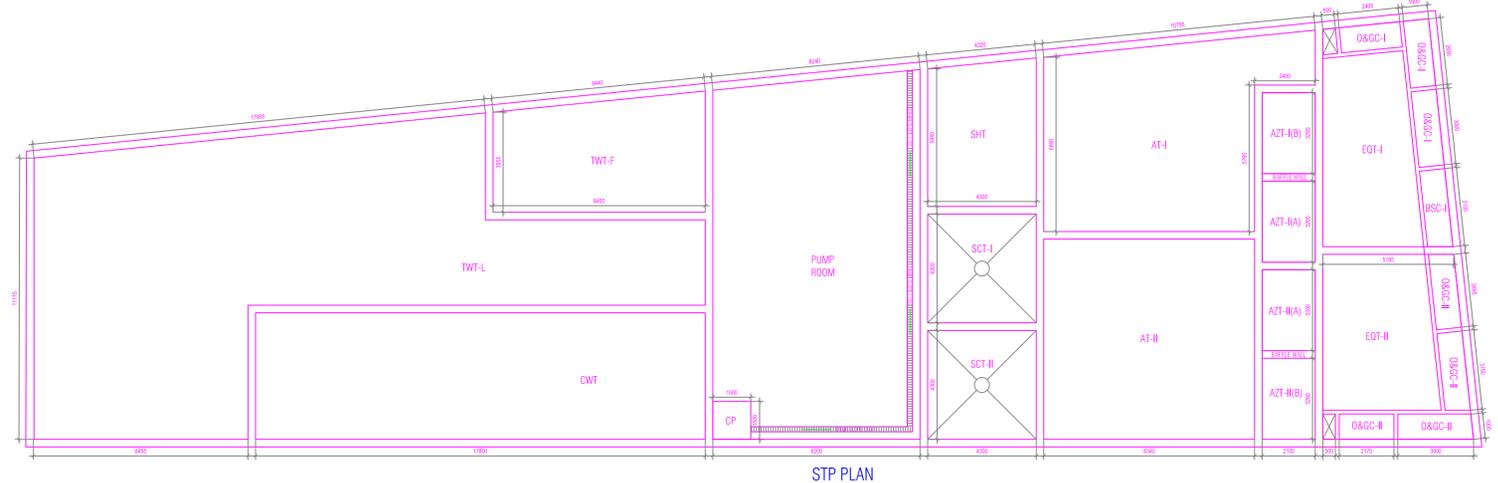
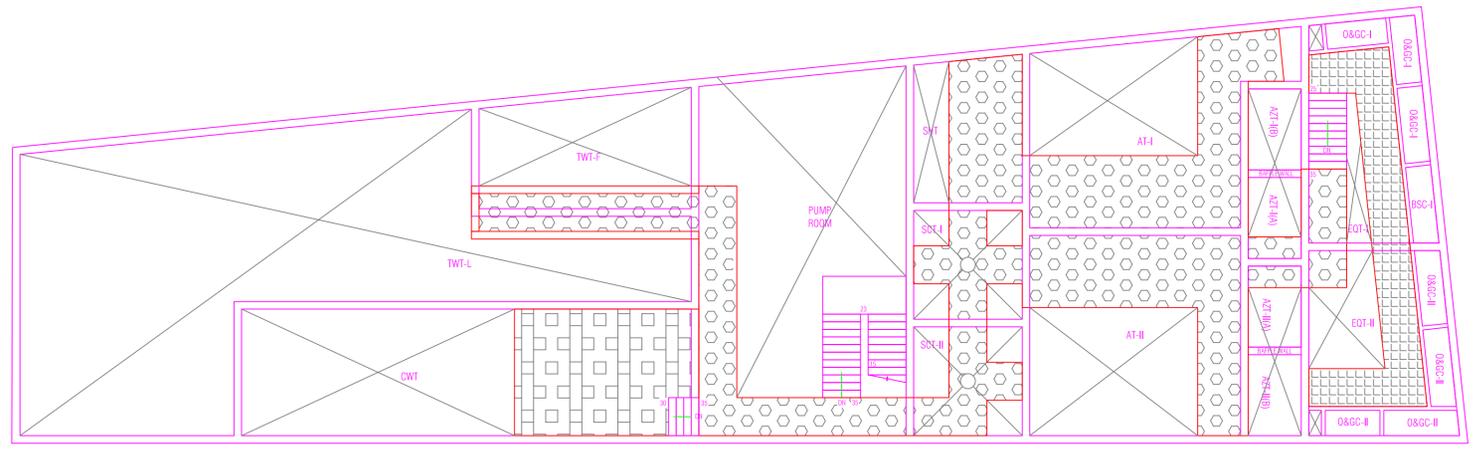


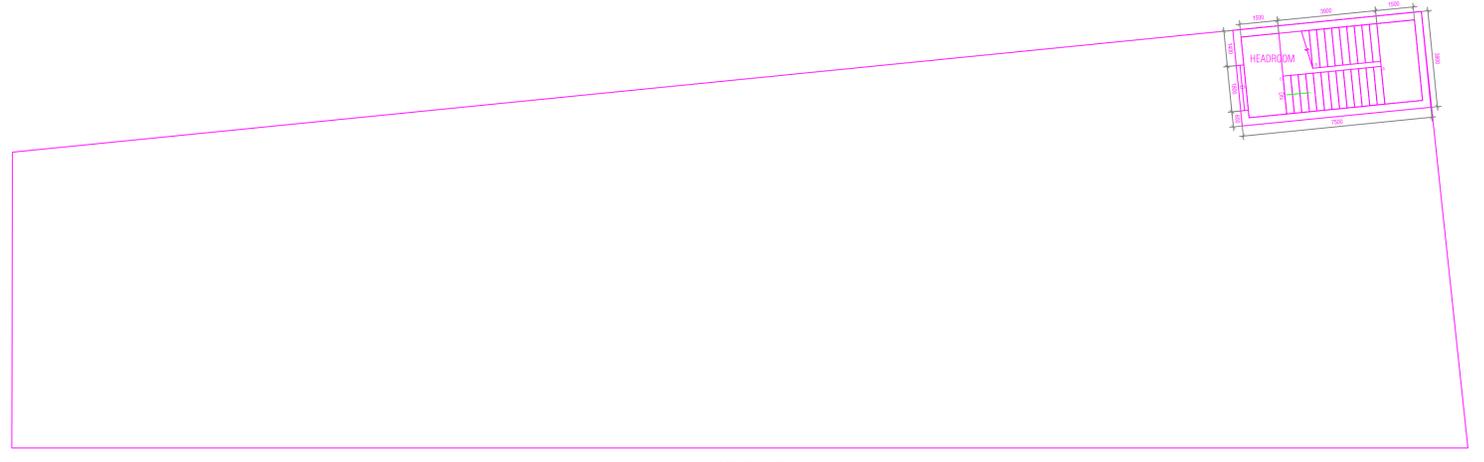
HYDRAULIC FLOW DIAGRAM-NTS



STP PLAN



STP INTERMEDIATE SLAB PLAN



STP TOP SLAB PLAN

LIST OF CIVIL UNITS: 360 x 2 modules

S.NO	TAG.NO	DESCRIPTION	SIZE (m)	VOL (m ³)	QTY.
01	BSC-I	BAR SCREEN CHAMBER-I	3.0M X 1.0M X 1.0SWD	3.0	01
02	BSC-II	BAR SCREEN CHAMBER-II	2.9M X 1.0M X 1.0SWD	2.9	01
03	O&GC-I	OIL & GREASE CHAMBER-I	8.05M X 1.0M X 1.0SWD	8.05	01
04	O&GC-II	OIL & GREASE CHAMBER-II	8.32M X 1.0M X 1.0SWD	8.32	01
05	EQT-I	EQUALISATION TANK-I	41.18SQM X 3.0M SWD	123.54	01
06	EQT-II	EQUALISATION TANK-II	40.77SQM X 3.0M SWD	122.31	01
07	AZT-I(A) & II(A)	ANOXIC ZONE TANK-I(A) & II(A)	2.1M X 3.2M X 4.2M SWD	28.22	02
08	AZT-I(B) & II(B)	ANOXIC ZONE TANK-I(B) & II(B)	2.1M X 3.2M X 4.2M SWD	28.22	02
09	AT-I	AERATION TANK-I	65.84 Sq.M X 4.0M SWD	263.36	01
10	AT-II	AERATION TANK-II	65.99 Sq.M X 4.0M SWD	263.96	01
09	SCT-I & II	SECONDARY CLARIFIER TANK-I & II	4.3M X 4.3M X 3.4M SWD	62.86	02
10	CWT	CLARIFIED WATER TANK	89.0 SQM X 2.7M SWD	240.30	01
12	SHT	SLUDGE HOLDING TANK	24.31 SQM X 4.1M SWD	99.67	01
13	TWT-L	TREATED WATER TANK-LANDSCAPING	194.03 SQM X 6.3M SWD	1222.89	01
13	TWT-F	TREATED WATER TANK-FLUSHING	36.74 SQM X 6.3M SWD	231.46	01
	CP	COLLECTION PIT	1.50M X 1.5M X 1.0M SWD	2.25	01

GENERAL NOTES

- ALL DIMENSIONS IN MM.
- ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS OF THE PROJECT.
- ANY DISCREPANCY NOTED IN THE FIELD SHOULD BE BROUGHT TO THE NOTICE OF THE PROJECT ENGINEER IN WRITING.
- THIS DRAWING SHALL BE USED IN CONJUNCTION WITH RELEVANT ARCHITECTURAL / STRUCTURAL DRAWINGS.

KEY PLAN

STP LOCATION

REVISIONS

NO.	DATE	DESCRIPTION

DESIGNED BY: _____

CHECKED BY: _____

PROJECT TITLE: SEWAGE TREATMENT PLANT 2 LAYOUT AND SECTIONAL DETAILS CAPACITY :720KLD (360x2)

PROJECT TITLE: PANATHUR

APPROVED BY: _____

DATE: _____

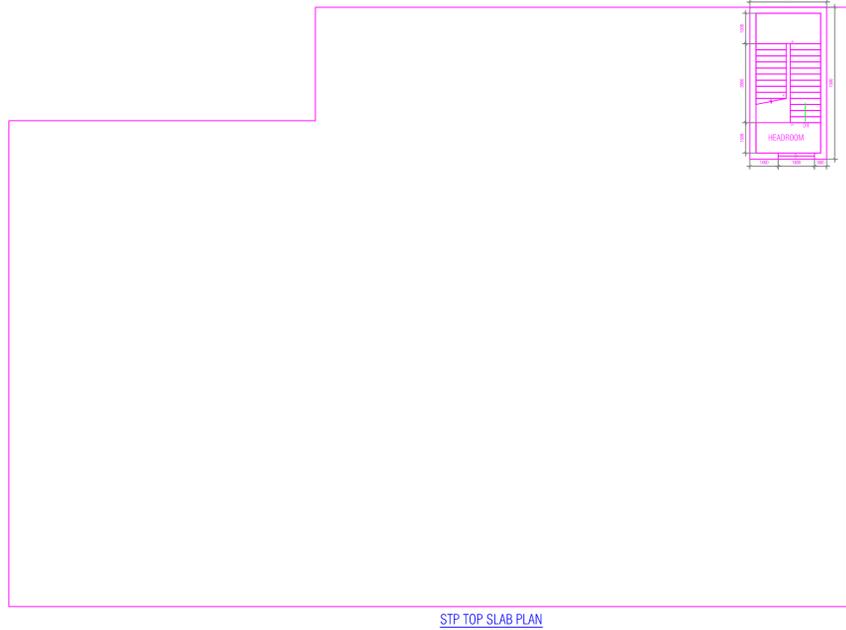
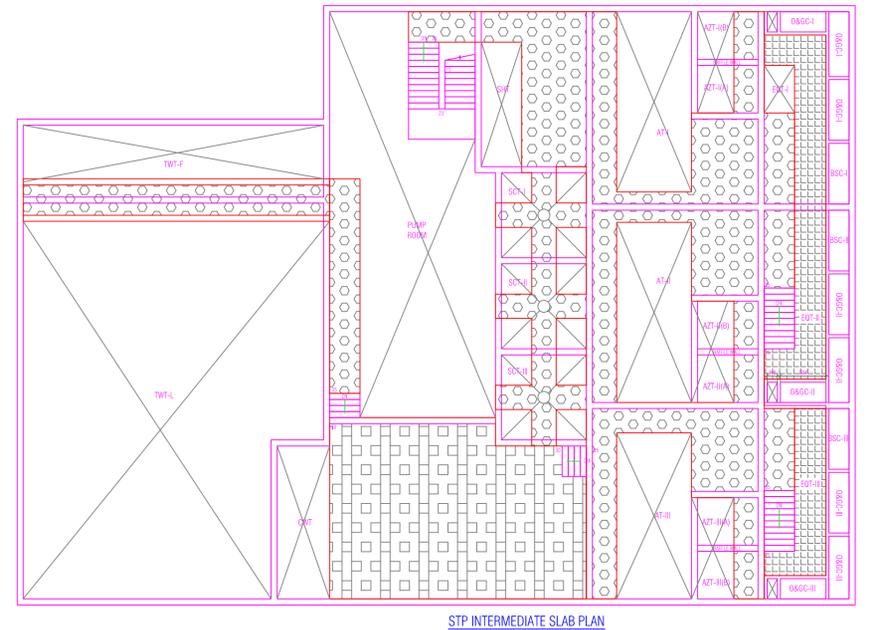
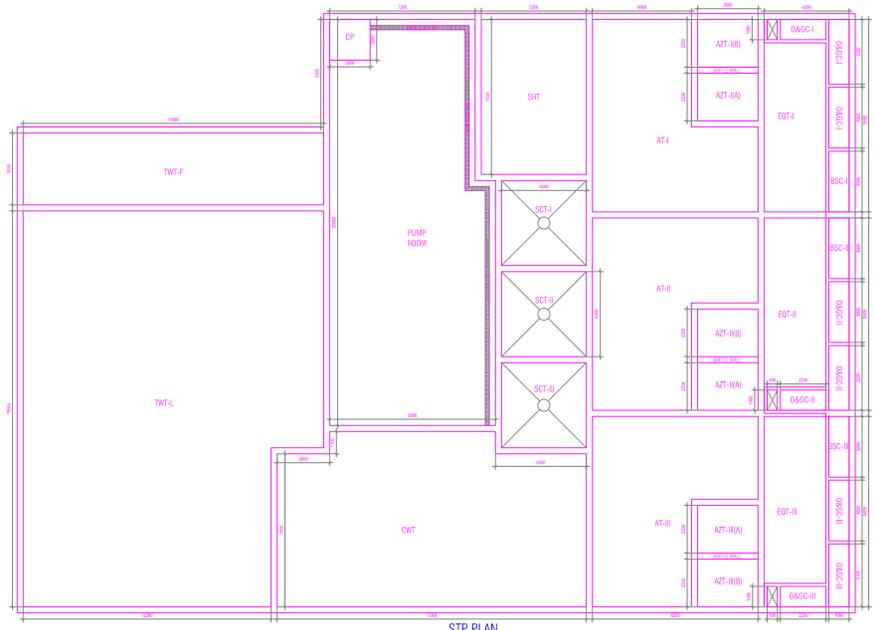
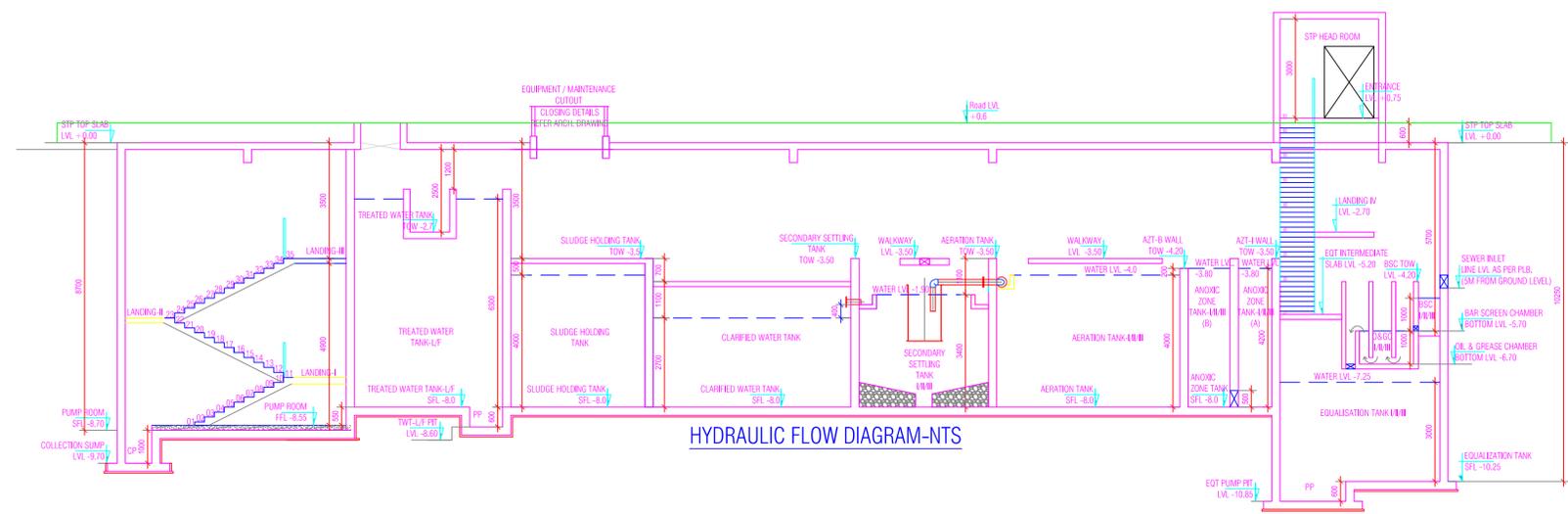
SCALE: _____

PROJECT NO: _____

DATE: _____

REVISIONS: _____

NO: _____



LIST OF CIVIL UNITS: 340 x 3 modules

S.NO	TAG.NO	DESCRIPTION	SIZE (m)	VOL (m ³)	QTY.
01	BSC-I,II & III	BAR SCREEN CHAMBER-I,II & III	3.0M X 1.0M X 1.0SWD	3.0	03
02	O&GC-I,II & III	OIL & GREASE CHAMBER-I,II & III	8.45M X 1.0M X 1.0SWD	8.45	03
03	EQT-I&II	EQUALISATION TANK-I & II	4.2M X 9.5M X 3.0M SWD	119.70	02
04	EQT-III	EQUALISATION TANK-III	4.2M X 9.4M X 3.0M SWD	118.44	01
05	AZT-I(A),II(A) & III(A)	ANOXIC ZONE TANK-I(A), II(A) & III(A)	3.0M X 2.35M X 4.2M SWD	29.61	03
06	AZT-I(B),II(B) & III(B)	ANOXIC ZONE TANK-I(B), II(B) & III(B)	3.0M X 2.35M X 4.2M SWD	29.61	03
07	AT-I	AERATION TANK-I	60.42 Sq.M X 4.0M SWD	241.68	01
08	AT-II	AERATION TANK-II	60.39 Sq.M X 4.0M SWD	241.56	01
09	AT-III	AERATION TANK-III	59.59 Sq.M X 4.0M SWD	238.36	01
10	SCT-I,II & III	SECONDARY CLARIFIER TANK-I,II & III	4.2M X 4.2M X 3.4M SWD	59.97	03
09	CWT	CLARIFIED WATER TANK	124.52 Sq.M X 2.7M SWD	336.20	01
10	SHT	SLUDGE HOLDING TANK	5.2M X 7.65M X 4.0M SWD	157.5	01
11	TWT-L	TREATED WATER TANK-LANDSCAPING	270.05 Sq.M X 6.3M SWD	1701.31	01
12	TWT-F	TREATED WATER TANK-FLUSHING	14.86M X 3.55M X 6.3M SWD	332.34	01
13	CP	COLLECTION PIT	2.0M X 2.0M X 1.0M SWD	4.0	01

GENERAL NOTES

- ALL DIMENSIONS IN METERS.
- ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS OF THE M&C DEPARTMENT.
- THIS DRAWING SHALL BE USED IN CONJUNCTION WITH RELEVANT ARCHITECTURAL / STRUCTURAL DRAWINGS.

KEY PLAN:

STP LOCATION

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT DATA

PROJECT TITLE: **SEWAGE TREATMENT PLANT 1 LAYOUT AND SECTIONAL DETAILS CAPACITY : 1020KLD (340x3)**

PROJECT TITLE: **PANATHUR**

APPROVED BY:

DESIGNED BY: **ANURAJ** | DRAWN BY: **ANURAJ**

CHECKED BY: **ANURAJ** | DATE: **15/12/2023**

SCALE: **1:100** | SHEET NO: **1** | TOTAL SHEETS: **1**

PROJECT NO: **1020KLD (340x3)** | REV: **01**

DATE: **15/12/2023** | DRAWN BY: **ANURAJ**

PROJECT TITLE: **PANATHUR**

APPROVED BY: **ANURAJ**

DATE: **15/12/2023**

SCALE: **1:100**

PROJECT NO: **1020KLD (340x3)**

REV: **01**

DATE: **15/12/2023**

DRAWN BY: **ANURAJ**

PROJECT TITLE: **PANATHUR**

**STP TECHNICAL WRITE-UP: 720 KLD
(360 KLD x 2 Modules)**

FOR

"PROPOSED RESIDENTIAL DEVELOPMENT PROJECT AND CLUBHOUSE"

PART-II

LOCATED AT:

Sy. No. 47/1 (New No. 47/3), 47/1 (New No. 47/5), 49/1, 49/3, 50,

46/5(P), 46/6, 46/4(P), 47/6, 47/7, 49/6,

PANATHUR VILLAGE,

VARTHUR HOBLI,

BANGALORE EAST TALUK.

DEVELOPED BY



SOBHA LIMITED

Registered and Corporate Office,

Sarjapur-Marthahalli Outer Ring Road (ORR)

Devarabisanahalli, Bellandur Post, Bangalore – 560 103.

Telephone No: 080-49320000,

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SEWAGE TREATMENT PLANT

Sewage Treatment plant is provided for treating all kinds of wastewater generated due to various domestic activities involved in the project. This facility is not only installed for conforming to the statutory requirement of Pollution Control Board, but also to ensure that the treated water is utilized for gardening and flushing activities. The treatment Process / system is designed on the principle of Activated Sludge Process (ASP), which ensures the aerobic decomposition of organic matter in presence of active microbial growth in the aeration tank followed by ultra-filtration.

Water Demand Calculation

PART-2					
Particulars	No. of units	Total Population	Water Demand (lpcd)	Domestic Water requirement (lts/day)	Flushing Water requirement (lts/day)
1 BHK	228	912	135	82,080	41,040
3 BHK (S)	152	912	135	82,080	41,040
3 BHK	304	1824	135	164,160	82,080
4 BHK	152	1064	135	95,760	47,880
Club house (10 % of Population)		471	45	9,424	11,780
Visitors (10 % of Population)		471	15	2,356	4,712
Total				436	229
Total water requirement in KLD				664	
Sewage generation (Considering 90% of total water demand) in KLD				598	
Sewage generation (Considering design peak factor @ 1.2) in KLD				718	
Proposed STP-2 Capacity in KLD				720 KLD (360 KLD x 2 modules)	

PROCESS DESIGN BASIS

Basis of Design

Sewage treatment plant is designed for Activated Sludge Process (ASP).

Sewage generated from domestic activities is considered at a maximum of 598 m³/day with design peak factor 1.2, the capacity of STP provided is 720 KLD. The Sewage treatment plant is designed taking the following parameters into account.

Sewage Quality Parameters (Raw & Treated)

Sl.No	Parameters	Unit	Influent	Limits (KSPCB OM Dated: 01.03.20210)
1.	pH	-	6.5 – 8.5	6.5 – 8.5
2.	COD	mg/l	200 - 600	< 50
3.	BOD (5 th day)	mg/l	300 - 400	< 10
4.	Suspended Solids	mg/l	300 – 400	< 10
5.	Ammonical Nitrogen	mg/l	20	< 5
6.	Total Nitrogen	mg/l	30	< 10
7.	Fecal Coliforms	MPN/100ml	10 ⁵ – 10 ⁸	< 100

PROCESS DETAILS

In the sewage treatment plant (S.T.P.), The treatment chambers in the plant consists of:

- Bar Screen Chamber
- Oil & Grease Trap
- Equalization Tank
- Anoxic Tank I & II
- Aeration Tank
- Secondary Settling Tank
- Clarified Water Tank
- Pressure sand filter
- Activated carbon filter
- Treated water tank I & II
- Sludge holding tank
- Sludge Handling System
- Collection Pit

1. Pre treatment system

Raw sewage generated from various sources is collected in the Equalization Tank, after passing through a manually operated Bar Screen that screens the large, floating matter. The collected screenings are disposed

off manually. In the equalization tank, sufficient retention time is provided to equalize and homogenize the variations in the flow and pollutant concentration. A Coarse Bubble Air Mixing System is provided to mix, and keep the sewage in an aerobic condition.

2. De-nitrification Process- Anoxic Zone Tank

From Equalization Tank sewage flows into Anoxic Zone Tank. Here removal of nitrogen in the form of nitrate by conversion to nitrogen gas will be accomplished biologically under anoxic (without oxygen) conditions. The process is known as de-nitrification.

3. Secondary Treatment System - Aeration Tank

From the Anoxic Zone tank, sewage is pumped into the Aeration tank. In aeration tank sufficient amount of air is supplied to oxidize the organics absorbed by the bacterial biomass.

4. Secondary Settling Tank

It helps in removing suspended solids and the biomass. Hopper bottom is provided because when sewage after bacterial activity rests for a given time, bio-mass and suspended impurities being heavier tend to settle at the bottom of Secondary settling tank. Conical bottom helps this mass (called sludge) to slide down the slope and accumulate near the pit which is connected to the sludge sump.

5. Clarified water Tank

The clarified water is collected in clarified water tank which is the overflow of secondary Settling tank.

6. Filtration

Clarified water is pumped through the Pressure Sand Filter & then to Activated Carbon Filter to remove the traces of suspended solids, organics, color and odor present in the treated sewage. This filtered water is collected in Treated Water Tank which will be used for landscaping and flushing after disinfection.

7. Sludge Dewatering/Handling

Excess sludge from Aeration tank is stored in Sludge Holding tank & then pumped to Screw Press for dewatering of sludge. A screw press (SP) provides sludge dewatering by conveying the sludge along the inside of a permeable cylinder. It is based on a slowly-rotating (~5 RPM) Archimedean screw within a cylindrical screen (otherwise termed drum filter/screen or basket). It is normally inclined by ~20° to the horizontal to assist with the draining of water into the sump. The screens are less susceptible to clogging than the filter media used for other thickening and dewatering processes. Consequently, spray-cleaning is applied only intermittently for around 2–4% of the operating time.

The filtrate water from the filter press is again recycled to equalization tank by means of a sump pump.

8. Collection Pit:

Collection Pit will be used to collect the spillages and backwash water from the filters.

DESIGN DETAILS

A. BAR SCREEN (2 streams flow)

In the incoming channel, a chamber with bar screen shall be fitted, the purpose of which is to floating matter from introducing into succeeding units of the treatment plant.

Flow to Bar Screen Chamber	=	15 cum/hr (720 /2/24)
Peak flow to Bar Screen Chamber (PF -2.5)	=	37.5 cum/hr
Velocity through Screen	=	0.6 m/s
Net Area of Screen	=	37.5/ (3600 X velocity through screen)
	=	37.5 / (3600 X 0.6)
	=	0.0173 m ²
Adopting screens with flats of 5 mm thick and 10 mm opening,		
Gross area	=	(0.0173 X 10)/5= 0.034 m ² .
Assuming that the inclination of screen to horizontal is at 60 degrees the gross area of screen needed		
	=	(0.034)/ Sin 60
Screen area will be	=	0.043 m ²

2 Bar Screen Chambers have been proposed for the 2 modules:

BSC I	=	3.0 m x 1.0 m x 1.0 SWD (3 cum)
BSC II	=	2.9 m x 1.0 m x 1.0 SWD (2.9 cum)

B. OIL & GREASE CHAMBER (2 Stream flow)

Flow	=	15 cum/hr
Peak Flow (2.5)	=	37.5 cum/hr
Retention Time tank I	=	13 min.
Volume of the tank I	=	8.05 m ³
Size of O&GC I	=	8.05 m x 1.0 m x 1.0 m SWD
Retention time tank II	=	13 min.
Volume of the tank II	=	8.32 m ³
Size of O&GC II	=	8.32 m x 1.0 m x 1.0 SWD

C. EQUALIZATION TANK (2 Stream flow)

Flow	=	15 cum/hr
Detention Time of tank I	=	8.2 hrs
Volume of the EQT tank I	=	123.54 cum.
Detention time of tank-II	=	8.15 hrs.
Volume of EQT II	=	122.31 cum.

EQT size proposed:

EQT I	=	41.18 sq.mt. x 3.0 m SWD (123.54 cum)
EQT II	=	40.77 sq.mt. x 3.0 m SWD (122.31 cum)

D. ANOXIC ZONE TANK I(A),II(A) (2 Stream flow)

Flow to Anoxic Zone Tank	=	15 cum/hr
Detention Time	=	1.9 hrs
Volume of the tank provided	=	28.22 m³
Dimensions of the Tanks proposed:		
AZT I(A)	=	2.1m x 3.2 m x 4.2 m SWD (28.22 cum)
AZT II(A)	=	2.1m x 3.2 m x 4.2 m SWD (28.22 cum)

E. ANOXIC TANK I(B), II(B) (2 Stream flow)

Flow to Anoxic Zone Tank	=	15 m ³ /hr
Detention Time	=	1.9 hrs
Volume of the tank provided	=	28.22 m³
Dimension of the Tank proposed:		
AZT I(B)	=	2.1 m x 3.2 m x 4.2 m SWD (28.22 cum)
AZT II(B)	=	2.1 m x 3.2 m x 4.2 m SWD (28.22 cum)

F. AERATION TANK (2 Stream flow)

Flow to Aeration Tank	=	15 m ³ /hr
Detention Time (AT-I)	=	17.5 hrs
Volume of the Tank provided (AT-I)	=	263.36 m ³
Detention Time (AT-II)	=	17.6 hrs
Volume of the Tank provided (AT-II)	=	263.96 m ³
Dimension of the aeration tank proposed:		
AT I	=	65.84 sq.mt. x 4.0 m SWD (263.36 cum)
AT II	=	65.99 sq.mt. x 4.0 m SWD (263.96 cum)

Air Requirement:

Flow	:	720 m ³ / day
Inlet BOD	:	350 mg/l or 350 g/cum or 0.35 kg/cum
BOD Load	:	720 cum/d X 0.30 kg/cum
Total BOD	:	216 kg/day
O ₂ required	:	2.5 kg/kg of BOD
Total O ₂ required	:	540 kg/day
	:	22.5 Kgs/hr
Air required	:	<u>22.5 kg of Oxygen/ hr</u>
	:	1.2* x 0.232 ** x 0.65 *** x 0.95 **** 0.23 *****
	:	570 m ³ /hr ----- A

Air Requirement in Equalization Tank	=	0.015 m ³ / min * Volume of Equalization Tank
	=	0.015 * 245.85
	=	3.7 m ³ /hr ----- B

Air Requirement in Sludge Holding Tank	=	0.015 m ³ / min * Volume of SHT
	=	0.015 m ³ /min * 99.67
	=	1.5 m ³ /hr ----- C

Total Air requirement (A+B+C) = 575.2 m³/hr.

G. SECONDARY CLARIFIER TANK (2 Stream flow)

Flow to Tank	=	15 m ³ /hr
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Detention time	=	4.2 hrs
Volume of the tank provided	=	62.86 m ³
Dimension of the tank		
SST I	=	4.3 m x 4.3 m x 3.4 m, SWD (62.86 cum)
SST II	=	4.3 m x 4.3 m x 3.4 m, SWD (62.86 cum)

H. CLARIFIED WATER TANK

Flow	=	30 m ³ /hr
Detention time	=	8 hrs
Volume of the tank provided	=	240.30 m ³
Dimension of the tank	=	89.0 sq.mt x 2.7 m SWD

I. PRESSURE SAND FILTER

Design Flow	=	30 m ³ /hr
Velocity of percolation through Filter	=	15 m ³ /hr/ m ²
Size of PSF	=	1.8 m dia X 2.0 m HOS
Quantity	=	1 No.

J. ACTIVATED CARBON FILTER

Design Flow	=	30 m ³ /hr
Velocity of percolation through Filter	=	15 m ³ /hr/ m ²
Size of PSF	=	1.8 m dia X 2.0 m HOS
Quantity	=	1 No.

K. HYPO DOSING

Hypo dosing pump	=	0-6 lph
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L. SLUDGE HOLDING TANK

Sludge Volume	=	2 % of total flow	= 14.5 m ³ /day
Detention Time	=	7 Days	
Volume of the tank	=	99.67 m ³	
Dimension of the tank	=	24.31 sq.mt. x 4.1 m SWD	

M. TREATED WATER TANK - L

Flow	=	30 m ³ /hr
Detention Time	=	41 hrs
Volume of the Tank	=	1222.89 m ³
Dimension of the tank provided	=	194.03 sq.mt. x 6.3 m SWD

N. TREATED WATER TANK - F

Flow	=	30 m ³ /hr
Detention Time	=	8 hrs
Volume of the Tank	=	231.46 m ³
Dimension of the tank provided	=	36.74 sq.mt. x 6.3 m, SWD

O. COLLECTION PIT

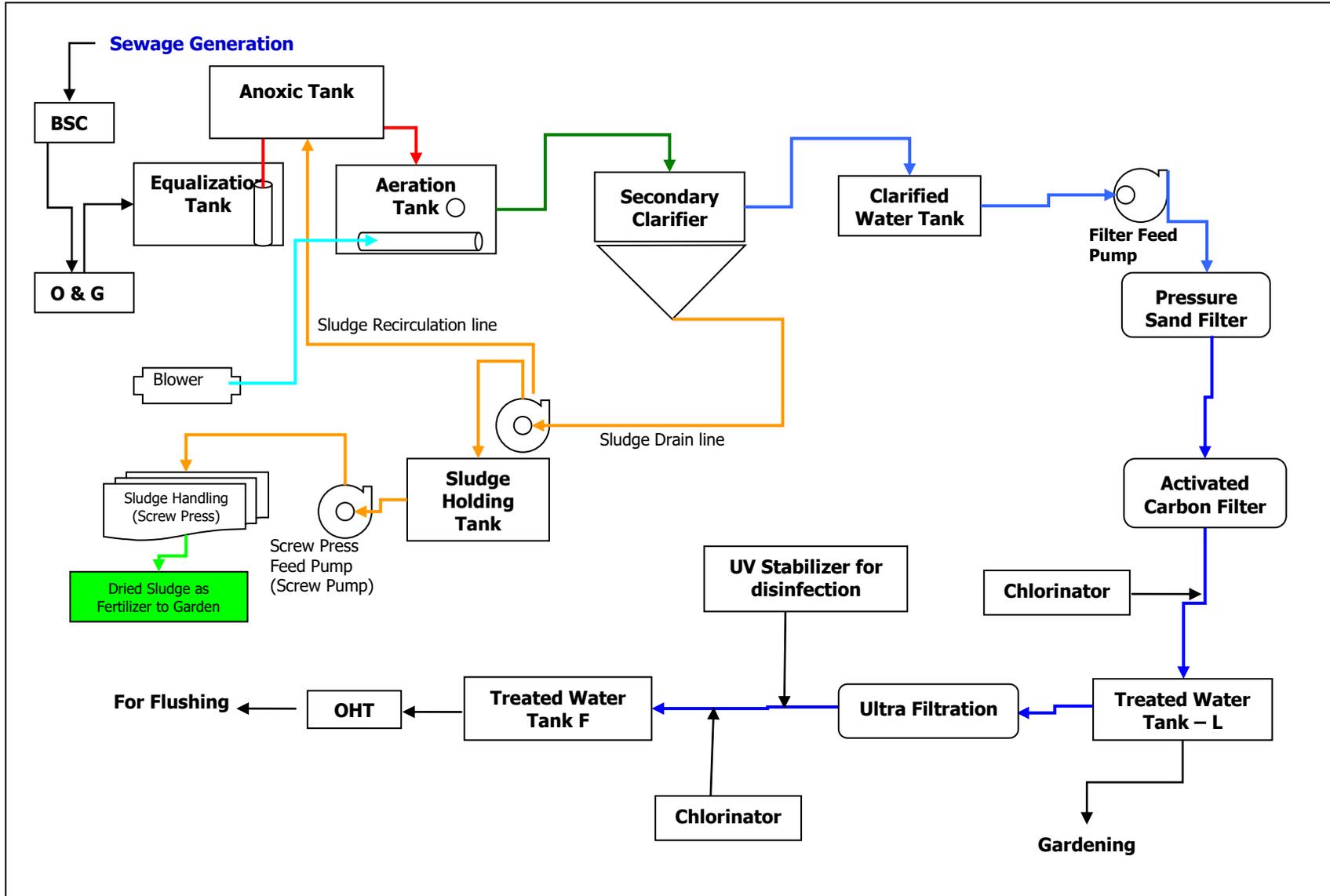
Volume of the tank	=	2.25 m ³
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Tank Size = 1.5 m X 1.5 m x 1.0 m, SWD

STP SPECIFICATIONS ARE SUMMARIZED AS FOLLOWS

SL. No.	Description	Qty	Dimension	Volume (cum)
1	Bar Screen Chamber I	1	3.0 m x 1.0 m x 1.0 m SWD	3.0
2	Bar Screen Chamber II	1	2.9 m x 1.0 m x 1.0 m SWD	2.9
3	Oil & Grease Chamber I	1	8.05 m x 1.0 m x 1.0 m SWD	8.05
4	Oil & Grease Chamber II	1	8.32 m x 1.0 m x 1.0 m SWD	8.32
5	Equalization Tank I	1	41.18 sq.mt. x 3.0 m SWD	123.54
6	Equalization Tank II	1	40.77 sq.mt. x 3.0 m SWD	122.31
7	Anoxic zone tank IA, IIA	2	2.1 m x 3.2 m x 4.2 m SWD	28.22
8	Anoxic zone tank IB, IIB	2	2.1 m x 3.2 m x 4.2 m SWD	28.22
9	Aeration tank I	1	65.84 sq.mt. x 4.0 m SWD	263.36
10	Aeration tank II	1	65.99 sq.mt. x 4.0 m SWD	263.96
11	Secondary Clarifier Tank I, II	2	4.3 m x 4.3 m x 3.4 m	62.86
12	Clarified Water Tank	1	89.0 sq.mt. x 2.7 m SWD	240.30
13	Sludge Holding Tank	1	24.31 sq.mt. x 4.1 m SWD	99.67
14	Treated Water Tank – L	1	194.03 sq.mt. x 6.3 m SWD	1222.89
15	Treated Water Tank - F	1	36.74 sq.mt. x 6.3 m SWD	231.46
16	Collection Pit	1	1.5 m x 1.5 m x 1.0 m SWD	2.25

STP FLOW DIAGRAM



**STP TECHNICAL WRITE-UP: 1020 KLD
(340 KLD x 3 Modules)**

FOR

"PROPOSED RESIDENTIAL DEVELOPMENT PROJECT AND CLUBHOUSE"

PART-I

LOCATED AT:

Sy. No. 47/1 (New No. 47/3), 47/1 (New No. 47/5), 49/1, 49/3, 50,

46/5 (P), 46/6, 46/4(P), 47/6, 47/7, 49/6,

PANATHUR VILLAGE,

VARTHUR HOBLI,

BANGALORE EAST TALUK.

DEVELOPED BY



SOBHA LIMITED

Registered and Corporate Office,

Sarjapur-Marthahalli Outer Ring Road (ORR)

Devarabisanahalli, Bellandur Post, Bangalore – 560 103.

Telephone No: 080-49320000,

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SEWAGE TREATMENT PLANT

Sewage Treatment plant is provided for treating all kinds of wastewater generated due to various domestic activities involved in the project. This facility is not only installed for conforming to the statutory requirement of Pollution Control Board, but also to ensure that the treated water is utilized for gardening and flushing activities. The treatment Process / system is designed on the principle of Activated Sludge Process (ASP), which ensures the aerobic decomposition of organic matter in presence of active microbial growth in the aeration tank followed by ultra-filtration.

Water Demand Calculation

Particulars	No. of units	Total Population	Water Demand (lpcd)	Domestic Water requirement (lts/day)	Flushing Water requirement (lts/day)
PART-1					
3 BHK (S)	266	1596	135	143640	71820
3 BHK	494	2964	135	266760	133380
4 BHK	304	2128	135	191520	95760
Club house (10 % of Population)		669	45	13,376	16,720
Visitors (10 % of Population)		669	15	3,344	6,688
TOTAL (KLD)				619	324
Total water requirement in KLD				943	
Sewage generation (Considering 90% of total water demand) in KLD				849	
Sewage generation (Considering design peak factor @ 1.2) in KLD				1,018	
Proposed STP-1 Capacity in KLD				1020 KLD (340 KLD x 3 Modules)	

PROCESS DESIGN BASIS

Basis of Design

Sewage treatment plant is designed for Activated Sludge Process (ASP).

Sewage generated from domestic activities is considered at a maximum of 849 m³/day with design peak factor 1.2, the capacity of STP provided is 1020 KLD. The Sewage treatment plant is designed taking the following parameters into account.

Sewage Quality Parameters (Raw & Treated)

Sl.No	Parameters	Unit	Influent	Limits (KSPCB OM Dated: 01.03.20210)
1.	pH	-	6.5 – 8.5	6.5 – 8.5
2.	COD	mg/l	200 - 600	< 50
3.	BOD (5 th day)	mg/l	300 - 400	< 10
4.	Suspended Solids	mg/l	300 – 400	< 10
5.	Ammonical Nitrogen	mg/l	20	< 5
6.	Total Nitrogen	mg/l	30	< 10
7.	Fecal Coliforms	MPN/100ml	10 ⁵ – 10 ⁸	< 100

PROCESS DETAILS

In the sewage treatment plant (S.T.P.), The treatment chambers in the plant consists of:

- Bar Screen Chamber
- Oil & Grease Trap
- Equalization Tank
- Anoxic Tank I & II
- Aeration Tank
- Secondary Settling Tank
- Clarified Water Tank
- Pressure sand filter
- Activated carbon filter
- Treated water tank I & II
- Sludge holding tank
- Sludge Handling System
- Collection Pit

1. Pre treatment system

Raw sewage generated from various sources is collected in the Equalization Tank, after passing through a manually operated Bar Screen that screens the large, floating matter. The collected screenings are disposed off manually. In the equalization tank, sufficient retention time is provided to equalize and homogenize the variations in the flow and pollutant concentration. A Coarse Bubble Air Mixing System is provided to mix, and keep the sewage in an aerobic condition.

2. De-nitrification Process- Anoxic Zone Tank

From Equalization Tank sewage flows into Anoxic Zone Tank. Here removal of nitrogen in the form of nitrate by conversion to nitrogen gas will be accomplished biologically under anoxic (without oxygen) conditions. The process is known as de-nitrification.

3. Secondary Treatment System - Aeration Tank

From the Anoxic Zone tank, sewage is pumped into the Aeration tank. In aeration tank sufficient amount of air is supplied to oxidize the organics absorbed by the bacterial biomass.

4. Secondary Settling Tank

It helps in removing suspended solids and the biomass. Hopper bottom is provided because when sewage after bacterial activity rests for a given time, bio-mass and suspended impurities being heavier tend to settle at the bottom of Secondary settling tank. Conical bottom helps this mass (called sludge) to slide down the slope and accumulate near the pit which is connected to the sludge sump.

5. Clarified water Tank

The clarified water is collected in clarified water tank which is the overflow of secondary Settling tank.

6. Filtration

Clarified water is pumped through the Pressure Sand Filter & then to Activated Carbon Filter to remove the traces of suspended solids, organics, color and odor present in the treated sewage. This filtered water is collected in Treated Water Tank which will be used for landscaping and flushing after disinfection.

7. Sludge Dewatering/Handling

Excess sludge from Aeration tank is stored in Sludge Holding tank & then pumped to Screw Press for dewatering of sludge. A screw press (SP) provides sludge dewatering by conveying the sludge along the inside of a permeable cylinder. It is based on a slowly-rotating (~5 RPM) Archimedean screw within a cylindrical screen (otherwise termed drum filter/screen or basket). It is normally inclined by ~20° to the horizontal to assist with the draining of water into the sump. The screens are less susceptible to clogging than the filter media used for other thickening and dewatering processes. Consequently, spray-cleaning is applied only intermittently for around 2–4% of the operating time.

The filtrate water from the filter press is again recycled to equalization tank by means of a sump pump.

8. Collection Pit:

Collection Pit will be used to collect the spillages and backwash water from the filters.

DESIGN DETAILS

A. BAR SCREEN (3 stream flow)

In the incoming channel, a chamber with bar screen shall be fitted, the purpose of which is to floating matter from introducing into succeeding units of the treatment plant.

Flow to Bar Screen Chamber	=	14.16 cum/hr (1020 /3/24)
Peak flow to Bar Screen Chamber (PF -2.5)	=	35.4 cum/hr
Velocity through Screen	=	0.6 m/s
Net Area of Screen	=	35.4/ (3600 X velocity through screen)
	=	35.4 / (3600 X 0.6)
	=	0.0163 m ²

Adopting screens with flats of 5 mm thick and 10 mm opening,

Gross area	=	(0.0163 X 10)/5= 0.033 m ² .
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Assuming that the inclination of screen to horizontal is at 60 degrees the gross area of screen needed

	=	(0.033)/ Sin 60
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Screen area will be	=	0.038 m ²
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3 Bar Screen Chambers have been proposed for the 3 modules:

BSC I	=	3.0 m x 1.0 m x 1.0 SWD
BSC II	=	3.0 m x 1.0 m x 1.0 SWD
BSC III	=	3.0 m x 1.0 m x 1.0 SWD

Total Volume	=	3 cum x 3 Nos.
	=	9 cum.

B. OIL & GREASE CHAMBER (3 Stream flow)

Flow	=	14.16 cum/hr
Peak Flow (2.5)	=	35.4 cum/hr
Retention Time	=	15 min.
Volume of the tank to be provided	=	8.45 m³

O&GC Chambers have been proposed for three stream flow:

O&GC 1	=	8.45 m x 1.0 m x 1.0 m, SWD. (8.45 m ³)
O&GC 2	=	8.45 m x 1.0 m x 1.0 m, SWD. (8.45 m ³)
O&GC 3	=	8.45 m x 1.0 m x 1.0 m, SWD. (8.45 m ³)

C. EQUALIZATION TANK (3 Stream flow)

Flow	=	14.16 cum/hr
Detention Time of tank I &II	=	8.45 hrs
Volume of the EQT tank I & II	=	119.70 cum.

Detention time of tank-III	=	8.36 hrs.
Volume of EQT III	=	118.44 cum.

EQT size proposed:

EQT 1	=	4.2 m x 9.5 m x 3.0 m SWD (119.70 cum)
EQT 2	=	4.2 m x 9.5 m x 3.0 m SWD (119.70 cum)
EQT 3	=	4.2 m x 9.4 m x 3.0 m SWD (118.44 cum)

D. ANOXIC ZONE TANK I,II,III (A) (3 Stream flow)

Flow to Anoxic Zone Tank	=	14.16 cum/hr
Detention Time	=	2.0 hrs
Volume of the tank provided	=	29.61 m³
Dimensions of the Tanks proposed:		
AZT I(A)	=	3.0 m x 2.35 m x 4.2 m SWD (29.61 cum)
AZT II(A)	=	3.0 m x 2.35 m x 4.2 m SWD (29.61 cum)
AZT III(A)	=	3.0 m x 2.35 m x 4.2 m SWD (29.61 cum)

E. ANOXIC TANK I,II,III (B) (3 Stream flow)

Flow to Anoxic Zone Tank	=	14.16 m ³ /hr
Detention Time	=	2.0 hrs
Volume of the tank provided	=	29.61 m³
Dimension of the Tank proposed:		
AZT I(B)	=	3.0 m x 2.35 m x 4.2 m SWD (29.61 cum)
AZT II(B)	=	3.0 m x 2.35 m x 4.2 m SWD (29.61 cum)
AZT III(B)	=	3.0 m x 2.35 m x 4.2 m SWD (29.61 cum)

F. AERATION TANK (3 Stream flow)

Flow to Aeration Tank	=	14.16 m ³ /hr
Detention Time (I & II)	=	17.0 hrs
Volume of the Tank provided (I & II)	=	241.68 m ³
Detention time (III)	=	16.8 hrs.
Volume of the tank	=	238.36 cum
Dimension of the aeration tank proposed:		
AT I	=	60.42 sq.mt. x 4.0 m SWD (241.68 cum)
AT II	=	60.39 sq.mt. x 4.0 m SWD (241.56 cum)
AT III	=	59.59 sq.mt. x 4.0 m SWD (238.36 cum)

Air Requirement:

Flow	:	1020 m ³ / day
Inlet BOD	:	350 mg/l or 350 g/cum or 0.35 kg/cum
BOD Load	:	1020 cum/d X 0.30 kg/cum
Total BOD	:	306 kg/day
O ₂ required	:	2.5 kg/kg of BOD
Total O ₂ required	:	765 kg/day
	:	32 Kgs/hr
Air required	:	<u>32 kg of Oxygen/ hr</u>
	:	1.2* x 0.232 ** x 0.65 *** x 0.95 **** 0.23 *****
	:	809 m ³ /hr ----- A

Air Requirement in Equalization Tank	=	0.015 m ³ / min * Volume of Equalization Tank
	=	0.015 * 357.84
	=	5.36m ³ /hr ----- B

Air Requirement in Sludge Holding Tank	=	0.015 m ³ / min * Volume of SHT
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$$= 0.015 \text{ m}^3/\text{min} * 157.5$$

$$= 2.36 \text{ m}^3/\text{hr} \text{ ----- C}$$

$$\text{Total Air requirement (A+B+C)} = \mathbf{816.72 \text{ m}^3/\text{hr.}}$$

G. SECONDARY CLARIFIER TANK (3 Stream flow)

Flow to Tank	=	14.16 m ³ /hr
Detention time	=	4.2 hrs
Volume of the tank provided	=	59.97 m ³
Dimension of the tank		
SST I	=	4.2 m X 4.2 m X 3.4 m, SWD. (59.97 m ³)
SST II	=	4.2 m X 4.2 m X 3.4 m, SWD. (59.97 m ³)
SST III	=	4.2 m X 4.2 m X 3.4 m, SWD. (59.97 m ³)

H. CLARIFIED WATER TANK

Flow	=	42.5 m ³ /hr
Detention time	=	8 hrs
Volume of the tank provided	=	336.20 m ³
Dimension of the tank	=	124.52 sq.mt. x 2.7 m SWD

I. PRESSURE SAND FILTER

Design Flow	=	42.5 m ³ /hr
Velocity of percolation through Filter	=	15 m ³ /hr/ m ²
Size of PSF	=	2.1 m dia X 2.0 m HOS
Quantity	=	1 No.

J. ACTIVATED CARBON FILTER

Design Flow	=	42.5 m ³ /hr
Velocity of percolation through Filter	=	15 m ³ /hr/ m ²
Size of PSF	=	2.1 m dia X 2.0 m HOS
Quantity	=	1 No.

K. HYPO DOSING

Hypo dosing pump	=	0-6 lph
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L. SLUDGE HOLDING TANK

Sludge Volume	=	2 % of total flow	= 20.4 m ³ /day
Detention Time	=	8 Days	
Volume of the tank	=	157.5 m ³	
Dimension of the tank	=	5.2 m x 7.65 m x 4.0 m	

M. TREATED WATER TANK - L

Flow	=	42.5 m ³ /hr
Detention Time	=	40 hrs
Volume of the Tank	=	1701.31 m ³
Dimension of the tank provided	=	270.05 m² X 6.3 m, SWD

N. TREATED WATER TANK - F

Flow	=	42.5 m ³ /hr
Detention Time	=	8 hrs
Volume of the Tank	=	332.34 m ³
Dimension of the tank provided	=	14.86 m X 3.55 m x 6.3m, SWD

O. COLLECTION PIT

Volume of the tank	=	4.0 m ³
Tank Size	=	2.0 m X 2.0 m x 1.0 m, SWD

STP SPECIFICATIONS ARE SUMMARIZED AS FOLLOWS

SL. No.	Description	Qty	Dimension	Volume (cum)
1	Bar Screen Chamber I, II, III	3	3.0 m x 1.0 m x 1.0 m SWD	3.0
2	Oil & Grease Chamber I, II, III	3	8.45 m x 1.0 m x 1.0 m SWD	8.45
3	Equalization Tank I & II	2	4.2 m x 9.5 m x 3.0 m SWD	119.70
4	Equalization Tank III	1	4.2 m x 9.4 m x 3.0 m SWD	118.44
5	Anoxic zone tank IA, IIA, IIIA	3	3.0 m x 2.35 m x 4.2 m SWD	29.61
6	Anoxic zone tank IB, IIB, IIIB	3	3.0 m x 2.35 m x 4.2 m SWD	29.61
7	Aeration tank I	1	60.42 sq.mt. x 4.0 m SWD	241.68
8	Aeration tank II	1	60.39 sq.mt. x 4.0 m SWD	241.68
9	Aeration tank III	1	59.59 sq.mt. x 4.0 m SWD	238.36
10	Secondary Clarifier Tank I, II, III	3	4.2 m x 4.2 m x 3.4 m SWD	59.97
11	Clarified Water Tank	1	124.52 sq.mt. x 2.7 m SWD	336.20
12	Sludge Holding Tank	1	5.2 m x 7.65 m x 4.0 m SWD	157.5
13	Treated Water Tank – L	1	270.05 sq.mt x 6.3 m SWD	1701.31
14	Treated Water Tank - F	1	14.86 m x 3.55 m x 6.3 m SWD	332.34
15	Collection Pit	1	2.0 m x 2.0 m x 1.0 m SWD	4.0

STP FLOW DIAGRAM

