



# **PRATHYUSHA ENGINEERING COLLEGE**

## **CRITERIA-7**

### **7.1 Institutional Values and Social Responsibilities**

#### **7.1.4 Water conservation facilities available in the Institution**

**FACILITIES FOR WASTE WATER RECYCLING**



## **7.1 Institutional Values and Social Responsibilities**

### **7.1.4 Water conservation facilities available in the Institution:**

#### **WASTE WATER RECYCLING :**

Water conservation and prevention of water wastage system is installed in the campus. The College is contemplating installing the water harvesting.

#### **SEWAGE TREATMENT PLANT WORKING PRINCIPLE IN PEC.**

The sewage water from entire college and hostel is received through the underground pipe lines. Kitchen waste water is passed through the pipes. Then the sewage is transferred to collection tank and again pumping to aeration tank.

The above treated water is passed through Final treatment tank. After the treatment, the sludge is sent to composting pits through leaves barrio filter. The Compost is used as natural organic manure for garden. Then the water is flowing into the final tank. The filtered water is then collected in a sump and the water is pumped to the entire college garden through overhead tank and sprinkles.

This makes the campus green in a very conservative manner. 2,20,000 liters of sewage is treated per day calculated on the basis of number of students and staff working in the campus.

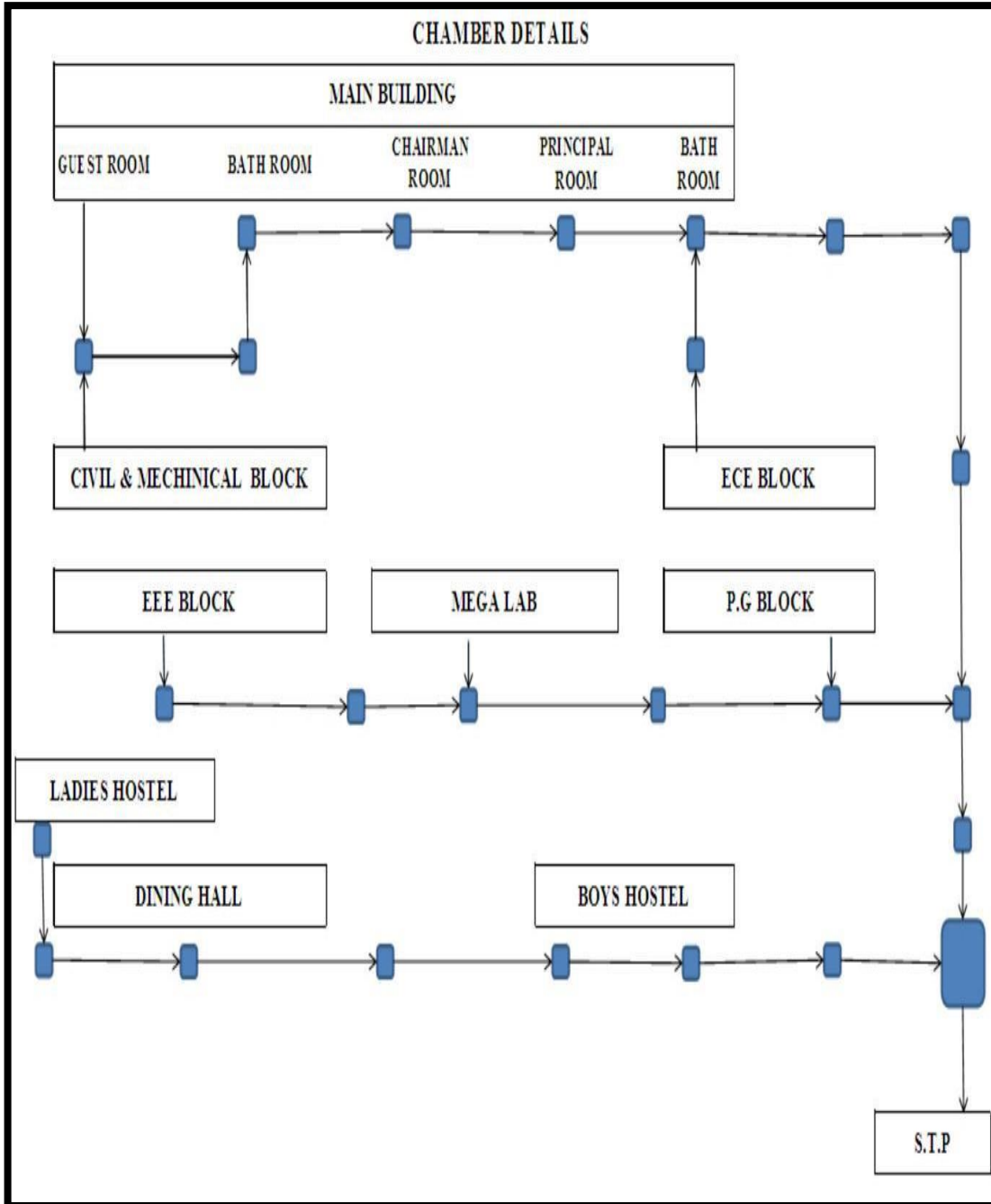
Sewage treatment plant capacity : Treatment of 2000000 liters per day

Treatment process : Activated Sludge Process

Analysis of following water quality parameters:

1. pH
2. BOD
3. COD
4. TDS.

**FLOW CHART OF SEWAGE COLLECTION IN PEC**



**SEWAGE TREATMENT PLANT DETAILS**

	<u>Water consumption</u>	<u>Wastewater generated</u>
Hostellers	125 ltrs / capita / day	100 ltrs / capita / day
Day scholars	40 ltrs / capita / day	30 ltrs / capita / day
Hostellers - 1000 people at 100 ltrs		- 100,000 ltrs / day
Day scholars - 3000 people @ 30 ltrs		- 90,000 ltrs / day
Other Office staff & Security		- 10,000 ltrs / day
		-----
		200,000 ltrs/ day
		-----
The Sewage Treatment Plant installed		- 200,000 ltrs / day

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27-9-12  
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## TREATMENT SCHEME

### PLANT CAPACITY: -

1. PLANT CAPACITY: Treatment of 200,000 Litres Sewage / day. (8,330 ltrs/hr)
2. TREATMENT PROCESS: Activated Sludge Process
3. TREATMENT SCHEME

- Bar Screen Chamber
- Oil & Grease Trap
- Equalisation Tank
- Aeration Tank
- Settling Tank
- Chlorination Tank
- Pressure Sand Filter
- Activated Carbon Filter
- Treated Water Tank

### 4.CHARACTERISTICS OF SEWAGE

PARAMETERS	Raw Sewage	Treated sewage
PH	6.5 – 7.5	6.5 – 7.5
BOD (mg/l)	300	<20
COD (mg/l)	900	<100
Total Suspended Solids (mg/l)	150	<30
Oil & Grease (mg/l)	50.0	<5

**Note:** The outlet from Sewage Treatment plant will meet the TNPCB norms for inland disposal.

## PROCESS DESCRIPTION

Process employed: **ACTIVATED SLUDGE PROCESS**

Method: **Diffused aeration**

The sewage water from the toilet, bathtubs, kitchen etc., will be received in the **Equilisation tank** through the existing drainage system and pass through **bar screen** and **oil & grease trap**. The bar screen will remove the larger sediments and grit whereas the oil and grease are separated in the oil & grease trap. The over flow from the grease trap will be diverted to the equalization tank and then transferred to aeration tank.

The process employed in aeration tank is **activated sludge process**. The sewage water from the collection tank is pumped at the required flow rate to the aeration tank, where aeration is carried out by the aid of **air blower**, which bubbles air through **fine bubble tubular diffusers** which ensures high oxygen transfer efficiency and very effective treatment of sewage.

The biologically treated sewage overflows to **settling tank**, where the sludge gets settled. The settled sludge is periodically pumped to **sludge drying beds**. The dried sludge is finally used as bio-manure. The clear supernatant water from the settling tank overflows to **chlorine contact tank**, where sodium hypochlorite is dosed in small quantities for disinfection of water. The disinfected water is further passed through **pressure sand filter** and **activated carbon filter** followed by bucket filter in order to get clear, odourless, colourless treated water. The treated water is used for irrigation.

*Wasser*

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TECHNICAL DATA	
<b>BAR SCREEN CHAMBER</b>	
Normal flow designed	8.33 m <sup>3</sup> /hr
No. of Screen chamber	1 No.
Angle of inclination	60 deg
Width of opening	25 mm
Size of the screen chamber	2200 x 1000 x 1000mm
Free board	300mm
M.O.C. of screen chamber	RCC
<b>OIL &amp; GREASE TRAPS</b>	
Normal flow designed	8.33 m <sup>3</sup> /hr
No. of traps	1 No.
Size of the trap	3000 x 2200 x 2000mm
M.O.C. of the trap	RCC
<b>EQUALISATION TANK</b>	
Normal flow designed	8.33 m <sup>3</sup> /hr
No. of sumps	1 No.
Size of the sump	3500 x 3000 x 5000mm
Free board	300mm
Volume of the sump	50 m <sup>3</sup>
Retention time	6 hrs

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AERATION TANK	
Type	Activated Sludge process
Normal flow designed	8.33 m <sup>3</sup>
Aeration tank size	8000 x 5000 x 4000mm
Free board	500mm
Volume of the tank	140 m <sup>3</sup>
Hydraulic Retention time	16.8 hrs
M.O.C. of aeration tank	RCC
BOD of influent	300 mg/l
BOD of effluent	20 mg/l
BOD utilized	350-20 = 330 mg/l
BOD to be removed	8330 ltr/hr x 0.33 gm/litre = 2748 gm/hr = 2.748 kg/hr
Oxygen required	1.2 kg/ kg BOD = 1.2 x 2.748 = 3.29 kg/hr
Volume of air required	3.2 kg/hr / 1.185 kg/m <sup>3</sup> x 0.232 = 11.96 m <sup>3</sup> /hr
Air required for diffuser aeration system:	
Diffuser air transfer efficiency	10%
Air required for BOD reduction	11.96 m <sup>3</sup> /hr ÷ 0.10 = 119.6 m <sup>3</sup> /hr ≈ 120.0 m <sup>3</sup> /hr
Air required for mixing	≈ 30.0 m <sup>3</sup> /hr
Air blower capacity	150 m <sup>3</sup> /hr
Air blower motor HP	7.5 HP
No. of Air blowers	2 Nos. (1 working + 1 standby)
Tubular diffusers	63mm dia x 620mm long
Type of diffusers	EPDM
Air flow for each diffuser	5.0 m <sup>3</sup> /hr
No. of diffusers installed	30 Nos.



SETTLING TANK	
Normal flow designed	8.33 m <sup>3</sup> /hr
No. of tanks	1 No.
Size of the tank	4400 x 3000x 4000mm
Free board	600mm
Volume of the tank	44 m <sup>3</sup>
Hydraulic Retention time	5.2 hrs
M.O.C. of tank	RCC
SLUDGE DRYING BEDS	
No. of tanks	4 Nos.
Size of the tank	3000 x 1500 x 1000mm
MOC of construction	Brick work
Filter media	Sand and pebbles

CHLORINATION TANK	
No. of tank	1 No.
Size of the tank	2500 x 3000 x 3300 mm
Volume of the tank	22.5 m <sup>3</sup>
Retention time	2.7 hrs
TREATED WATER TANK	
No. of tanks	2 Nos.
Sizes of the tank	4000 x 3000 x 3000 mm – 1No. 1800 x 3000 x 3000 mm – 1 No.
M.O.C of tanks	RCC

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PRESSURE SAND FILTER	
Size	1000 m dia x 1500HOS
Flow	8.33 m <sup>3</sup> /hr
Material of construction	MS epoxy coated vessel
Valve	Diaphragm valves
Filter Media	Graded sand & Pebbles
ACTIVATED CARBON FILTER	
Size	1000 m dia x 1500HOS
Flow	8.33 m <sup>3</sup> /hr
Material of construction	MS epoxy coated vessel
Valve	Diaphragm valves
Filter Media	Graded sand & Pebbles

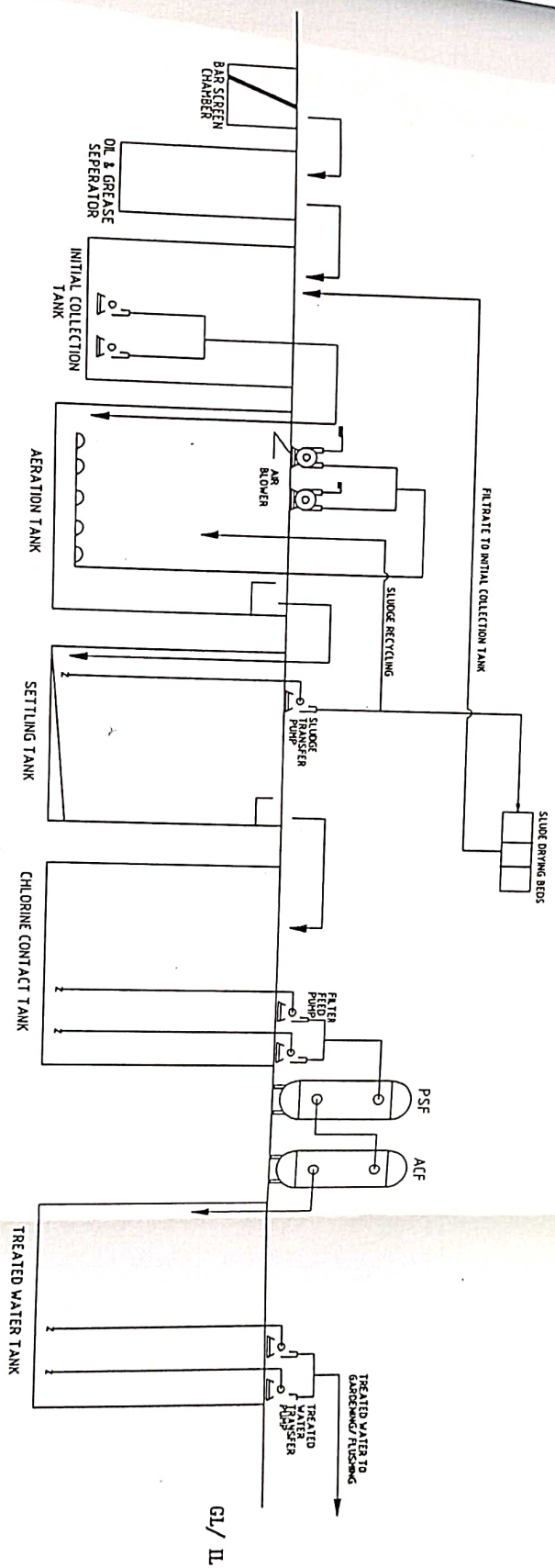
The treated water is used for irrigating the garden of **1,00,000 sq.yards.**

The waste sludge generated is being used as manure for plantation.




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# SCHEMATIC FLOW DIAGRAM FOR SEWAGE TREATMENT PLANT



NOTE:  
GL/ IL - GROUND LEVEL / INVERT LEVEL

  
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Item#	Quantity	Title: SCHEMATIC FLOW DIAGRAM OF STP(200 KLD)		Reference: Yr Data Sheet
Designed by KBN	Checked by VRR	Approved by - date	File name	Date 23.09.2012
<b>WATER &amp; CHEMICAL TECHNOLOGIES</b>		Client: <b>M/S. PITAM, Tiruvallur</b>		
Draw No: WCT/PEC-01/12-13		Edition		Sheet

