

# Design of Waste Water Treatment Plant for CSMSS, CSCOE

Sagar Kailas Ghodke<sup>1</sup>, Somesh Bhagaji Dafal<sup>2</sup>, Vaibhav Rameshwar Mali<sup>3</sup>, Pooja Dattatray Bhapkar<sup>4</sup>,  
Swapnali Suresh Bhosle<sup>5</sup>, Prof.C.P.Thosar Sir<sup>6</sup>

U.G. Student, Department of Civil Engineering, CSMSS ChhatrapatiShahu College Of Engineering, Aurangabad,  
Maharashtra, India<sup>1-5</sup>

Assistant Professor, Department of Civil Engineering, CSMSS ChhatrapatiShahu College Of Engineering, Aurangabad,  
Maharashtra, India<sup>6</sup>

**ABSTRACT:** There are two fundamental reasons for treatment of waste water viz. prevention of pollution and there by protecting the environmental and protecting the public health by safeguarding water supplies and preventing the spread of water borne diseases. When

Untreated sewage is discharged sewage may be washed upon to the shore,near thepoint of disposal,where they decomposes and create fousl mell and bad odors. The discharged sewage will contaminate the natural body water i.e. river, lake etc with pathogenic bacteria. It is absolutely necessary to study the characteristics and behavior of sewage, to ensure its safe disposal. This study will help in determination the degree and type of treatment required to be given to given sewage,and this avoid the pollution of the source of its disposal. The present study involves thea nalysis of pH value, total solids, total suspended soils, hardness, acidity, alkalinity, chloride, chlorine, BOD and DO. The sampling of the domestic waste from CSMSS, CSCOE Aurangabad havean average data of the measured parameter. The average values of pH,Turbidity, DO,TDS,BOD,COD. A sewage treatment plant has been designed with treatment units, a bar screen,grit chamber, primary settling tank, secondary settling tank, sludge digester.

**KEYWORDS:** Characterization, sewage, treatment plant.

## I. INTRODUCTION

It is the branch of environmental engineering in which the basic principles of science and engineering are applied to the problems of water pollution control. So, as an overview, this wastewater engineering includes wastewater treatment, sludge disposal and reuse, wastewater reclamation and reuse, effluent disposal and the role of engineer. Every community produces both solid and liquid wastes. The liquid waste is known as the wastewater. It may be defined as liquid wastes collected in a sewer system and conveyed to a treatment plant for processing.In view of their sources of generation it may be defined as a combination of the liquid or water carrying wastes removed from residences, institutions, commercial and industrial establishments together with ground water, surface water and storm water (may also be present).In most of the communities, storm runoff water is collected in a separate sewer system and conveyed to the nearest water course for disposal without treatment. Several large cities have a combined wastewater collection system where both storms as well as sanitary wastes are collected in the same pipe system.Storm wastewater means the wastes from rains or floods while sanitary or domestic waste water refers to liquid collected from residences, business buildings and institutions.

## II.OBJECTIVES OF THE STUDY

The objectives of the study are:

Physical, chemical and biological characterization of domestic waste water samples from the kitchen effluent, toilets and the bathroom waste.

Comparison with the prescribed standard.

Design of the sewage treatment plant.

III. PHYSICAL , CHEMICAL AND BIOLOGICAL CHARACTERISTICS OF WATER

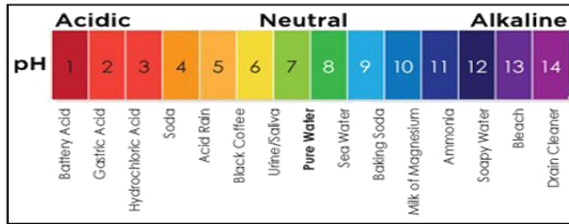


Fig.1. pH scale

Water Hardness Scale		
Grains/Gal	mg/L & ppm	Classification
Less than 1	Less than 17.1	Soft
1 – 3.5	17.1 - 60	Slightly Hard
3.5 - 7	60 - 120	Moderately Hard
7 - 10	120 - 180	Hard
Over 10	Over 180	Very Hard

Fig.2. Hardness scale



Fig.3. Turbidity waste water



Fig.4.DO Meter

Sr. No	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the absence of Alternate Source.
01	Colour, Hazen units, Max	5	15
02	Odour	Agreeable	Agreeable
03	pH value	6.5-8.5	No relaxation
04	Turbidity, NTU, Max	1	5
05	Total dissolved solids, mg/l, max	500	2000

06	Chloride (as Cl), mg/l, Max	250	1000
07	Nitrate (as NO <sub>3</sub> ), mg/l, Max	45	No relaxation
08	Sulphide (as H <sub>2</sub> S), mg/l, Max	0.05	No relaxation
09	Total alkalinity As Calcium carbonate, mg/l, Max	200	600
10	Total Hardness (as CaCO <sub>3</sub> ), mg/l, Max	200	600

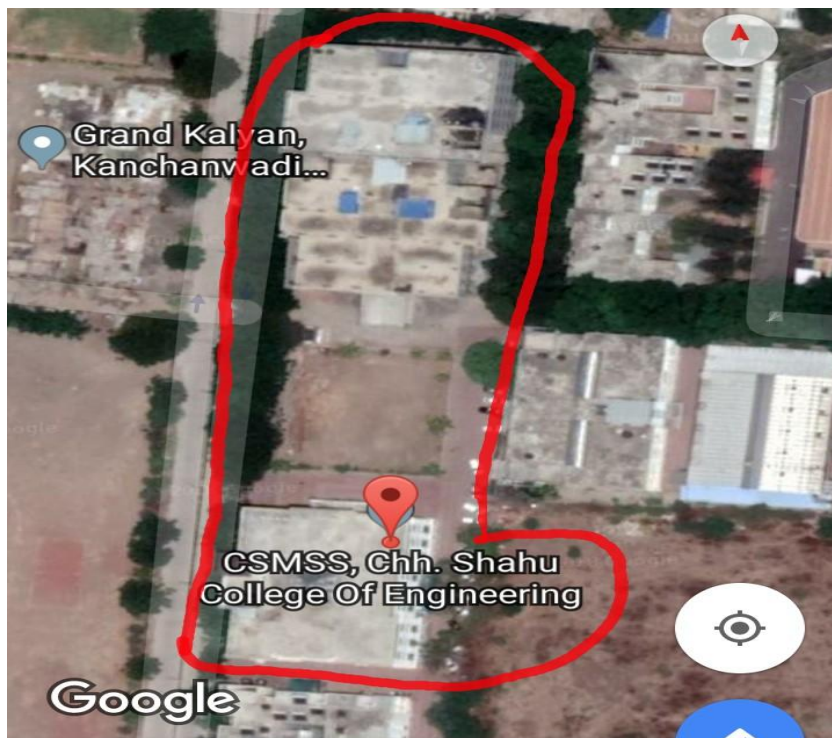
**Table.1.Physical and chemical Parameters**

#### IV. STUDY AREA

- Location of project:- CSMSS, CSCOE, AURANGABAD
- Population of students studying in CSMSS,CSCOE = 2750 (students and teachers)
- Surveying of area :- CSMSS, CSCOE Campus

Waste water samples have been collected from the bathroom of CSMSS, CSCOE

- Layout of CSMSS, CSCOE



**Fig.5. Layout of CSMSS,CSCOE**



**RESULTS OF TEST PERFORMANCE**

Sr .No	Characteristics	Inlet	Outlet
1	Ph	7.5	7.1
2	Turbidity (NTU)	16	12
3	TDS (Mg/lit)	2500	1200
4	COD (mg/lit)	800	175
5	DO (mg/lit)	0.6	5.5
6	BOD (mg/lit)	600	25
7	Oil and Grease (mg/l)	18 ± 5	6 ± 5

**TABLE.2. RESULT OF TEST PERFORMANCE**

**V.DESIGN CALCULATIONS**

- ❖ Population of college students = 2750
- ❖ Sewage Flow = 200 lit/capita/day (avg.)
- ❖ Hourly variation= max. flow / avg. flow=1.40  
And min. flow = 0.65
- ❖ Suspended solids in the sewage = 560ppm out of which 10 is settle able grit
- ❖ BOD of the average = 300ppm
- ❖ Climatic condition of the town hot and dry average atmospheric temp. = 27 degree C  
Required quality of the effluent after treatment BOD 30ppm  
Suspended solids= 50ppm
- ❖ Characteristics of sewage purely domestic

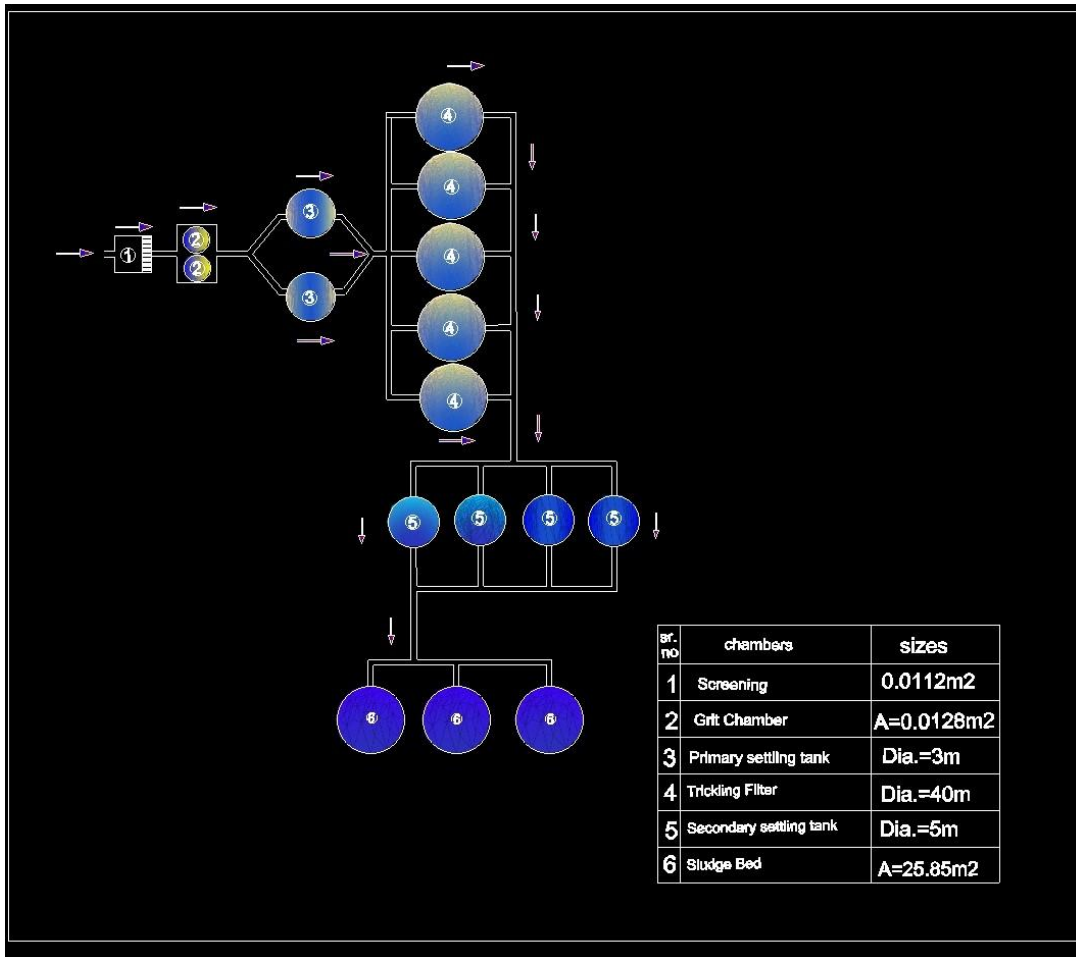


Fig.6.Layout of Waste Water Treatment Plant



PLANT DETAILS		
COMPONENTS	NOS	DIMENSIONS
Screens	1	Area of screen =0.0112 sq. m. Depth=1.20m, width= 1.41m Angle=30degree with vertical Drop=10cm
Grit Chamber	2	Capacity=0.384 cu. m Area=44cu.m.per m. sq. Size= 15x1.2x0.1m, cross section area=0.0128 sq. m
Primary Settling Tank	2	Capacity=46.08 cu. M Area of each tank=6.98sq.m Dia. of tank=3 m Depth=3.3m at side Bottom slope 1 in 15 towards centre
Trickling Filter	5	Dia. =40 cm , depth=1.2m
Secondary Settling Tank	4	Depth= 3m Capacity of each = 57.29 cu. M Dia. = 5 m
Digester unit	4	Area = 4.308 sq. m

**Table.3. Plant Details**

**VI. CONCLUSION**

- A successful technical project involves integration of various fields.
- This is an attempt to combine several aspects of environmental, biological, chemical and civil engineering.
- Since, in CSMSS CSCOE there is lots of waste water produces so, it is necessary to construct a Sewage Treatment Plant.
- The plant is designed perfectly to meet the future expansion for the next 30 years.
- This project consists the design of the complete components of a Sewage Treatment Plant from screening chamber, grit chamber, primary settling tank, trickling filter, secondary settling tank and sludge drying beds for sewage.

**REFERENCES**

1. A. P. Hangargekar and P. K. Takpere, “A case study on waste water treatment plant, CETP (Common effluent treatment plant)”, International journal of innovative research in advanced engineering (IJIRAE) ISSN: 2349-2163 Issue 11, volume 2 November 2015.





2. Prachi N. Wakode, Sameer U. Sayyad, “Performance Evaluation of 25MLD Sewage Treatment Plant (STP) at Kalyan”, American Journal of Engineering Research (AJER) e-ISSN : 2320-0847 p-ISSN : 2320-0936 Volume-03, Issue-03, pp-310-316 .
3. N. Muthukumaran and Dr. N. K. Ambujam, “Wastewater treatment and management in urban areas- A case study of Tiruchirappalli city, Tamilnadu, India”, Proceedings of the Third International Conference on Environment and Health, Chennai, India, 15-17 December, 2003.
4. Sanjeev Kumar Sinha, Vikas Kumar Sinha, Samir Kr. Pandey, Anup Tiwari , “A Study on the Waste Water Treatment Technology for Steel Industry: Recycle And Reuse”, American Journal of Engineering Research (AJER) e-ISSN : 2320-0847 p-ISSN : 2320-0936 Volume-03, Issue-04, pp-309-315 .
5. J. S. Lambe and R. S. Chougule, “Grey water - treatment and reuse”, IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)- ISSN: 2278-1684, PP: 20-26.
6. Prof. PramodSambhaji Patil, Shaikh Hujefa, Neman Rahu Mujawar Sumer, Deo Prasad and Chaudhari Shivprasad , “Design of Sewage Treatment Plant for Dhule City”, International Journal of Engineering Research ISSN:2319-6890 Volume No.5, Issue No.5, pp : 353-355, 1 May 2016.
7. Rakesh Singh Asiwal and Shweta Singh, “Wastewater Treatment by Effluent Treatment Plants”, SSRG International Journal of Civil Engineering (SSRG-IJCE) – volume 3 Issue 12 December 2016.