

PLANNING AND HYDRAULIC DESIGN OF SEWAGE TREATMENT PLANT FOR YAVATMAL CITY

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ABSTARCT:

Sewage treatment & Disposal is always great problem for Yavatmal Municipal Corporation, as there is no sewage treatment plant for treating domestic waste. Waste water from Yavatmal city has directly disposed into the canal & river without any prior treatment. Based on the conditions the efforts have been made & data regarding population has been collected from Yavatmal Municipal Corporation^[1] & waste water sample has been collected from canal of TALAV FAIL area. The tests on waste water sample has been done & based on the characteristics of waste after comparing with discharge standards of waste water given by CPCB, the various units has been decided. The hydraulic design of various units has been carried out as per design standards of CPHEEO manual. The hydraulic calculations have been carried out by considering all losses.

Keywords: STP; Planning; Hydraulic design.

1. INTRODUCTION:

Sewage treatment is very much essential before discharging it into the water body or on to the land. To meet the discharge standards given by CPCB, prior treatment is essential before directly discharge of waste water into the water body or on to the land. Sewage treatment & Disposal is always great problem for Yavatmal Municipal Corporation, as there is no sewage treatment plant for treating domestic waste. Waste water from Yavatmal city has directly disposed into the canal & river without any prior treatment.

Based on the conditions the efforts have been made & data regarding population has been collected from Yavatmal Municipal Corporation^[1] & waste water sample has been collected from canal of TALAV FAIL area.

The tests on waste water sample has been done & based on the characteristics of waste after comparing with discharge standards of waste water given by CPCB, treatment philosophy for given waste has been decided.

The hydraulic design of various units has been carried out as per design standards of CPHEEO manual. The hydraulic calculations have been carried out by considering all losses. The model for the sewage treatment plant for Yavatmal city has also been made.

2 OBJECT OF SEWAGE TREATMENT:

Proper disposal of human excreta to a safe place before it's starts decomposition and may cause insanitary condition in the locality.

To take out all kinds of waste water from the locality, immediately after its use, so all mosquitoes, flies, bacteria etc. may not breed in it cause nuisance. Final disposal of sewage on land or in nearby water-courses after some treatment so that receiving land or water may not get polluted and unsafe for its further use.

As far as possible the fertilizing element of sewage may be used in growing crop through sewage farming and getting some income in addition to the disposal of sewage.

In answered area, the treatment of sewage from individual houses should be done by septic tank or other suitable means, and the effluent should be disposal of.

If the sewage is disposal of on the land it should have such a degree of treatment that it may not affect the sub-soil in way.

3 DATA COLLECTION:

As per information collected from authority of Yavatmal Municipal Corporation, the population of Yavatmal city of three decades as follows:

Table 1: Population Data

Sr. No.	Year	Population
01	1991	1,08,578
02	2001	1,19,941
03	2011	1,25,956

Based on the Population data of Three decades population forecasting has been done by using Arithmetic increase method & population for next decade (Up to 2021) should be **1, 34,645** (One Lack thirty four thousand six hundred forty five).

4.0 SAMPLE COLLECTION:

As per information given by concerned authority of Yavatmal Municipal Corporation, we had collected waste water sample from disposal point. The location of waste water disposal point of Yavatmal city is a canal of Talav fail area.

5.0 TESTS ON WASTE WATER SAMPLE:

Following tests on given waste water sample has been carried out:

1. pH Value
2. Total Solid
3. Suspended Solid
4. BOD
5. COD

Table 2: Tests Results & Characteristics of waste water of Yavatmal City

PARAMETER	VALUE
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pH	6.7
Suspended Solid	120 mg/lit
BOD	125 mg/lit
COD	366 mg/lit

Table 3: Standards of CPCB Manual

PARAMETER	VALUE
pH	6.5-8.0
BOD	30mg/lit(in drains)
BOD	100mg/lit(on land for irrigation)
COD	250mg/lit(in drains & also on land)
Suspended solids	200-500mg/lit(in drains & also on land)

5 TREATMENT PHILOSOPHY:

From Characteristics of waste water (Table 2) & Discharge standards given by CPCB (Table 3), the characteristics of waste water from "Yavatmal City" shows that the waste water can be treated physio-chemically and due to rapid industrializations in city, the waste will also be Biologically treatable and based on the treatment philosophy following units has been decided for treatment of given waste.

1. Screen Chamber
2. Grit Chamber
3. Primary Settling Tank
4. Aeration Basin
5. Secondary Settling Tank
6. Sludge Drying Bed

6 HYDRAULIC DESIGN OF STP ^[2, 3, 4]

Hydraulic design for all units of Sewage Treatment Plant has been carried out as per CPHEEO manual

Table 4: SUMMARY OF HYDRAULIC DESIGN

SR. No.	Treatment Units	No. of Units	Size of tank (m)	Volume Hold up(m ³)

1	Screen chamber	01	2 x 0.6 x(0.4swd +0.3 FB)	0.84
2	Grit Chamber	01	2 x 0.3x(1.3swd +0.3 FB)	9.6
3	Primary settling tank	01	28 dia. x (5.0swd +0.3FB)	3263.48
4	Aeration tank	03	95 x 8 x(4.0swd +0.5 FB)	3420
5	Secondary settling tank	01	15 dia. x (2.0swd +0.25 FB)	397.6
6	Sludge drying beds	08	10 x 20 x(2.0swd +0.3 FB)	60

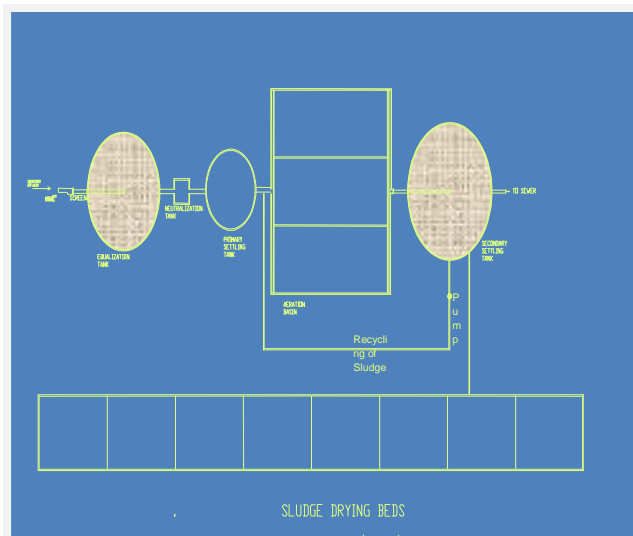


FIG 1. FLOW SHEET OF STP FOR YAVATMAL CITY



Fig 2. Model of STP for Yavatmal City (Front View)



Fig 3. Model of STP for Yavatmal City (Top View)



Fig 4. Model of STP for Yavatmal City (Top View)

7 CONCLUSIONS:

The characteristics of waste water from “Yavatmal City “shows that the waste water can be physio-chemically and biologically treatable to meet the discharge standards as mentioned by Central Pollution Control Board. Based on the characteristics of waste water, treatment philosophy has been decided and hydraulic design for various units of Sewage treatment Plant has been carried out as per design standards of Central Public Health Environmental Engineering Organisation Manual (CPHEEO manual). Feasible hydraulic design with all

necessary checks (as per CPHEEO manual) and position of units has been finalised by considering all head losses. The flow sheet of Hydraulic design & model of sewage treatment plant for Yavatmal city has also prepared.

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