DESIGN STP AND TO INCREASE EFFICIENCY OF EXISTING SEWAGE TREATMENT PLANT BY MODIFICATIONS IN THE CONVENTIONAL DESIGN

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ABSTRACT: *Chiplun city has been developing place due to the steady increase in city population which is in term resulted in the increase of domestic sewage generated but there is no treatment plant. So it is required a sewage treatment plant with sufficient capacity to treat the generated sewage. Sewage treatment to operation are done by various method in order to reduce its water and organic content and the ultimate goal of wastewater management the protection of environment and public health. In one day total sewage generated was estimated 10MLD considering the projected population of chiplun city for the next 30 year. The various component of sewage treatment plant are screening, grit chamber, primary sedimentary tank, biological reactor, secondary clarifier, activated sludge tank, drying beds. It is proposed to design various component of STP, considering the various standards. The treated water will be supplied for irritating the crops and sludge which generated after treatment will be used as manure. So it increases the fertility of soil. Also reduce ground water usage.*

Key Words: BOD, COD, TDS, Trickling filter

INTRODUCTION:

Waste water treatment plants consumes large amount of energy. Waste water is liquid waste discharged by domestic residences, commercial properties, industries and agriculture which often contains some contaminants that result from mixing of waste water from different sources. The disposal of waste water into the surface water bodies leads to serious problem and affects the people in health aspects. Especially in the urban areas, the pollution of domestic effluent discharges into nearby surface bodies creating problem for the public. Waste water or sewage treatment is one such alternative, wherein many processes are design and operated in order to mimic the natural treatment processes to reduce pollutant load to a level that nature can handle.

Due to rapid growth of industrialization there is increase in sewage waste. 70-80% of water Become sewage. There are chemical industries which have CETP that can handle less amount of effluent so there is a large amount of effluent from plant to stream. Instead of treating sewage, discharging it to open atmosphere, the groundwater and surface water get polluted, sewage water contains pathogenic bacteria, and it may spread communicable disease. Due to this, the nearby villages and environment gets affected. And nearby soil is no more fertile. To overcome this problem we are going to design STP and to increase efficiency of existing STP by modification in the conventional design.

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STUDY AREA

Chiplun is a city and a tehsil in Ratnagiri District in the state of Maharashtra, India. It is the Head Quarter of Chiplun Taluka. It is located on the Mumbai Goa Highway (NH66). The city is about 320 Kms south of Mumbai in the Konkan Region of Maharashtra. It is a fast developing city in Konkan region of Maharashtra. It is a fast developing city in konkan with a strong cultural background.

Chiplun city consists of total 13 wards. The climate here is tropical rainfall is significant most months of the year.

Extending from march to may this season is hot with average temperature ranges between 22 to 40 ^{O}C. The average annual temperature is 27.3 ^{O}C in chiplun city. About 3973mm of precipitation falls annually .Coordinates of chiplun city is 17.53^{O} N and 73.52^{O} E.

SAMPLING

Sr.no.	Sector	Latitude	Longitude
1	Sector 1	17.53652	73.52103
2	Sector 2	17.52942	73.51835
3	Sector 3	17.5246	73.5316
4	Sector 4	17.52318	73.53669
5	Sector 5	17.51806	73.51806
6	Sector 6	17.53804	73.50883
7	Sector 7	17.53519	73.5081
8	Sector 8	17.54827	73.49038
9	Sector 9	17.53051	73.51063
10	Sector 10	17.53143	73.51449
11	Sector 11	17.52814	73.52229
12	Sector 12	17.52508	73.52203
13	Sector 13	17.52226	73.51577

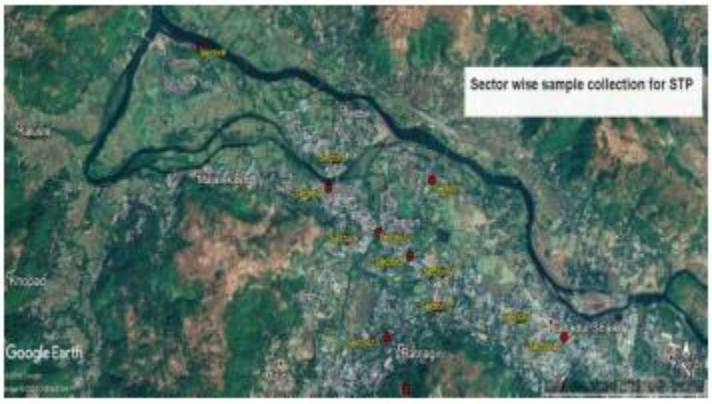
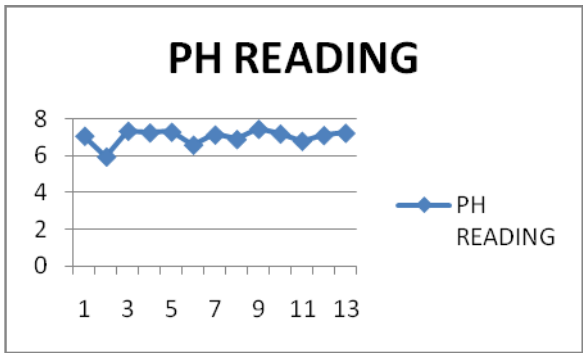


Fig 3.1 SAMPLE COLLECTING POINTS BY USING GOOGLE EARTH

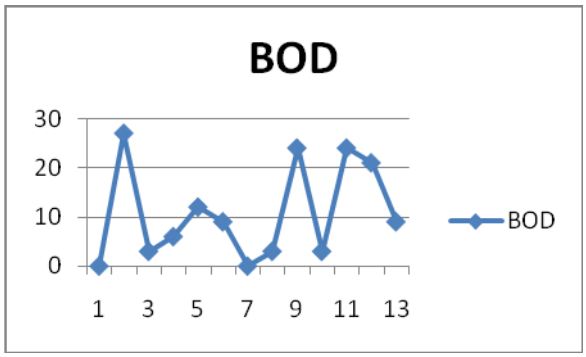
pH testing

The pH of a solution is measured as negative logarithm of hydrogen ion concentration. At a given temperature, the intensity of the acidic or basic character of a solution is indicated by pH or hydrogen ion concentration. pH values from 0 to 7 are diminishing acidic, 7 to 14 increasingly alkaline and 7 is neutral.



BOD testing

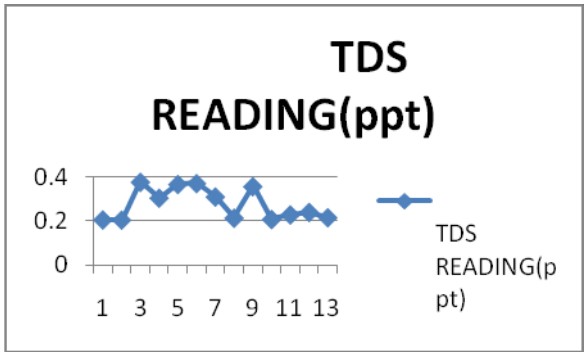
BOD is defined as the amount of oxygen require by the microorganisms in oxidizing the biologically degradable organic matter under aerobic conditions. It is an empirical test in which standardized laboratory procedures are used to determine the relative oxygen requirements waste water, effluents, and polluted waters. It is necessary to dilute the sample depending upon the oxygen demand in the sample. The samples with low DO values are aerated to increase the DO content above that required by BOD. DO of one portion of aerated sample is determined and other portion is incubated for BOD determination. Complete stabilization of a given waste theoretically requires infinite period. Hence 5 day period has been accepted as standard.



TDS testing

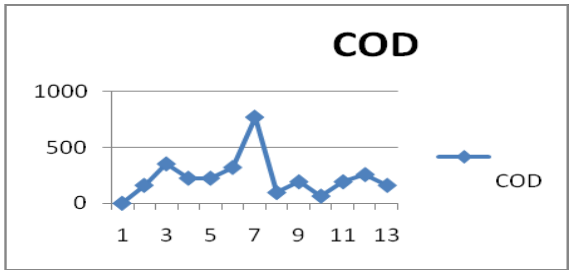
The term total dissolved solids refer to materials that are completely dissolved in water.

These solids are filterable in nature. It is defined as residue upon evaporation of filterable sample. The term total suspended solids can be refer to materials which are not dissolved in water and non-filterable in nature. It is defined as residue upon evaporation of non-filterable sample on a filter paper

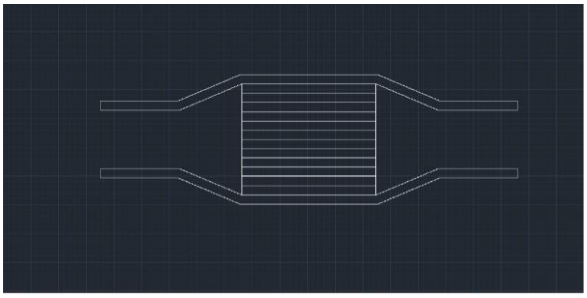


COD testing

Chemical oxygen demand is defined as the amount of oxygen that is required to chemically oxidize the organic matter in the presence of a strong oxidizing agent. The dichromate reflux method is used for COD determination. In the reflux condensers the sample is boiled without significant loss of volatile organic compounds. The oxidizing agent used is potassium dichromate, which oxidizes the hydrocarbons. Mercuric sulphate prevents the interference of chlorides. After digestion the remaining potassium dichromate is titrated with ferrous ammonium sulphate. The oxygen equivalent is calculated in terms of potassium dichromate consumed.



Design of STP component



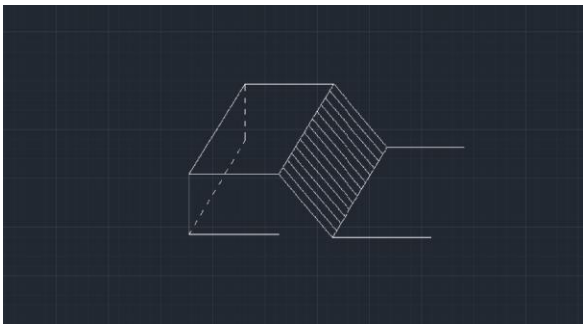


Fig 4.1 SCREENING CHAMBERS

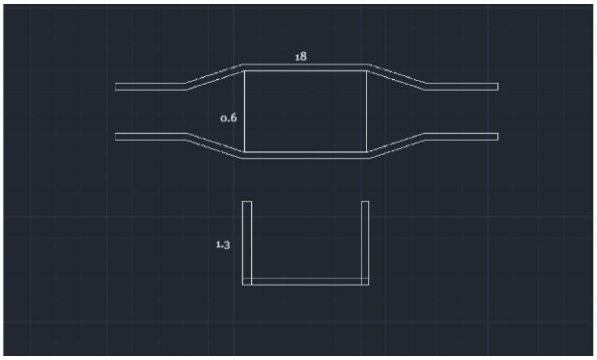


Fig 4.2 GRIT CHAMBER

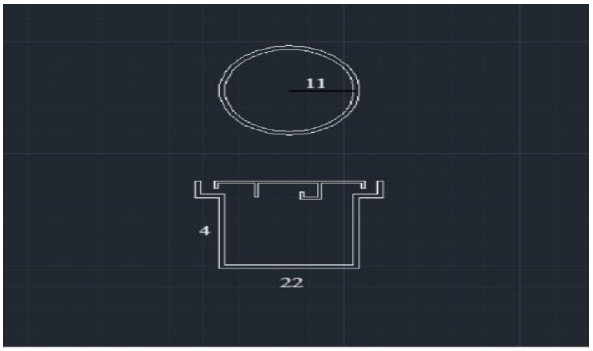


Fig 4.3 SEDIMENTATION TANK

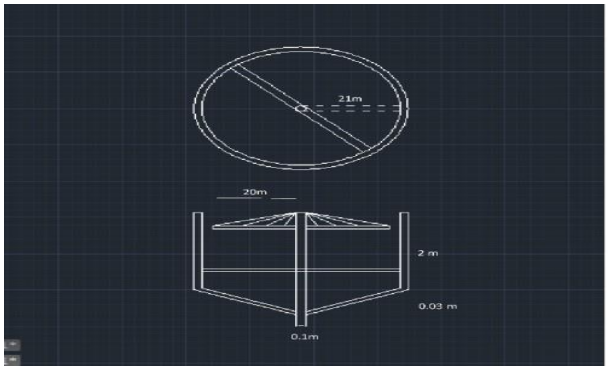


Fig 4.4 TRICKLING FILTER CONCUSION

The average ranges of physical, chemical and biological characteristics of waste water quality are experimented and found out.

- The pH ranges from 5.94 to 7.46
- Total amount of waste water treated = 14.64 MLD.
- The BOD ranges from 0 to 90 mg/l
- The parameters studied resemble the waste water quality

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