = 0.954\times D_3^2\times\frac{\pi}{4}\times D^2$$

1.389 × 10^{-3} = D$^{8/3}$ D = 0.084m

[D = 0.1m] Adopting dia of sewer **= 0.20 m**

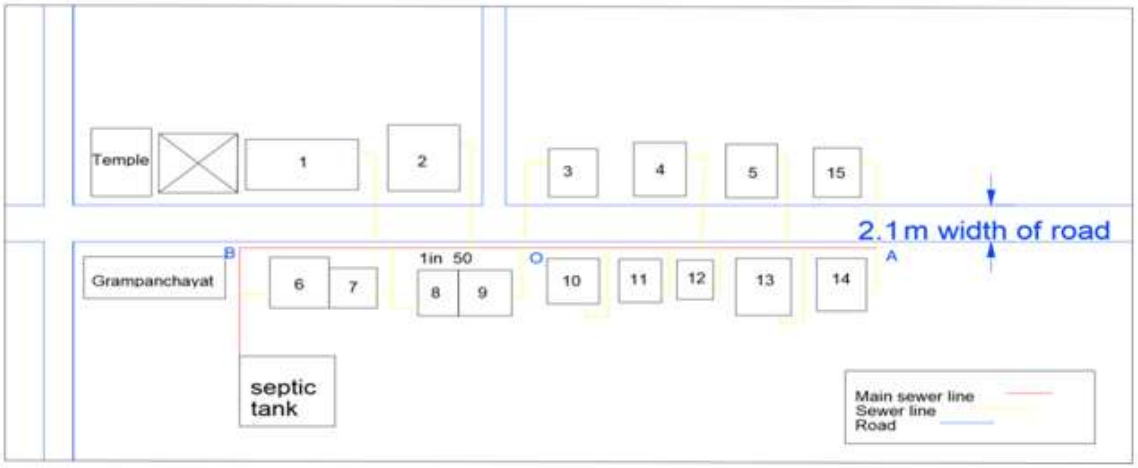

FIGURE2 :- plan of sewer line

Hence as per the design we are providing diameter of sewer line is **10cm** but on the field it is practically difficult for laying the sewer line, so that we are provide the diameter of sewer line about **20cm**. Lateral pipes carrying sewage from houses are connected to the main sewer line which is laying centrally to the road and further it is connected to the septic tank. All the waste is carried in septic tank.

4.5:-Plan of sewer line

FIGURE2 :- plan of sewer line

4.6:-Estimation of septic tank

It is necessary to calculate the estimation amount of septic tank to which we can gives the idea about how the septic tank is usable for given budget. The designing and detailing of septic tank means we got the length, width, and height of the septic tank. Septic tank shall be brickwork in 1:4 cement mortar and foundation be of 1:3:6 cement concrete. Inside of septic tank shall be finished with 12 mm cement plaster and floor shall be finished with 20 mm cement plaster with 1:3 mortar mixed with standard water proofing compound. Upper and lower portion of the soak pit shall be of second class brickwork in 1:6 cement and middle portion shall be dry brickwork. roof covering slab and baffle wall shall be of precast R.C.C. Septic systems will vary in price depending on a few different factors such as material costs, the company which you hire to install the system, the area in which you live and the type of septic system which you have installed.

Total estimated amount required for sanitary system

Sr no	Description of item	Total amount
1	Septic tank	174788.75
2	Soak pit	25140.88
3	Toilet construction	93471.45
4	sanitary fittings and pipes	55260

Total cost = 348661.08

V. RESULT

As per the above analysis and design of sewerage system the total estimated cost of the project is **Rs348661.08 /-** .we design this sewerage system for 15 families and the cost of each family to be required is **Rs23244.072 /-** (including the cost of toilet, soak pit, septic tank and sewer line) . From this project we can construct the permanent toilet over large period life to their habitants.

The Government of Maharashtra gives Rs 15000/- for each family for constructing their own toilets under a scheme of **NIRMAL BHARAT ABHIYAN**

VI. CONCLUSION

According to our project work we get the total cost for sanitation system is Rs.3,48,661 but we get the money from government scheme nearby Rs.2,25,000 (considering Rs.15000/each house)but we provide modern sanitation system which is better than government sanitation system ,hence according to our project work it is feasible/affordable to people living in that rural area. If we invest Rs 8000 more money than the govt. Granted subsidy then we will provide permanent toilet with proper sewerage system to their community. Hence it is concluded that by adopting such type of project we get the improved and longer life of sanitation system resulting healthy environment in rural area and improved living standard of people in living in rural area.

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