

CHAPTER - II

PROFILE OF THE SHIVSADAN SOCIETY

2.0. HISTORICAL BACKGROUND OF SHIVSADAN SOCIETY :

"Shivsadan Society" was established as a Co-operative Society in 1969. The main objectives of the society are as follows :-

- 1) To manufacture pre-fabricated house, cattle sheds, poultry sheds, godowns, latrines, bathrooms, bio-gas plants, compost pits, water storage tanks, R.C.C. spun pipes, compound walls, burial yards etc. and the parts thereof.
- 2) Transport these parts to the site of the consumer and complete the erection work.
- 3) Adoption of renewable energy sources like solar energy, bio-gas plants, bio-energy and water energy, supply them to consumers and develop these sources.
- 4) To Undertake Projects in housing, pollution control, rural development and agriculture and social forestry.
- 5) To undertake research and development projects in the area of non-conventional energy source, pollution control and agricultural and social forestry.

In the initial stage, Shivsadan Society, gave emphasis on

construction of pre-fabricated houses for the consumers in Sangli and Satara districts. Upto 1973-74, Shivsadan Society constructed 130 such houses mainly in urban area of the two districts. But during 1973-74 there was unprecedented shortage of cement which was the main raw material required for the prefabricated houses. It followed by government control on distribution of cement. The government control specified that while releasing the cement quota, priority would be given to the agricultural needs. Shivsadan Society, therefore, shifted its emphasis on farmer's needs and decided to manufacture the biogas plants and R.C.C. pipes required for energy and irrigation purposes respectively.

The Government of India's 20-point Programme launched in the year 1975, included construction of houses for landless agricultural workers in villages as one of the points of the said programme. In view of these important developments, Shivsadan Society had to take an urgent and closer look at the rural housing programme including gobargas plant.

After a great deal of thought, it was noticed that an efficient and ideal cluster of a village dwelling unit of an Indian farmer should have a gobargas plant feeding the compost pits at its centre. The farm house, cattle and poultry shed, toilet block and wash place and a suitable water storage device should form the surrounding elements of the above nucleus. Shivsadan Society took up the studies to deal with

the whole problem of rural housing as viewed above and worked on each of the above elements systematically. It is proposed in this study to evaluate these efforts of Shivsadan Society

- i) First one covering gobargas plant and
- ii) the second, covering the surrounding structures.

Gobar gas plant should be an indispensable part of the rural housing scheme. In fact, it is a simple instrument for harnessing the abundant hidden source of energy and manure lying around through micro-biological activity.

Technicians of Shivsadan Society, since its inception, were also engaged in harnessing the above said energy most economically and putting the same to practical use by adopting appropriate modern technology to suit the Indian conditions.

Working on these lines, Shivsadan Society, successfully produced the prototype prefabricated gobar gas plant confirming to the K.V.I.C. pattern in December 1974, and toilet block in July 1975.

All the components of Shivsadan Gobar gas Plant including circular digester chamber, inlet and outlet chamber, feed and discharge pipes, central dividing wall and circular frame supporting the gas holder are precast in reinforced cement concrete (R.C.C.) which is capable of bearing flexural stresses.

Intially, this project was carried out in close collaboration with Shetkari Sakhar Karkhana, Sangli.

Shivsadan Society has constructed 615 commercial plants. Out of these plants 279 plants were constructed for the benefit of the producer members of the Sangli Karkhana. Almost all the banks in Sangli District have been coming forward to lend money to farmers for construction of Shivsadan Society's gobar gas plants and toilet blocks.

After getting experience of constructing 615 plants, some of the inferences drawn for worth noting and foremost is that the plant should be formed and run as a small compost factory and not simply as a gobar gas plant. The disposition of the farmhouse cluster has very important bearing on the efficiency of the plant. The elevation of toilet block and cattle shed should be so located that the effluent from W.C. block and urine from cattle shed feed the gobar gas plant by gravity. The cattle dung and poultry litter should be fed by hand after thoroughly mixing it with water to get proper feed. Waste water from wash place and kitchen should also be discharged in the compost pits through the above channel.

In case of urban population, one can have very small and clean family size biogas plants with the main purpose of meeting the fuel needs of cooking. Human excreta and leftover food are two assured feed materials obtained in every house. With these grain, fodder nutritious waste biogas plant can be operated and such biogas plant working on renewable energy basis would be a boon to those who haven't got the cattle.

• During the years 1969 to 1988, KVIC with the banking of the Government of India was able to construct about one lakh go-bar gas plants all over India. KVIC was mainly instrumental in attracting the attention of millions of farmers and the Governments towards this scheme. KVIC was successful in fulfilling this preliminary objective. But numerically this is a small work considering the vast expanse of the country.

2.1. ORGANISATIONAL SET UP OF SHIVSADAN SOCIETY :

I) Members and Share Capital :

50% of the share holders are biogas plant holders, i.e. these members are first consumers of Shivsadan Society and then they have become members.

Table-2.1. : Statement Showing Share Capital and Members of Shivsadan Society

1) Share Capital (Rs)	38,000	1,42,000	2,54,000	4,90,000
2) Membership (no.) (One share of Rs.1000)	38	92	172	280
3) Bio-gas Installed (no.)	-	78	706	957

Source : Compiled from the Annual Reports Of Shivsadan Society

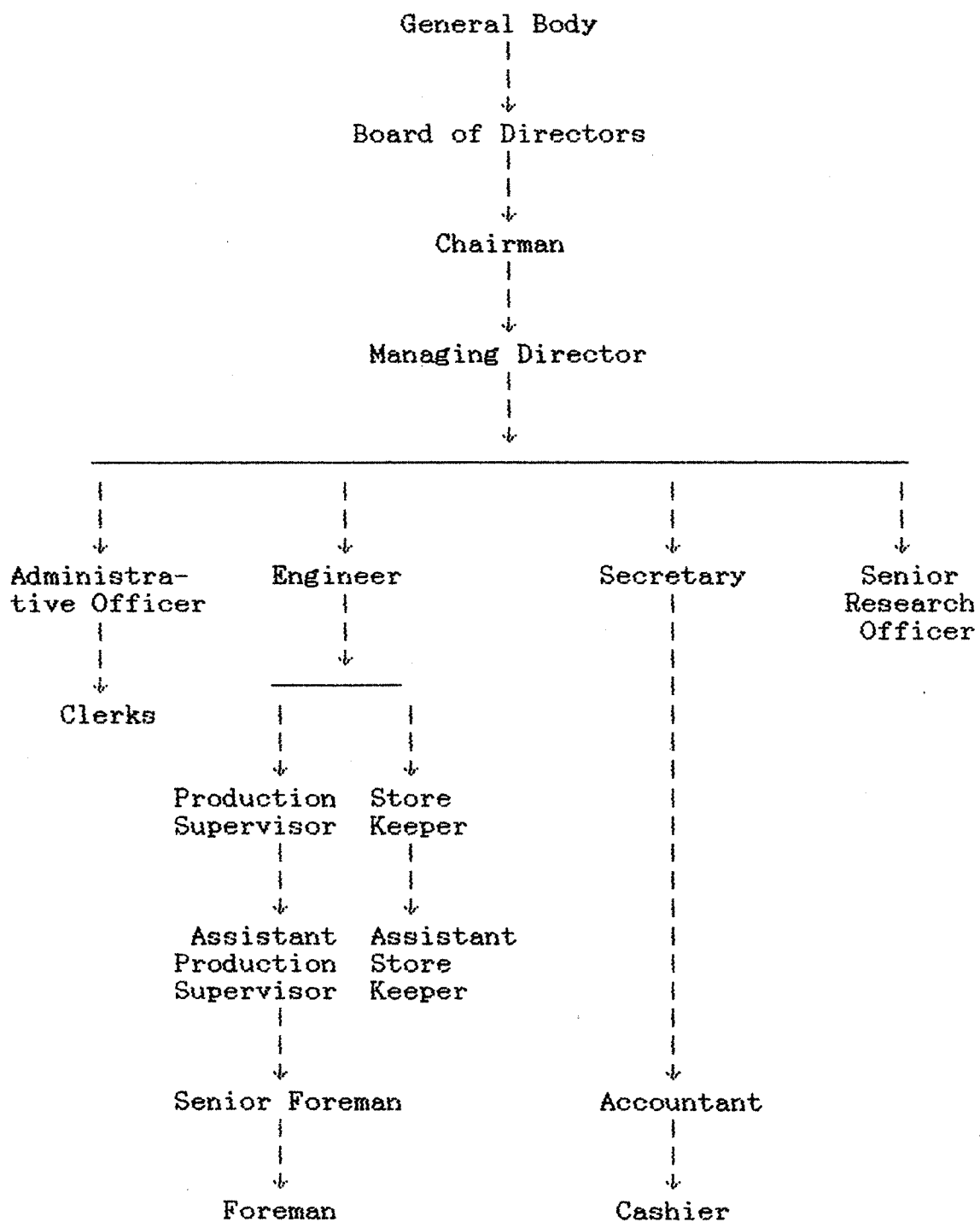
II) Organisation and Management :

The General Body consisting of all the members is the supreme authority in Shivsadan Society, as in case of any other co-operative organisation. The General Body, elects from amongst the members, 9 members to become directors. In addition to these 9 elected members, 2 directors are co-opted

and 1 is appointed the Managing Director. The co-opted directors are normally the experts in the field of business done by the Society or other allied fields. The Board of Directors shall elect from among themselves a Chairman and a Vice-Chairman to work in their respective capacities for a period of one year. The Board is expected to formulate policies to be pursued and give directions to the Managing Director and other key personnel in respect of business of the Society and other important matters. The Board is responsible to the General Body for the overall administration and management of the Society.

The Managing Director shall be responsible for the general working of Shivsadan Society and its administration subject to the directives and control of the Board. He is the Chief Executive Officer of the Society. Under him, there are technical and Administrative staff.

Organisation chart of the Society, as shown below, depicts the functional structure and the manner in which authority and responsibility flow-



III) Operating Aspects :

After studying the technique of construction of gohar gas plant by conventional method, Shivsadan Society

concentrated its attention on a centralised production at the unit located at District Industrial Campus, Sangli. This could enable Shivsadan Society to get all the necessary infrastructure and facilities for procuring necessary raw material, skilled labour and supervisors to carry out the construction of gohar gas plants by fabrication method. Farmers located in surrounding area could get these plants at reasonable cost and within a reasonable time span. Every repetitive component of gas plant consisting of inlet and outlet chambers, feed and discharge pipes, circular digestion chambers, dividing wall, gas holders and their supporting frame could all be manufactured by prefabrication method. The prefabricated R.C.C. components could then be transported by truck to the site of the installation. A day is sufficient to install one plant by this method. One erector and an assisted crane operator can complete the toilet block in one day. The toilet block discharges its effluent in the gohar gas plant.

IV) Procedure for Instalattiom of Biogas Plant :

A most comprehensive but simple procedure is followed in biogas installation. The village agriculturist who is normally a member of the local Primary Agricultural Credit Society (PACS) and who has a desire to install a biogas plant in his house or farm, gives a written application to Shivsadan Society. The PACS, after verifying and getting

ascertained that the applicant is not a defaulter, recommends him for the installation of biogas plant with the map of a local area. The application is then sent to the Agricultural Development Officer of the Zilla Parishad who, in turn, forwards it to the branch officer of the lead bank or any other bank entrusted with that case. The bank on sanctioning financial aid to the applicant sends the information about loan sanction to Shivsadan Society for further action. On receipt of the bank's letter, together with 75% advance and 25% guarantee for the remaining amount, Shivsadan Society sends its quotation to the PACS for the information of the applicant. The supervisors of Shivsadan Society visit the site of the applicant. After verifying his field and the place where he desires to instal the plant, the supervisors prepare initial digpot. Normally within a period of one or one and half months Shivsadan Society constructs the Biogas plant on the site and hands it over to the user.

V) Models of Bio-gas Plant :

Shivsadan Society has been manufacturing 3 types of biogas plants.

i) KVIC Model :

This model includes prefabricated floating Drum of bio-gas plant consisting of a R.C.C. digester and a moving mild steel gas holder. The gas holder floats

directly on the fermentation slurry. It rises when the gas collects and falls when the gas is drawn from the gasholder. Its operation is easy and volume of gas is visible directly. But the main drawbacks are high cost of mild sheet and also regular painting. Shivsadan Society, therefore, thought of developing another model for adoption.

ii) Janata Model :

Shivsadan Society developed the Janata Model in the late 70's. Its dome is fixed and it consists of an enclosed digester with a fixed nonmovable gas space. The gas is stored in the upper part of the digester. The slurry is displaced into the compensating tank as the gas production commences. Gas pressure increases with the volume of the gas stored and reduces when the volume is low. The merits of this model are-

- a) Low construction cost.
- b) No moving parts.
- c) Underground construction affording.

protection from winter and cold and saving space.

The main demerits of this model are-

- 1) Cracks resulting into leakage of gas
- 2) Volume of gas is not visible.

Shivsadan Society has lateron developed a third model named "Krishna Model".

iii) Krishna Model :

'Krishna' Biogas plant has a wholly new and innovative design. It has been developed in 1988 by Shivsadan Society. This plant is entirely prefabricated in R.C.C. costs 15% to 20% less than KVIC model and overcomes the problem of corrosion, frequent repairs and gas leakage from the dome, etc., which are often encountered in custom built KVIC and Janata models.

VI) Cost of Bio-gas Plant :

The cost of biogas plant depends on distance between the factory of Shivsadan Society and the site of its installation. The table given below shows cost of plant on the basis of distance.

Table 2.2 : Statement Showing Cost of Biogas
Plant on the Basis of Distance

<u>KVIC MODEL</u>				<u>JANATA MODEL</u>			
Size of the plant Cubic Mtrs.	Distance from Shivsadan Society			Size of the plant Cubic Mtrs.	Distance from Shivsadan Society		
	upto 50 Kms. Rs.	51 to 200 Kms. Rs.	201 to 250 kms. Rs.		Upto 50 kms. Rs.	51 to 200 kms. Rs.	201 to 250 Kms. Rs.
1	4200	4300	5100	1	-	-	-
2	5400	6100	6900	2	4500	5200	6300
3	7200	7700	8800	3	6200	6600	7900
4	8900	9400	10600	4	7600	8000	9500
6	10600	11100	12200	6	9000	9500	11000
8	12600	13100	14400	8	-	-	-
10	16300	17000	18100	10	-	-	-

Source : Compiled from Shivsadan Society's Office

VII) Cost Benefit Figures :

It is observed that the efficient working of the plant as described yielded 25 bullock cart loads of compost manure per cattle per year. At the rate of Rs. 30/- per cart load of manure prevailing in this area, the resulting value of manure alone would be above Rs. 750/-. One cattle head also yields cooking gas worth Rs. 200/- giving a gross yearly return of Rs. 950/- to Rs. 1000/-. The cost of installation of gobar gas plant and compost pit approximately comes to Rs. 1200/- per cattle head. Thus, the yearly gross return of Rs. 950/- to Rs. 1000/- over the investment of Rs.1200/- is really an attractive proposition from economic angle also.

Sketches of these three models are given in the Appendix to this chapter.

2.2. WORK DONE BY SHIVSADAN SOCIETY :

Work done by Shivsadan Society, right from its inception in 1969 upto 30th June, 1990, can be seen from the following table.

Table 2.3 : STATEMENT SHOWING WORK DONE BY SHIVSADAN SOCIETY OVER YEARS

Sr. No.	YEAR	Prefabricated Houses No.	Bio-gas plants No.	Ready-made Latrines No.	R. C. C. Pipes Burial Yards etc. (No.)	Sales & Revenues Rs. Lakh.	Profit in Rs. Lakh.	Share Holder capital in Rs. lakh	Share Holders No.
	1969-70	3	-	-	-	0.45	0.03	0.33	33
	1970-71	14	-	-	-	2.11	0.07	0.60	49
	1971-72	39	-	-	-	5.39	0.09	0.65	59
	1972-73	36	-	-	-	5.00	0.16	1.23	59
	1973-74	38	-	-	-	5.25	0.24	1.32	72
	1974-75	-	25	1	-	6.56	0.17	1.38	89
	1975-76	32	78	42	-	6.81	0.19	1.42	92
	1976-77	394	114	28	21,746 ft	15.64	0.18	1.42	98
	1977-78	374	110	79	84,827 ft	17.67	0.19	1.42	98
	1978-79	52	135	69	69,044 ft	12.00	0.19	1.45	100
	1979-80	94	96	49	35,000 ft	10.78	0.25	1.58	109
	1980-81	136	116	40	36,552 ft	18.28	0.28	1.72	120
	1981-82	259	72	97	34,810 ft	28.12	0.30	1.79	125
	1982-83	275	236	124	9,392 ft	27.20	0.40	2.25	150
	1983-84	266	706	120	9,144 ft	72.00	0.50	2.54	172
	1984-85	2	1565	385	-	135.00	1.28	2.77	182
	1985-86	12	968	249	-	87.00	0.96	2.94	189
	1986-87	7	1405	273	-	126.00	1.10	4.18	228
	1987-88	59	1248	420	B. YARD 1	129.00	1.24	4.34	237
	1988-89	24	957	282	B. YARD 1	98.00	1.30	4.90	280
	1989-90	11	707	177	-	79.23	-	4.90	280

Source : Compiled from Annual Reports and other Office Records of Shivsadan Society.

2.3. RESARCH ON WATER HYACINTH :

The means of production utilised for solar energy and photovoltike energy are very costly and beyond the reach of the common man. Shivsadan Society, therefore, devoted its attention to this issue from the year 1979 to 1981. They did continuous laboratory experimental work which proved that green plants are a more powerful source of producing gas than any other chemical fertilizer used in the plant. The plant "Water Hyacinth" has proved effective for this purpose. Shivsadan Society, therefore, set up an independent project in 1 hectare area. The Power and Energy Department of Government of India has sanctioned Rs. 6 lakhs as financial assistance for this project. Sangli Municipality had made available the required land for this work.

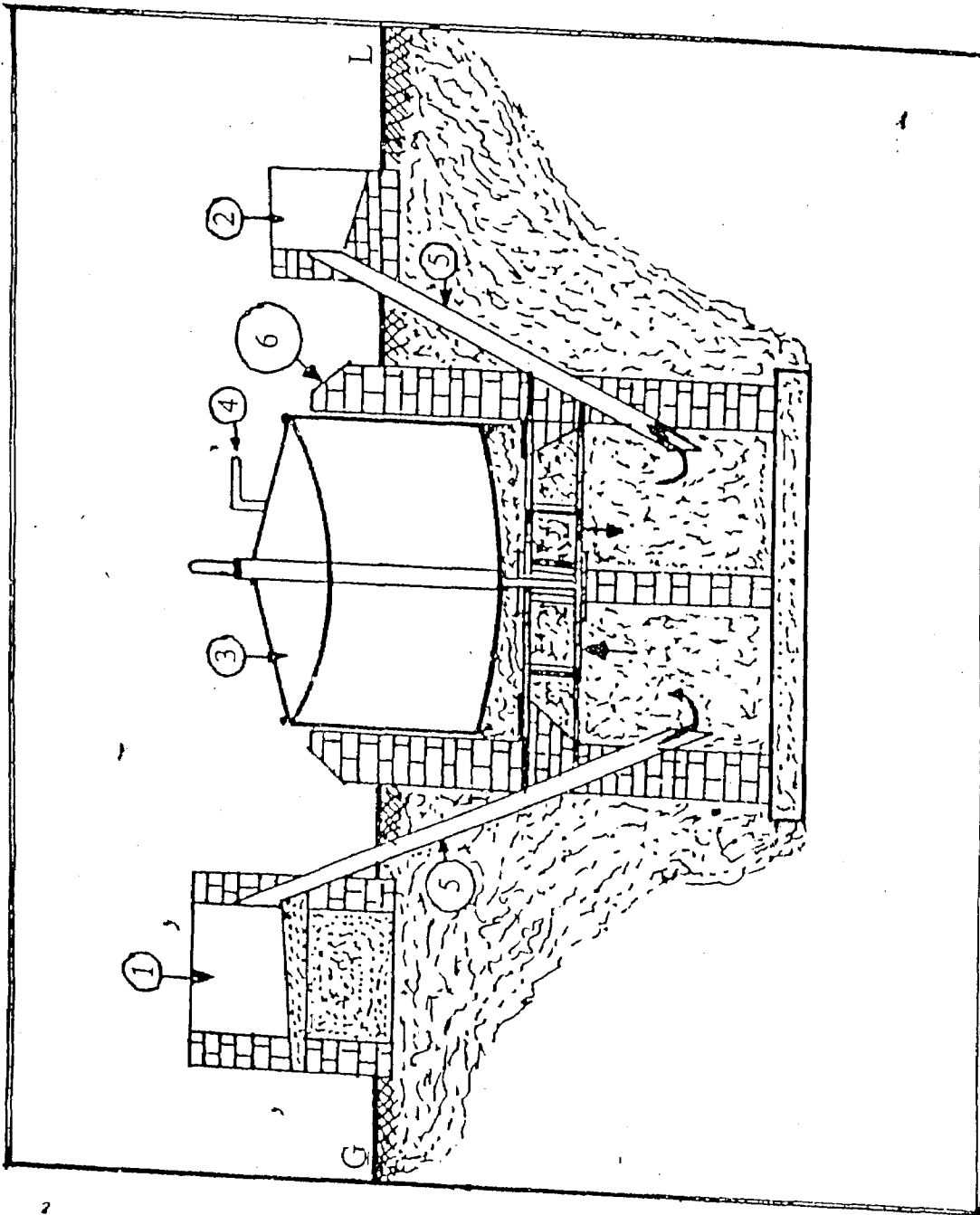
Water Hyacinth offers a very rich and potential source of energy apart from the fact that it also acts as a good fodder and fertilizer. It offers better prospect for biogas production than any other animal photosynthetic efficiency.

One acre plot of Water Hyacinth can provide 11,000 cft. gas per day. It can be seen that gas production with 50% cattle dung and 50% Water Hyacinth combination is highest in all seasons as compared to gas produced with other combination of cattle dung. If it is available continuously any village can get biogas for whole year continuously.

Maximum production of biogas occurs at 32° C to 36° C temperature. There is an ideal ratio of carbon and Nitrogen which is suitable for the production of biogas. Fresh Water Hyacinth plants contains 15% leaves, 75% stem and 10% roots. Practically every part of the plant is suitable for biogas production.

Diagram of the plant

- (1) INLET TANK
- (2) OUTLET TANK
- (3) GAS HOLDER
- (4) GAS OUTLET
- (5) A.C. PIPE
- (6) DIGESTER

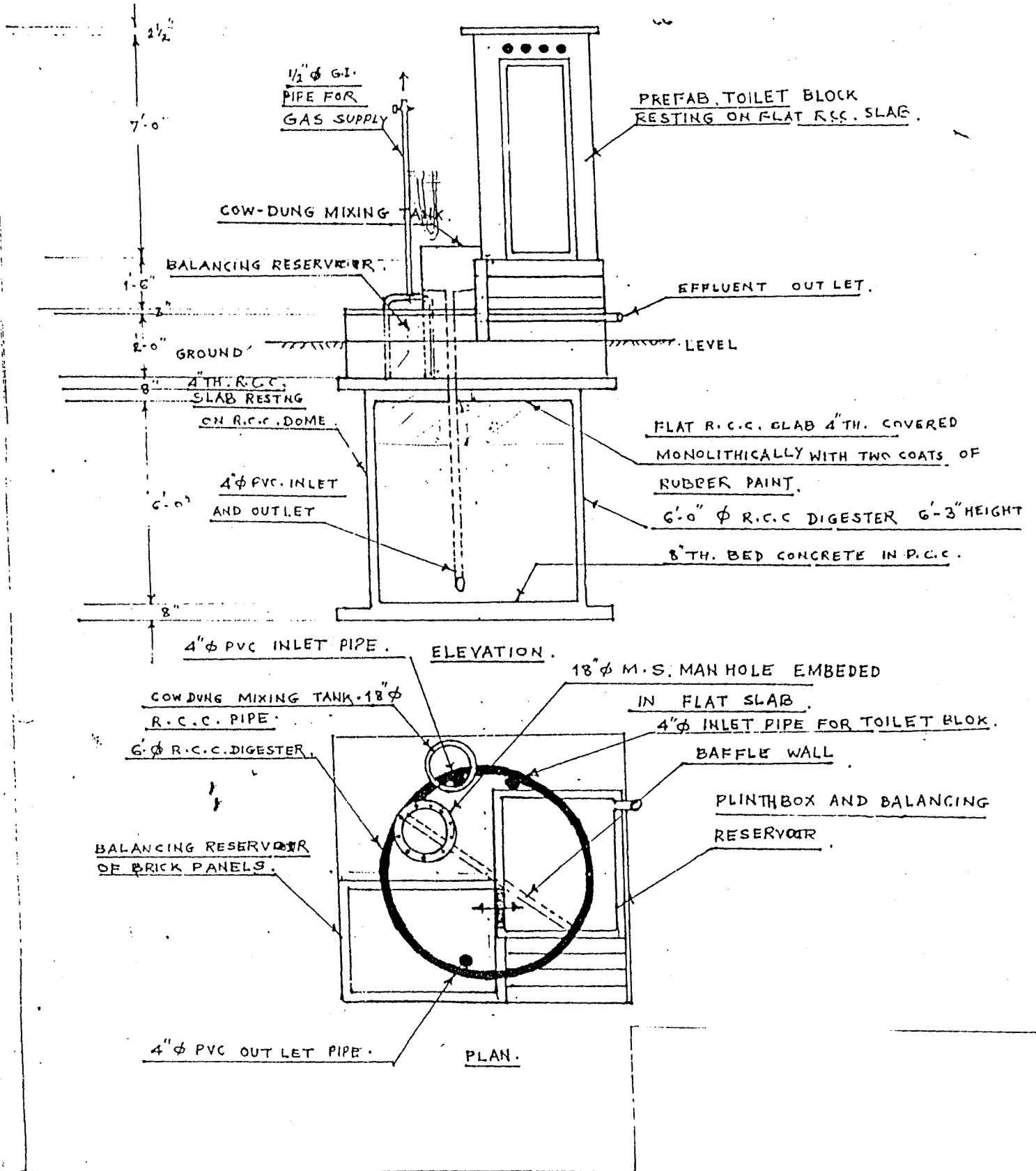


शिवसदन गृहनिर्माण सहकारी सोसायटी लिमिटेड, सांगली.

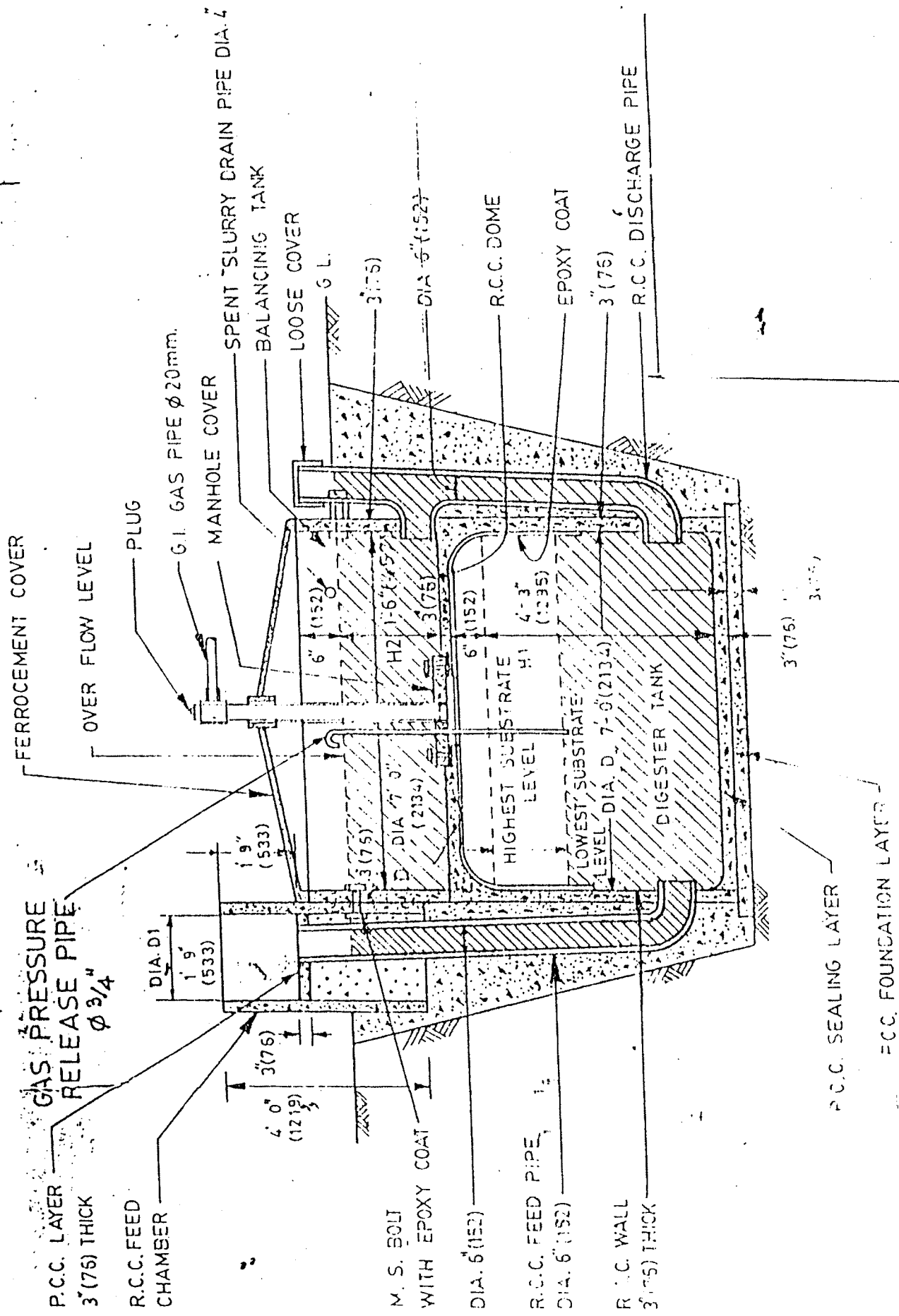
हस्तालिखित मसुदा :

A SKETCH SHOWING:

3 CMT. CAPACITY PREFAB. JANATA BIO-GAS PLANT AND TOILET BLOCK.



APPENDIX 2.3



SECTIONAL ELEVATION ON AA