



# Government of Maharashtra

## Solid & Liquid Waste Management (SLWM)

### Design, Drawing and Type Estimates

#### FAECAL SLUDGE MANAGEMENT

**Water Supply and Sanitation Department**  
**State Water & Sanitation Mission**  
**Swachh Bharat Mission (Gramin)**



## Faecal Sludge Management

### Design, Drawing and Type Estimates for Faecal Sludge Management

<b>Sr No</b>	<b>Component</b>	<b>Page No</b>
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<b>Deep Row entrenchment</b>			
<b>Sr No</b>	<b>Item Description</b>	<b>Quantity</b>	<b>Unit</b>
1	Volume of Trench	50	m <sup>3</sup>
2	No of trenches accommodated in 1 acre area	32.0	nos.
3	Volume of faecal sludge accommodated in the site	1600	m <sup>3</sup>
4	Assumed capacity of septic tank	4.00	m <sup>3</sup>
5	No. of septic tanks accommodated in the site	400	nos.
6	Detention time	2	years
7	De-sludging frequency of septic tanks	5	years
8	Total number of septic tanks that can be catered	1000	nos.
9	Population served directly by the site	5000	capita

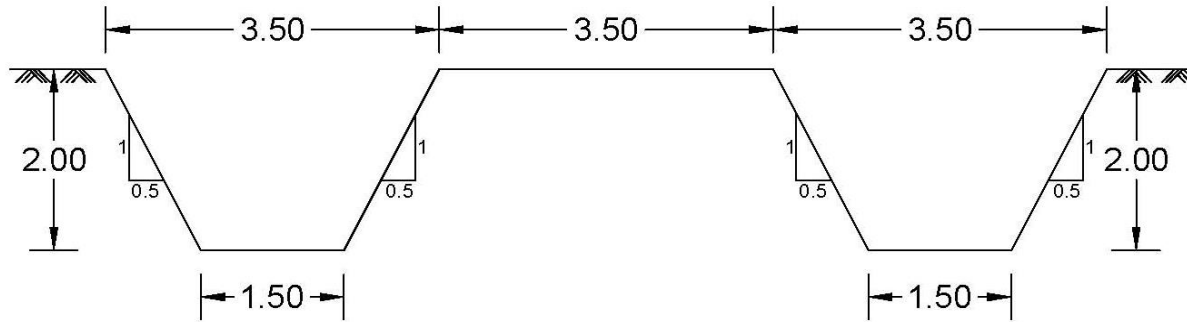
There is reduction in the volume of FS after laying due to evaporation and percolation, therefore the trench can actually accommodate more sludge than the volumetric calculation. This is however dependent on climatic conditions like humidity, temperature, etc. and ground strata. This volume reduction is not considered in the calculations above.

<b>Name of Work:- CONSTRUCTION OF DEEP ROW ENTRENCHMENT</b>					
<b>ABSTRACT for DEEP ROW ENTRENCHMENT</b>					
<b>Quantity</b>		<b>Particulars</b>	<b>Rate</b>	<b>Unit</b>	<b>Amount</b>
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
		Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)			
1320.00	CuM	Lift 0 to 1.5 M	150	CuM	198000.00
280.00	CuM	Lift 1.5 to 3.0 M	164	CuM	45920.00
		(MJP SSR 2021-22 P NO 42 I No 1)			
		<b><u>Item No 2. :-</u></b>			
		Providing and erecting 1.5 metre high wire fencing with seven rows of barbed wire supported on M.S.Angles ( 50mm x 50mm x 6mm) at 2.5 Metres, Center to center including excavating pits for foundation, fixing post in cement concrete 1:4:8 of size 45 x 45 x 45 cm fastening the wire and painting the M.S.Angles with one coat of red lead primer and two coats of painting etc.complete			
307.00	CuM		613.00	CuM	188191.00
		(PWD SSR 2020-21 P NO 244 I No 44.09)			
		<b><u>Item No 3. :-</u></b>			
		Providing and fixing mild steel grill gate with angle iron frame 65mm x 65mm x 10mm with iron bars at 150mm C/C and diagonal flats as per the detailed drawing including hinges, pivot block locking arrangement, welding riveting and oil painting of three coats of approved shade Weight of gate 35 Kilogram/Smt			
10.00	SqM		2548.00	SqM	25480.00
		(PWD SSR 2020-21 P NO 244 I No 44.10)			
		<b>Total Cost of Deep Row Entrenchment in Rs:-</b>			<b>457591</b>

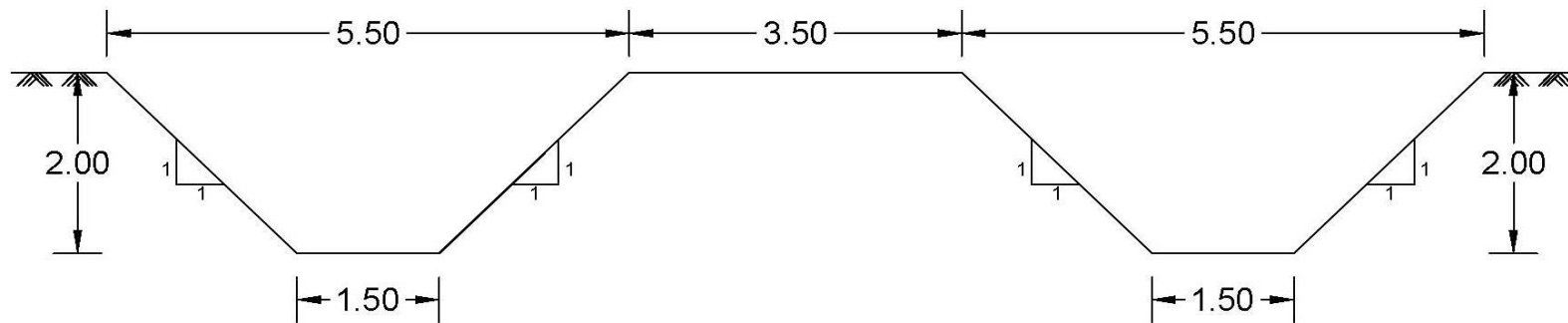
<b>MEASUREMENTS FOR CONSTRUCTION OF DEEP ROW ENTRENCHMENT</b>											
<b>Particulars</b>	<b>Nos.</b>	<b>L</b>	<b>B</b>	<b>D</b>							<b>Quantity</b>
1	2	3	4	5							6
<b>Item No:-1</b>											
Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)											
	<b>Nos. of Trench</b>	<b>L</b>	<b>Top Width (B1)</b>	<b>Bottom Width (B2)</b>	<b>Height</b>						
0-1.5 M	32	10	3.5	2	1.5	0.5	=	1320			CuM
1.5-3 M	32	10	2	1.5	0.5	0.5	=	280			CuM
<b>Total Excavation Quantity</b>								<b>1600</b>			<b>CuM</b>
<b>Item No:-2</b>											
Providing and erecting 1.5 metre high wire fencing with seven rows of barbed wire supported on M.S.Angles (50mm x 50mm x 6mm) at 2.5 Metres, Center to center including excavating pits for foundation, fixing post in cement concrete 1:4:8 of size 45 x 45 x 45 cm fastening the wire and painting the M.S.Angles with one coat of red lead primer and two coats of painting etc. Complete											
Total Fencing	2	118.5	35				=	307.0			R. Mtr
<b>Item No:-3</b>											
Providing and fixing mild steel grill gate with angle iron frame 65mm x 65mm x 10mm with iron bars at 150mm C/C and diagonal flats as per the detailed drawing including hinges, pivot block locking arrangement, welding riveting and oil painting of three coats of approved shade Weight of gate 35 Kilogram/Smt											
Steel Grill Gate	1	5		2			=	10.00			SqM
Steel Grill Gate								10.00			SqM

## Deep Row entrenchment

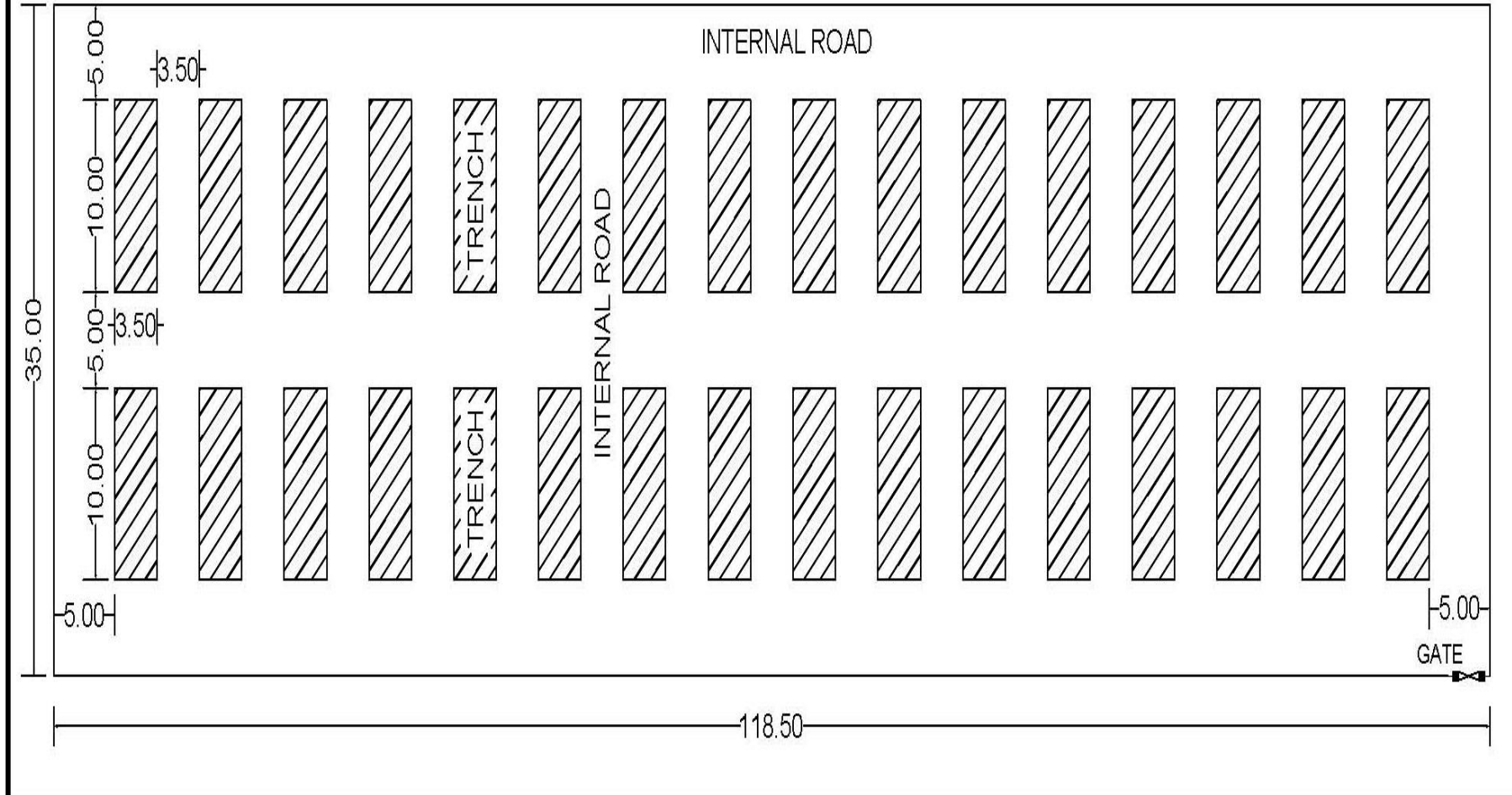
### 1) Normal Deep Row Entrenchment a) Hard Soil Formation



### b) Loose Soil Formation



# TYPICAL PLAN FOR TRENCHING SITE



<b>Planted Sludge Drying Beds</b>			
<b>Sr No</b>	<b>Item Description</b>	<b>Quantity</b>	<b>Unit</b>
1	Assumed capacity of treatment plant	4	KLD
2	Assumed capacity of septic tank	4.00	m <sup>3</sup>
3	Permissible sludge layer thickness	75-100	mm
4	Dimensions of sludge drying bed		
	Length	5	m
	Breadth	6	m
5	Area of the sludge drying bed	30	m <sup>2</sup>
6	Reduction in sludge volume after its application	50.0	%
7	Permissible overall sludge thickness	1.0	m
8	Frequency of loading the sludge drying bed	1.0	per week
9	Sludge accommodated in the sludge drying beds	45.0	m <sup>3</sup>
10	No. of septic tanks that can be accommodated in one SDB	12.00	Nos.
11	No. of weeks required for filling single sludge drying bed	12	weeks
12	No. of beds in one set ( assumed)	6	beds
13	Detention time	2	year
14	De-sludging frequency of septic tanks	5	years
15	Total number of septic tanks that can be catered in 5 years' time	216	nos.
16	Population served directly by the site	1080	capita



**Name of Work:- CONSTRUCTION OF PLANTED SLUDGE DRYING BEDS (PSDB)**

Quantity		Particulars	Rate	Unit	Amount
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
1.00	No.	Planted Sludge Drying Bed	1597485.84	No.	1597485.84
		<b><u>Item No 2. :-</u></b>			
1.00	No.	Settler	139918.02	No.	139918.02
		<b><u>Item No 3. :-</u></b>			
1.00	No.	HFBG	150025.36	No.	150025.3634
		<b><u>Item No 4. :-</u></b>			
1.00	No.	Polishing Ponds	34740.94735	No.	34740.94735
		<b>Total Cost of Screen Chamber in Rs:-</b>			<b>1922170.172</b>

<b>Name of Work:- CONSTRUCTION OF PLANTED SLUDGE DRYING BEDS</b>					
<b>ABSTRACT for PLANTED SLUDGE DRYING BEDS</b>					
<b>Quantity</b>		<b>Particulars</b>	<b>Rate</b>	<b>Unit</b>	<b>Amount</b>
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
		Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)			
384.91	CuM	Lift 0 to 1.5 M (MJP SSR 2021-22 P NO 42 I No 1)	150	CuM	57735.77
		<b><u>Item No 2. :-</u></b>			
		Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38			
34.92	CuM	In PCC M-100 (MJP SSR 2021-22 P NO 49 I No 1)	5185.00	CuM	181060.20
		<b><u>Item No 3. :-</u></b>			
		Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)			
33.16	CuM	In RCC M-250	7206.00	CuM	238950.96

		(MJP SSR 2021-22 P NO 49 I No 2)			
		<b><u>Item No 4. :-</u></b>			
2.65	MT	Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306)	66218.00	MT	175663.11
		<b>ToR Steel</b>			
		(MJP SSR 2021-22 P NO 52 Sr No 08 b)			
		<b><u>Item No 5. :-</u></b>			
42.12	CuM	Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc. Complete.	7407.00	CuM	311982.84
		(PWD SSR 2021-22 P NO 167 Sr No 888)			
		<b><u>Item No 6. :-</u></b>			
335.84	SqM	Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1Kilogramper cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.complete.	599.00	SqM	201166.962
		(SSR PWD 2020-21 P NO 177 I No 32.04)			

		<b><u>Item No 7. :-</u></b>			
18.00	CuM	Aggregates from size 40-60mm	900.00	CuM	16200
27.00	CuM	Aggregates from size 16-20mm	900.00	CuM	24300
18.00	CuM	Aggregates from size 6-8 mm	1343.00	CuM	24174
54.00	CuM	Sand (1-2mm)	1689.00	CuM	91206
		(SSR MJP 2021-22 P NO 13 Sr No 50, 46 & 63)			
		<b><u>Item No 8. :-</u></b>			
30.00	RM	HDPE Pipe for inelt & outlet of 160 mm	615.00	RM	18450
63.00	RM	Vent pipe (perforated pipe 160mm)	1090.00	RM	68670
96.00	RM	Perforated PVC pipe for under drain (160mm)	1090.00	RM	104640
36.00	RM	Outlet pipe (PVC 1600 mm)	414.00	RM	14904
42.00	Nos.	Elbow 160 mm	600.00	Nos.	25200
30.00	Nos.	Vent Pipe Cowl	150.00	Nos.	4500
18.00	Nos.	Four way TEE Fitting	900.00	Nos.	16200
		<b><u>Item No 9. :-</u></b>			
2.00	Nos.	TEE at inlet and outlets (160mm)	600.00	Nos.	1200
		<b><u>Item No 10. :-</u></b>			
6.00	Nos.	Providing and fixing reinforced cement concrete cover of size 90 cm x 45 cm with frame over inspection chamber etc. complete. Medium duty (140 Kilogram)	3547.00	Nos.	21282
		(SSR PWD 2020-21 P NO 235 I No 42.69 )			
		<b>Total Cost of 1 PDB in Rs:-</b>			<b>1597485.84</b>

## MEASUREMENTS FOR CONSTRUCTION OF PLANTED SLUDGE DRYING BEDS

Particulars	Nos.	L	B	D									Quantity	
1	2	3	4	5									6	
<b>Item No:-1</b>														
Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)														
<b>0 -1.5 M</b>														
For Beds	1	x	32.81	x	7.66	x	1.5					=	376.99	CuM
For Outlet Chamber	6	x	0.83	x	1.06	x	1.5					=	7.92	CuM
<b>Total Excavation Quantity 0-1.5 M</b>													<b>384.91</b>	<b>CuM</b>
<b>Item No:-2</b>														
Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38														
<b>In PCC M-100</b>														
For Beds	1	x	32.21	x	7.06	x	0.15					=	34.12	CuM
For outlet Chamber	6	x	0.83	x	1.06	x	0.15					=	0.80	CuM
<b>Total PCC Quantity</b>													<b>34.92</b>	<b>CuM</b>
<b>Item No:-3</b>														
Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)														
<b>In RCC M-250</b>														
RCC for Beds	1	x	31.91	x	6.76	x	0.15					=	32.36	CuM
RCC for Outlet Chamber	6	x	0.83	x	1.06	x	0.15					=	0.80	CuM
<b>Total RCC Work</b>													<b>33.16</b>	<b>CuM</b>
<b>Item No:-4</b>														
Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306) ToR Steel														
<b>Reinforcement @80kg/m3</b>													<b>2.65</b>	<b>MT</b>
<b>Item No:-5</b>														

Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc.complete.

Long Wall	2	x	31.61	x	0.23	x	1.95			=	28.36	
Short Wall	4	x	6	x	0.23	x	1.95			=	10.77	
Chamber Brickwork	6	x	0.6	x	0.23	x	1.2			=	1.00	
	12	x	0.6	x	0.23	x	1.2			=	1.99	
<b>Total Brick Masonry Work</b>											<b>42.12</b>	<b>CuM</b>

**Item No:-6**

Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1Kilogramper cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.complete.

Long Wall	4	x	31.61			x	1.95			=	246.56	SqM
Short Wall	8	x	6			x	1.95			=	93.60	SqM
Chamber Brickwork	6	x	0.6			x	1.2			=	4.32	SqM
	12	x	0.6			x	1.2			=	8.64	SqM
<b>Total Plastering Work</b>											<b>335.84</b>	<b>SqM</b>

**Item No:-7**

Aggregates from size 40-60mm	6	x	6	x	5	x	0.1			=	18.00	CuM
Aggregates from size 16-20mm	6	x	6	x	5	x	0.15			=	27.00	CuM
Aggregates from size 6-8 mm	6	x	6	x	5	x	0.1			=	18.00	CuM
Sand (1-2mm)	6	x	6	x	5	x	0.3			=	54.00	CuM

**Item No:-8**

Providing & Supplying various Pipes

HDPE Pipe for inelt & outlet of 160 mm	6	x	5.00							=	30.00	RM
Vent pipe (perforated pipe 160mm)	30	x	2.10							=	63.00	RM
Perforated PVC pipe for under drain (160mm)	6	x	16.00							=	96.00	RM
Outlet pipe	6	x	6.00							=	36.00	RM
Elbow 160 mm	42									=	42.00	Nos.
Vent Pipe Cowl	30									=	30.00	Nos.
Four way TEE Fitting	18									=	18.00	Nos.

**Item No:-9**

**TEE at inlet and outlets (160mm)**

Total TEE	2									=	2.00	Nos.
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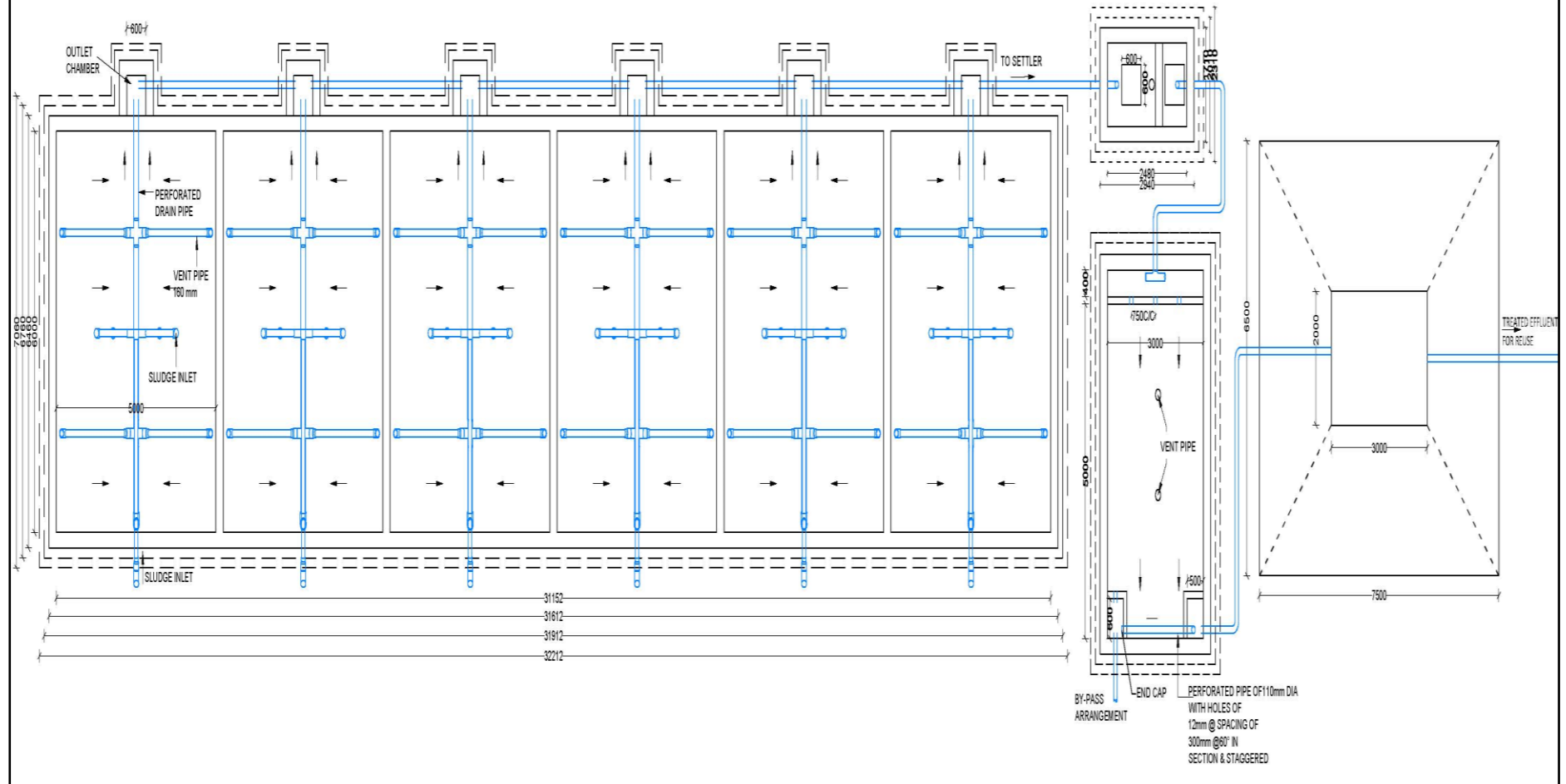
**Item No:-10**

Providing and fixing reinforced cement concrete cover of size 90 cm x 45 cm with frame over inspection chamber etc. complete. Medium duty (140 Kilogram)

	6									=	6.00	Nos.
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# Planted Sludge Drying Bed

## LAYOUT OF PLANTED SLUDGE DRYING BED



<b>Planted Sludge Drying Beds</b>		
<b>Design Calculations for Settler</b>		
<b>Inflow</b>	<b>2.2</b>	<b>m3/day</b>
<b>say</b>	<b>2.5</b>	<b>m3/day</b>
	0.2	m3/hr
HRT	1-2	hrs
Say	1	hrs
SRT (assumed)	10	months
BOD	6,480	
COD	31,900	
COD/BOD	4.93	
TSS	34,106	
Factor removal to HRT	0.3	
ss/COD ratio	0.25	
Surface Load factor	0.6	
COD removal rate	0.13	
COD out	27753	
Factor of Efficiency ratio of BOD removal to COD removal	1.06	
BOD removal rate	0.1378	
BOD out	5588	
Water depth at outlet	<b>1.35</b>	m
Sludge and storage volume		
reduction of sludge volume during storage	0.86	
Sludge volume (l/g BOD removed)	0.005	
Sludge volume per BOD removal	0.0043	
reduction in BOD	892	
Sludge volume from BOD reduction	0.00446	
Sludge volume	2.95	
Settler volume		
Water volume	0.2	
Water volume + sludge volume	3.15	
Settler surface area	2.33	
Ht of scum	0.2	
Scum volume	0.47	
Total volume of settler	3.62	
Size of chamber		
Width of chamber assumed	<b>1.25</b>	
Length of 1st chamber	1.43	
say	<b>1.5</b>	
Length of 2nd chamber	0.75	
Say	<b>0.75</b>	
Surface area of the settler	2.81	
Volume of settler	3.80	



Name of Work:- CONSTRUCTION OF SETTLER FOR PSDB					
ABSTRACT for SETTLER FOR PSDB					
Quantity		Particulars	Rate	Unit	Amount
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
		Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)			
15.03	CuM	Lift 0 to 1.5 M	150	CuM	2255.04
7.82	CuM	Lift 1.5 to 3.0 M	164	CuM	1282.07
		(MJP SSR 2021-22 P NO 42 I No 1)			
		<b><u>Item No 2. :-</u></b>			
		Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38			
1.23	CuM		5185.00	CuM	6377.55
		<b>In PCC M-100</b>			
		(MJP SSR 2021-22 P NO 49 I No 1)			
		<b><u>Item No 3. :-</u></b>			
		Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)			
1.50	CuM		7206.00	CuM	10809.00
		In RCC M-250			
		(MJP SSR 2021-22 P NO 49 I No 2)			

		<b><u>Item No 4. :-</u></b>			
0.76	Nos.	Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)	8046.00	Nos.	6114.96
		In RCC M-150			
		(MJP SSR 2021-22 P NO 49 I No 5)			
		<b><u>Item No 5. :-</u></b>			
0.18	MT	Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306)	66218.00	MT	11972.21
		<b>ToR Steel</b>			
		(MJP SSR 2021-22 P NO 52 Sr No 08 b)			
		<b><u>Item No 6. :-</u></b>			
4.86	CuM	Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc.complete.	7407.00	CuM	35998.02
		(PWD SSR 2021-22 P NO 167 Sr No 888)			

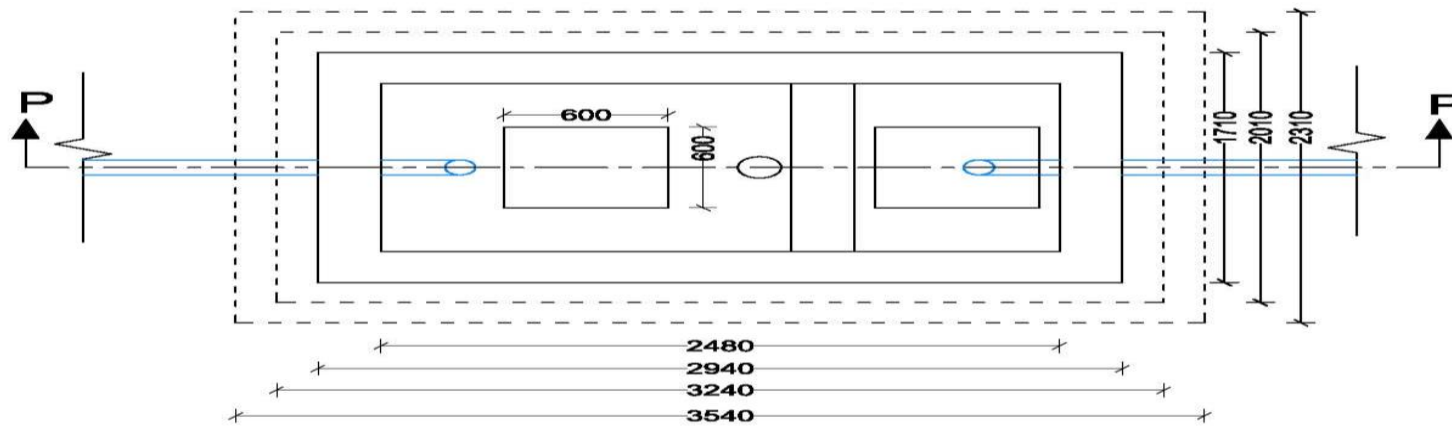
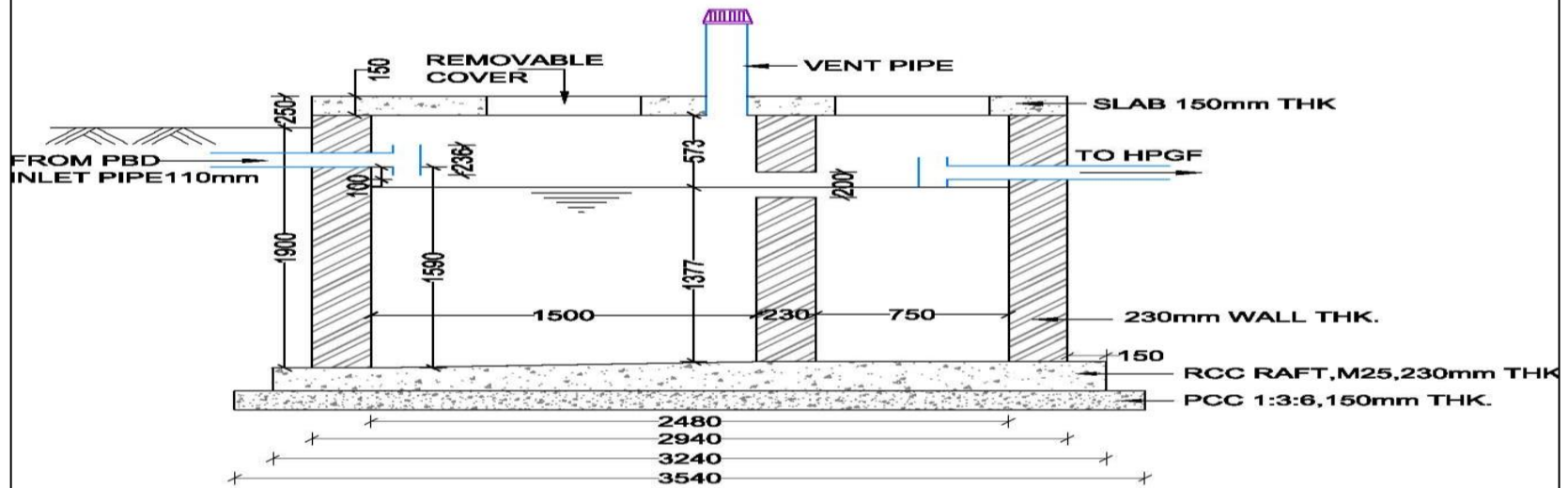
		<b><u>Item No 7. :-</u></b>			
96.43	SqM	Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1Kilogramper cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.complete.	599.00	SqM	57759.17
		(SSR PWD 2020-21 P NO 177 I No 32.04)			
		<b><u>Item No 8. :-</u></b>			
10.00	RM	Providing & Supplying HDPE Pipe of 160 mm diametre (Pressure 6 kg / Sq. cm)	615.00	RM	6150
		(SSR PWD 2020-21 P NO 113 Sr No 1.A. vii)			
		<b><u>Item No 9. :-</u></b>			
2.00	Nos.	Providing & Supplying TEE of 160 mm at inlet & outlet	600.00	Nos.	1200
		Market Rates			
		<b>Total Cost of 1 Settler in Rs:-</b>			<b>139918.02</b>

<b>MEASUREMENTS FOR CONSTRUCTION OF SETTLER FOR PSDB</b>													
<b>Particulars</b>	<b>Nos.</b>	<b>L</b>	<b>B</b>	<b>D</b>							<b>Quantity</b>		
1	2	3	4	5							6		
<b>Item No:-1</b>													
Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)													
0-1.5 M	1	x	3.84	x	2.61	x	1.5				=	15.03	CuM
1.5-3 M	1	x	3.84	x	2.61	x	0.78				=	7.82	CuM
<b>Total Excavation Quantity 0-1.5 M</b>												<b>15.03</b>	<b>CuM</b>
<b>Total Excavation Quantity 1.5-3 M</b>												<b>7.82</b>	<b>CuM</b>
<b>Item No:-2</b>													
Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38													
<b>In PCC M-100</b>													
<b>Total PCC Work</b>	1	x	3.54	x	2.31	x	0.15				=	1.23	CuM
<b>Item No:-3</b>													
Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)													
<b>In RCC M-250</b>													
RCC Raft for Chamber 1	1	x	3.24	x	2.01	x	0.23				=	1.50	CuM
<b>Total RCC Work</b>												<b>1.50</b>	<b>CuM</b>
<b>Item No:-4</b>													
Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works in <b>Slabs / Landings / Vertical Walls / Waist Slabs / Steps</b> for Staircase as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)													
<b>In RCC M-150</b>													
Top Slab RCC	1	x	2.94	x	1.71	x	0.15				=	0.76	CuM
<b>Total RCC Work</b>												<b>0.76</b>	<b>CuM</b>

<b>Item No:-5</b>												
Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306) ToR Steel												
<b>Reinforcement @80kg/m3</b>										<b>0.18</b>	<b>MT</b>	
<b>Item No:-6</b>												
Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc.complete.												
Long Wall	2	x	2.94	x	0.23	x	2		=	2.71		
Short Wall	2	x	1.71	x	0.23	x	2		=	1.58		
Wall with cavity	1	x	1.25	x	0.23	x	2		=	0.58		
Cavity	1	x	0.2	x	0.23	x	0.2		=	0.01		
<b>Total Brick Masonry Work</b>										<b>4.86</b>	<b>CuM</b>	
<b>Item No:-7</b>												
Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1Kilogramper cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc. complete.												
Long Wall	4	x	4.84			x	2.85		=	55.18	SqM	
Short Wall	4	x	2.5			x	2.85		=	28.50	SqM	
Wall with cavity	2	x	2.5			x	2.85		=	14.25	SqM	
Deduction of cavity	2	x	1.5			x	0.5		=	1.50	SqM	
<b>Total Plastering Work</b>										<b>96.43</b>	<b>SqM</b>	
<b>Item No:-8</b>												
Providing & Supplying HDPE Pipe of 160 mm diametre (Pressure 6 kg / Sq. cm)												
	10								=	10.00	RM	
<b>Item No:-9</b>												
<b>TEE at inlet and outlets (160mm)</b>												
<b>Total TEE</b>	<b>2</b>									<b>2.00</b>	<b>Nos.</b>	

# SETTLER FOR PSDB

## PLAN & SECTION OF SETTLER



<b>Planted Sludge Drying Beds</b>			
<b>Design Calculations for HPGF</b>			
<b>Inflow</b>		<b>2.2</b>	<b>m<sup>3</sup>/day</b>
<b>say</b>		<b>2.5</b>	<b>m<sup>3</sup>/day</b>
<b>depth at inlet</b>		<b>0.6</b>	
Hydraulic loading rate		30	m <sup>3</sup> /m <sup>2</sup> /day
Organic loading at surface		20	g/m <sup>2</sup>
Organic loading at cross section		150	g/m <sup>2</sup>
Area required		0.1	m <sup>2</sup>
Say BOD at Inlet		110	mg/l
total organic load		275	gm/day
Surface area required		13.75	m <sup>2</sup>
Cross sectional area required		1.9	m <sup>2</sup>
<b>Length of pond</b>		<b>3.2</b>	<b>m</b>
<b>say</b>		<b>3</b>	
<b>Width of pond</b>		<b>4.6</b>	<b>m</b>
<b>say</b>		<b>5</b>	
<b>effective Pond dimensions</b>		<b>3 x5x0.6</b>	

Name of Work:- CONSTRUCTION OF Horizontal Planted Gravel Filter (HPGF)					
ABSTRACT for HPGF					
Quantity		Particulars	Rate	Unit	Amount
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
		Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)			
29.91	CuM	Lift 0 to 1.5 M	150	CuM	4486.44
		(MJP SSR 2021-22 P NO 42 I No 1)			
		<b><u>Item No 2. :-</u></b>			
		Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38			
4.00	CuM		5185.00	CuM	20740.00
		<b>In PCC M-100</b>			
		(MJP SSR 2021-22 P NO 49 I No 1)			
		<b><u>Item No 3. :-</u></b>			
		Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)			
4.71	CuM		7206.00	CuM	33940.26
		In RCC M-250			
		(MJP SSR 2021-22 P NO 49 I No 2)			



		<b><u>Item No 4. :-</u></b>			
0.38	MT	Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306)	66218.00	MT	24950.94
		<b>ToR Steel</b>			
		(MJP SSR 2021-22 P NO 52 Sr No 08 b)			
		<b><u>Item No 5. :-</u></b>			
4.39	CuM	Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc. complete.	7407.00	CuM	32535.77
		(PWD SSR 2021-22 P NO 167 Sr No 888)			
		<b><u>Item No 6. :-</u></b>			
25.13	SqM	Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1 Kilogram per cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc. complete.	599.00	SqM	15049.88
		(SSR PWD 2020-21 P NO 177 I No 32.04)			
		<b><u>Item No 7. :-</u></b>			
0.36	CuM	Brick Bat Filling	778.00	CuM	280.08
		PWD SSR 2021-22 P No 371 Sr No 49			
		<b><u>Item No 8. :-</u></b>			
9.18	CuM	Filter media at inlet and outlet zone	900.00	CuM	8262
		MJP SSR 2021-22 P No 13 Sr No 49			

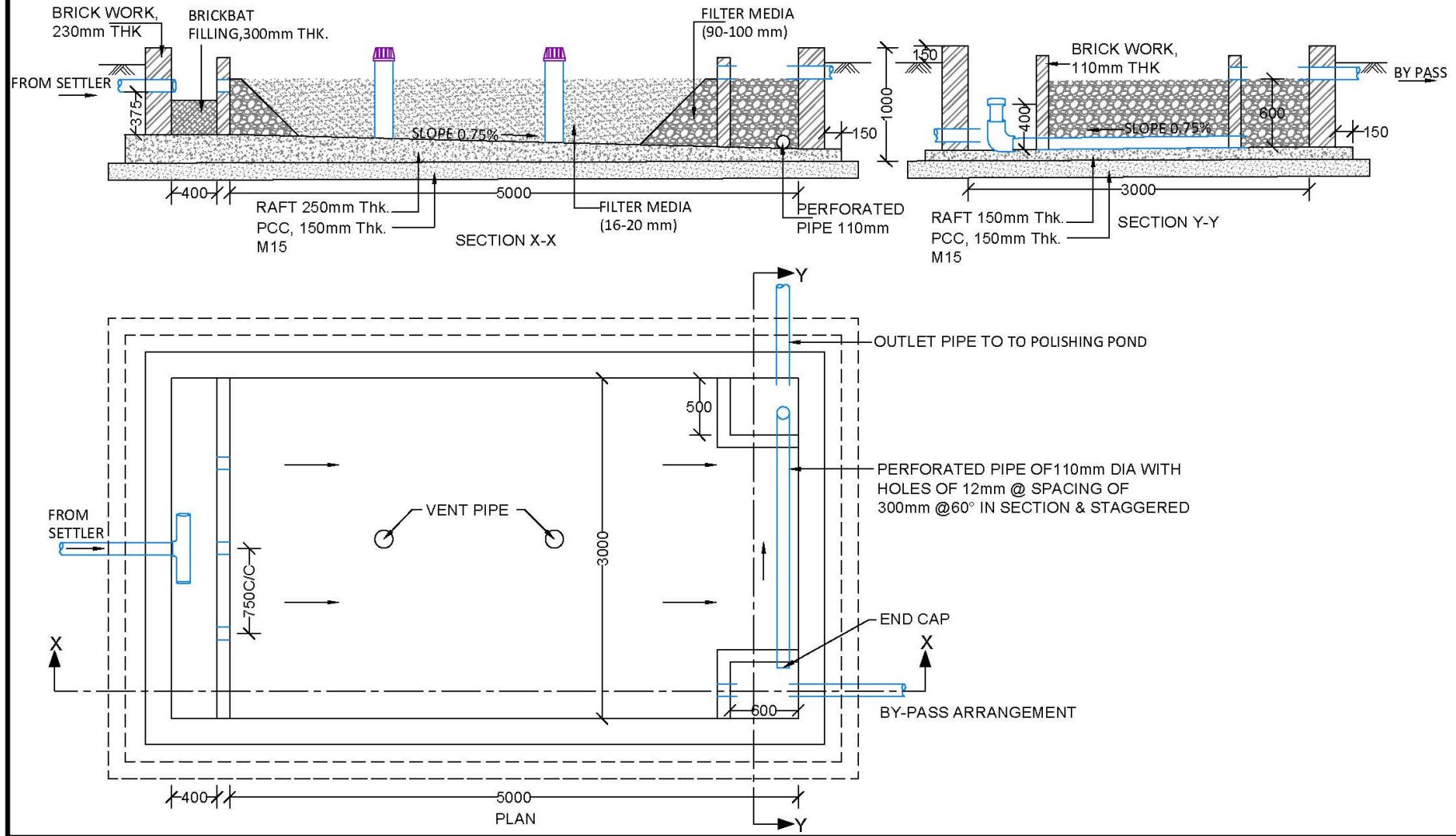
		<b><u>Item No 9. :-</u></b>			
5.00	RM	Providing & Supplying HDPE Pipe of 160 mm diameter (Pressure 6 kg / Sq. cm)	1101.00	RM	5505
		(SSR PWD 2021-22 P NO 151 I No 31.14)			
		<b><u>Item No 10. :-</u></b>			
5.00	RM	Providing & Supplying HDPE Pipe of 160 mm diameter (Pressure 6 kg / Sq. cm)	615.00	RM	3075
		(SSR PWD 2020-21 P NO 113 Sr No 1.A. vii)			
		<b><u>Item No 11. :-</u></b>			
1.00	Nos.	Providing & Supplying TEE of 160 mm at inlet	600.00	Nos.	600
		Market Rates			
		<b><u>Item No 12. :-</u></b>			
1.00	Nos.	Providing & Supplying elbow of 160 mm at outlet	600.00	Nos.	600
		Market Rates			
		<b>Total Cost of 1 Settler in Rs:-</b>			<b>150025.363</b>

MEASUREMENTS FOR CONSTRUCTION OF HPGF												
Particulars	Nos.		L		B		D				Quantity	
1	2		3		4		5				6	
<b>Item No:-1</b>												
Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)												
0 -1.5 M	1	x	6.86	x	4.36	x	1			=	29.91	CuM
<b>Total Excavation Quantity 0-1.5 M</b>											<b>29.91</b>	<b>CuM</b>
<b>Item No:-2</b>												
Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38												
<b>In PCC M-100</b>												
<b>Total PCC Work</b>	1	x	6.56	x	4.06	x	0.2			=	4.00	CuM
<b>Item No:-3</b>												
Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)												
<b>In RCC M-250</b>												
RCC Raft for Chamber	1	x	6.26	x	3.76	x	0.2			=	4.71	CuM
<b>Total RCC Work</b>											<b>4.71</b>	<b>CuM</b>
<b>Item No:-4</b>												
Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306) Tor Steel												
<b>Reinforcement @80kg/m3</b>											<b>0.38</b>	<b>MT</b>
<b>Item No:-5</b>												
Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc. complete.												
Long Wall	2	x	5.97	x	0.23	x	0.9			=	2.33	CuM
Short Wall	2	x	3.46	x	0.23	x	0.9			=	1.35	CuM
Short Wall with cavity	1	x	3	x	0.11	x	0.9			=	0.28	CuM

Long Wall for tank	4	x	0.71	x	0.11	x	0.9					0.27	CuM
Short Wall for tank	4	x	0.5	x	0.11	x	0.9					0.19	CuM
Deduction for cavity	3	x	0.2	x	0.23	x	0.2				=	0.03	CuM
<b>Total Brick Masonry Work</b>												<b>4.39</b>	<b>CuM</b>
<b>Item No:-6</b>													
Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1Kilogramper cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.complete.													
Long Wall	2	x	5.97			x	0.9				=	10.15	SqM
Short Wall	2	x	3.46			x	0.9				=	5.88	SqM
Wall with cavity	2	x	3			x	0.9				=	5.10	SqM
Long Wall for tank	4	x	0.71			x	0.9					2.41	SqM
Short Wall for tank	4	x	0.5			x	0.9					1.70	SqM
Deduction for cavity	3	x	0.2			x	0.2				=	0.12	SqM
<b>Total Plastering Work</b>												<b>25.13</b>	<b>SqM</b>
<b>Item No:-7</b>													
Brick Bat Filling													
	1	x	3	x	0.4	x	0.3				=	0.36	CuM
<b>Item No:-8</b>													
Filter media at inelt and outlet zone													
Filter media in tanks (16 - 20 mm)	1	x	0.6	x	0.5	x	0.6				=	0.18	CuM
Filter media at inlet & outlet zones (90-100 mm)	1	x	1.5	x	3	x	0.6				=	2.7	CuM
Filter media at middle zone (16-20 mm)	1	x	3.5	x	3	x	0.6				=	6.3	CuM
Total Filter Media												9.18	CuM
<b>Item No:-9</b>													
Providing and laying perforated PVC 160 mm dia pipe in proper line, level and slope including necessary material fitting etc. complete.													
	5										=	5.00	RM
<b>Item No:-10</b>													
Providing & Supplying HDPE Pipe of 160 mm diametre (Pressure 6 kg / Sq. cm)													
	5										=	5.00	RM
<b>Item No:-11</b>													
<b>TEE at inlet (160mm)</b>													
Total TEE	1											1.00	Nos.
<b>Item No:-12</b>													
<b>Elbow at outlet (160mm)</b>													
Total elbow	1											1.00	Nos.

# HPGF

PLAN & SECTION OF HORIZONTAL PLANTED GRAVEL FILTER



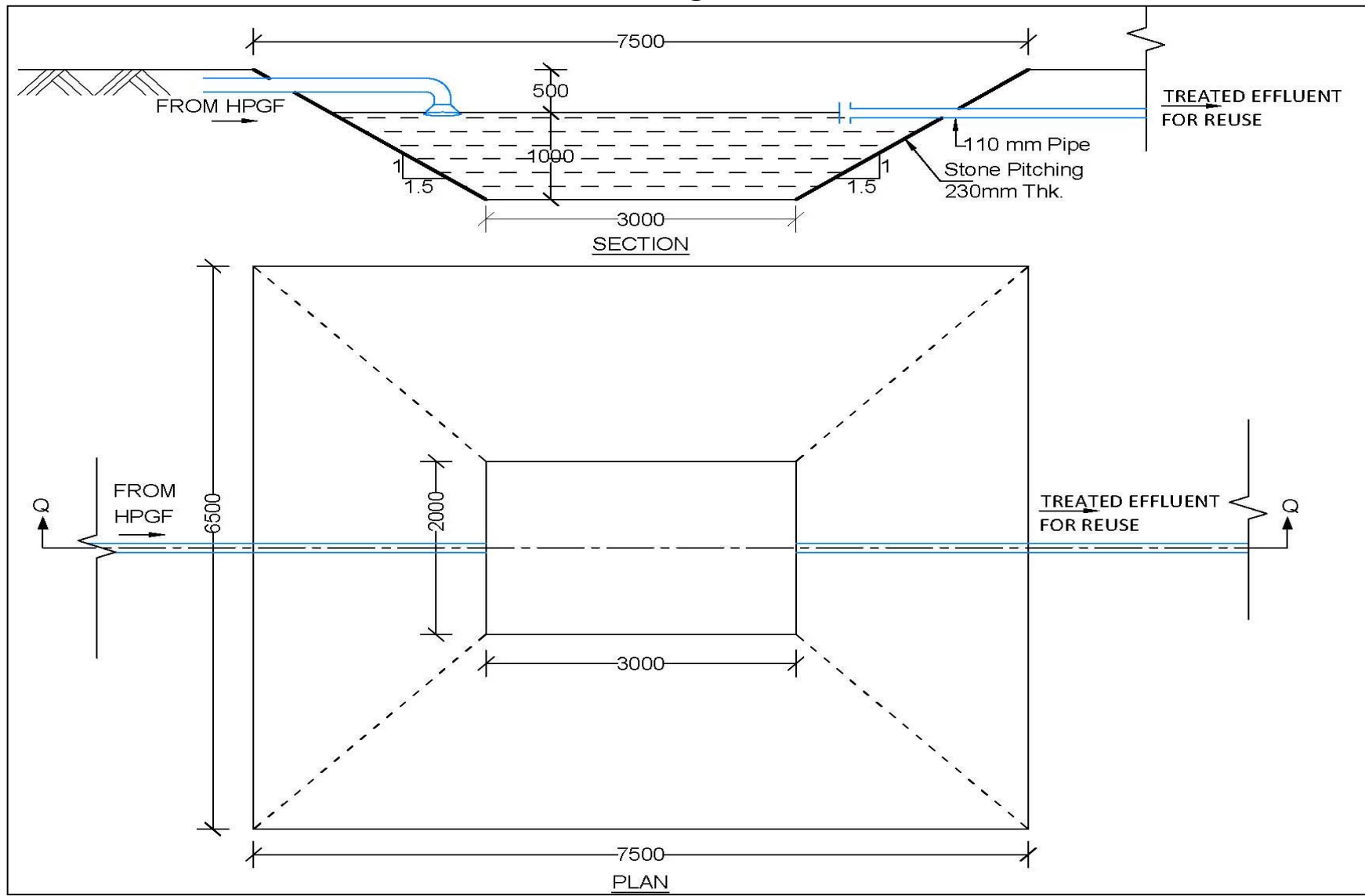
<b>Planted Sludge Drying Beds</b>				
<b>Design Calculations for Polishing Ponds</b>				
Maturation Pond		Planted		
Inflow		2.2	m <sup>3</sup> /day	
say		2.5	m <sup>3</sup> /day	
Retention time		2	days	
Volume of pond required		5	m <sup>3</sup>	
say Depth of pond		1	m	
Area of pond		5		
say Length of pond		<b>3</b>	m	
Width		1.7	m	
say		<b>2</b>		

Name of Work:- CONSTRUCTION OF POLISHING POND					
ABSTRACT for POLISHING POND					
Quantity		Particulars	Rate	Unit	Amount
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
		Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)			
35.93	CuM	Lift 0 to 1.5 M	150	CuM	5388.95
		(MJP SSR 2021-22 P NO 42 I No 1)			
		<b><u>Item No 2. :-</u></b>			
57.00	SqM	Providing dry rubble stone pitching 23 cm (about 9 ) thick including all material, quarry spalls, labour etc. complete.	386.00	SqM	22002.00
		(PWD SSR 2021-22 P NO 25 I No 2.34)			
		<b><u>Item No 3. :-</u></b>			
10.00	RM	Providing & Supplying HDPE Pipe of 160 mm diametre (Pressure 6 kg / Sq. cm)	615.00	RM	6150
		(SSR MJP 2021-22 P NO 113 Sr No 1)			
		<b><u>Item No 4. :-</u></b>			
2.00	Nos.	Providing & Supplying TEE of 160 mm	600.00	Nos.	1200
		Market Rates			
		<b>Total Rs:-</b>			<b>34740.95</b>

<b>MEASUREMENTS FOR CONSTRUCTION OF POLISHING POND</b>												
<b>Particulars</b>	<b>Nos.</b>	<b>L</b>	<b>B</b>	<b>D</b>							<b>Quantity</b>	
1	2	3	4	5							6	
<b>Item No:-1</b>												
Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)												
<b>Volume of Pond = <math>\frac{1}{3} \times (6+48.75+(\sqrt{6 \times 48.75})) \times 1.5 = 35.93</math></b>												
0 -1.5 M										=	35.93	CuM
<b>Total Excavation Quantity 0-1.5 M</b>											<b>35.93</b>	<b>CuM</b>
<b>Item No:-2</b>												
Stone Pitching												
Area of long wall	2	7.5	3	1.5	0.5					=	15.75	SqM
Area of short wall	2	6.5	2	1.5	0.5					=	12.75	SqM
<b>Total Stone Pitching</b>											<b>57</b>	<b>SqM</b>
<b>Item No:-3</b>												
Providing & Supplying HDPE Pipe of 110 mm diametre (Pressure 6 kg / Sq. cm) for internal flow												
	10									=	10.00	RM
<b>Item No:-4</b>												
TEE at inlet and outlets (160mm)												
<b>Total TEE</b>	<b>2</b>										<b>2.00</b>	<b>Nos.</b>



# Polishing Ponds



<b>Unplanted Sludge Drying Beds</b>			
<b>Sr No</b>	<b>Item Description</b>	<b>Quantity</b>	<b>Unit</b>
1	Assumed capacity of treatment plant	8	KLD
2	Assumed capacity of septic tank	4.00	m <sup>3</sup>
3	Permissible sludge layer thickness	200	mm
4	Dimensions of sludge drying bed		
	Length	10	m
	Breadth	4	m
5	Area of the sludge drying bed	40	m <sup>2</sup>
	no. of septic tanks accommodated in single sludge drying bed	2	Nos.
6	Time interval in consecutive fills	12.0	days
7	No. of fills per year	25.0	Nos.
8	No. of septic tanks that can be accommodated in one SDB per year	50.00	Nos.
9	No. of beds in one set ( assumed)	7	beds
10	Detention time	1	year
11	De-sludging frequency of septic tanks	5	years
12	Total number of septic tanks that can be catered in 5 years' time	1400	nos.
13	Population served by the directly by the site	7000	capita

Name of Work:- CONSTRUCTION OF UNPLANTED SLUDGE DRYING BEDS					
Quantity		Particulars	Rate	Unit	Amount
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
2.00	No.	UPDB	1900155.59	No.	3800311.18
		<b><u>Item No 2. :-</u></b>			
1.00	No.	Settler	253968.74	No.	253968.74
		<b><u>Item No 3. :-</u></b>			
1.00	No.	ABR	362406.465	No.	362406.46
		<b><u>Item No 3. :-</u></b>			
1.00	No.	HFBG	113387.83	No.	113387.83
		<b><u>Item No 4. :-</u></b>			
1.00	No.	Polishing Ponds	99136.75	No.	99136.75
		<b>Total Cost of Screen Chamber in Rs:-</b>			<b>4629210.96</b>

Name of Work:- CONSTRUCTION OF UNPLANTED SLUDGE DRYING BEDS					
ABSTRACT for UNPLANTED SLUDGE DRYING BEDS					
Quantity		Particulars	Rate	Unit	Amount
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
		Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)			
356.64	CuM	Lift 0 to 1.5 M	150	CuM	53496.38
		(MJP SSR 2021-22 P NO 42 I No 1)			
		<b><u>Item No 2. :-</u></b>			
		Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38			
52.49	CuM		5185	CuM	272160.65
		<b>In PCC M-100</b>			
		(MJP SSR 2021-22 P NO 49 I No 1)			
		<b><u>Item No 3. :-</u></b>			
		Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)			
50.62	CuM		7206	CuM	364767.72
		In RCC M-250			
		(MJP SSR 2021-22 P NO 49 I No 2)			
		<b><u>Item No 4. :-</u></b>			

4.05	MT	Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pargies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306)	66218	MT	268156.41
		<b>ToR Steel</b>			
		(MJP SSR 2021-22 P NO 52 Sr No 08 b)			
		<b><u>Item No 5. :-</u></b>			
42.04	CuM	Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc. complete.	7407	CuM	311390.28
		(PWD SSR 2021-22 P NO 167 Sr No 888)			
		<b><u>Item No 6. :-</u></b>			
366.75	SqM	Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1 Kilogram per cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc. complete.	599	SqM	219685.65
		(SSR PWD 2020-21 P NO 177 I No 32.04)			
		<b><u>Item No 7. :-</u></b>			
28.00	CuM	Aggregates from size 40-60mm	900	CuM	25200
28.00	CuM	Aggregates from size 16-20mm	900	CuM	25200
28.00	CuM	Aggregates from size 6-8 mm	1343	CuM	37604
84.00	CuM	Sand (1-2mm)	1689	CuM	141876
		(SSR MJP 2021-22 P NO 13 Sr No 50, 46 & 63)			
		<b><u>Item No 8. :-</u></b>			

59.22	RM	HDPE Pipe for inelt & outlet of 160 mm	615	RM	36420.3
17.50	RM	Vent pipe (perforated pipe 160mm)	1090	RM	19075
61.38	RM	Perforated PVC pipe for under drain (160mm)	1090	RM	66904.2
35.00	RM	Outlet pipe (PVC 1600 mm)	414	RM	14490
21.00	Nos.	Elbow 160 mm	600	Nos.	12600
14.00	Nos.	Vent Pipe Cowl	150	Nos.	2100
7.00	Nos.	TEE for sludge inlet	600	Nos.	4200
		<b><u>Item No 9. :-</u></b>			
7.00	Nos.	Providing and fixing reinforced cement concrete cover of size 90 cm x 45 cm with frame over inspection chamber etc. complete. Medium duty (140 Kilogram)	3547	Nos.	24829
		(SSR PWD 2020-21 P NO 235 I No 42.69 )			
		<b>Total Cost of UPDB in Rs:-</b>			<b>1900155.59</b>

**MEASUREMENTS FOR CONSTRUCTION OF UNPLANTED SLUDGE DRYING BEDS**

Particulars	Nos.	L	B	D						Quantity	
1	2	3	4	5						6	
<b>Item No:-1</b>											
Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)											
<b>0 -1.5 M</b>											
For Beds	1	x	32.81	x	11.89	x	0.9		=	351.10	CuM
For Outlet Chamber	7	x	0.83	x	1.06	x	0.9		=	5.54	CuM
<b>Total Excavation Quantity 0-1.5 M</b>										<b>356.64</b>	<b>CuM</b>
<b>Item No:-2</b>											
Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38											
<b>In PCC M-100</b>											
For Beds	1	x	30.44	x	11.29	x	0.15		=	51.56	CuM
For outlet Chamber	7	x	0.83	x	1.06	x	0.15		=	0.93	CuM
<b>Total PCC Quantity</b>										<b>52.49</b>	<b>CuM</b>
<b>Item No:-3</b>											
Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)											
<b>In RCC M-250</b>											
RCC for Beds	1	x	30.14	x	10.99	x	0.15		=	49.69	CuM
RCC for Outlet Chamber	7	x	0.83	x	1.06	x	0.15		=	0.93	CuM
<b>Total RCC Work</b>										<b>50.62</b>	<b>CuM</b>
<b>Item No:-4</b>											
Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations,slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306) ToR Steel											
<b>Reinforcement @80kg/m3</b>										<b>4.05</b>	<b>MT</b>

**Item No:-5**

Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc.complete.

Long Wall	2	x	29.84	x	0.23	x	1.1			=	15.10	
Short Wall	8	x	10.23	x	0.23	x	1.1			=	20.71	
Central Wall	1	x	29.38	x	0.23	x	0.75			=	5.07	
Chamber Brickwork	7	x	0.6	x	0.23	x	0.6			=	0.58	
	7	x	0.6	x	0.23	x	0.6				0.58	
Total Brick Masonry Work											42.04	CuM

**Item No:-6**

Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1Kilogramper cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.complete.

Long Wall	4	x	29.84			x	1.1			=	131.30	SqM
Short Wall	16	x	10.23			x	1.1			=	180.05	SqM
Central Wall	2	x	29.38			x	0.75			=	44.07	SqM
Chmaber Brickwork	14	x	0.6			x	0.75			=	6.30	SqM
	14	x	0.6			x	0.6			=	5.04	SqM
Total Plastering Work											366.75	SqM

**Item No:-7**

Aggregates from size 50-70mm	14	x	4	x	5	x	0.1			=	28.00	CuM
Aggregates from size 10-12mm	14	x	4	x	5	x	0.1			=	28.00	CuM
Aggregates from size 6-8mm	14	x	4	x	5	x	0.1			=	28.00	CuM
Sand (1-2mm)	14	x	4	x	5	x	0.3			=	84.00	CuM

**Item No:-8**

Providing & Supplying various Pipes

HDPE Pipe for inelt & outlet of 160 mm	7	x	8.46							=	59.22	RM
Vent pipe (perforated pipe 160mm)	14	x	1.25								17.50	RM
Perforated PVC pipe for under drain (160mm)	6	x	10.23								61.38	RM
Outlet pipe	7	x	5.00								35.00	RM
Elbow 160 mm	21										21.00	Nos.
Vent Pipe Cowl	14										14.00	Nos.
TEE for sludge inlet	7										7.00	Nos.

**Item No:-9**

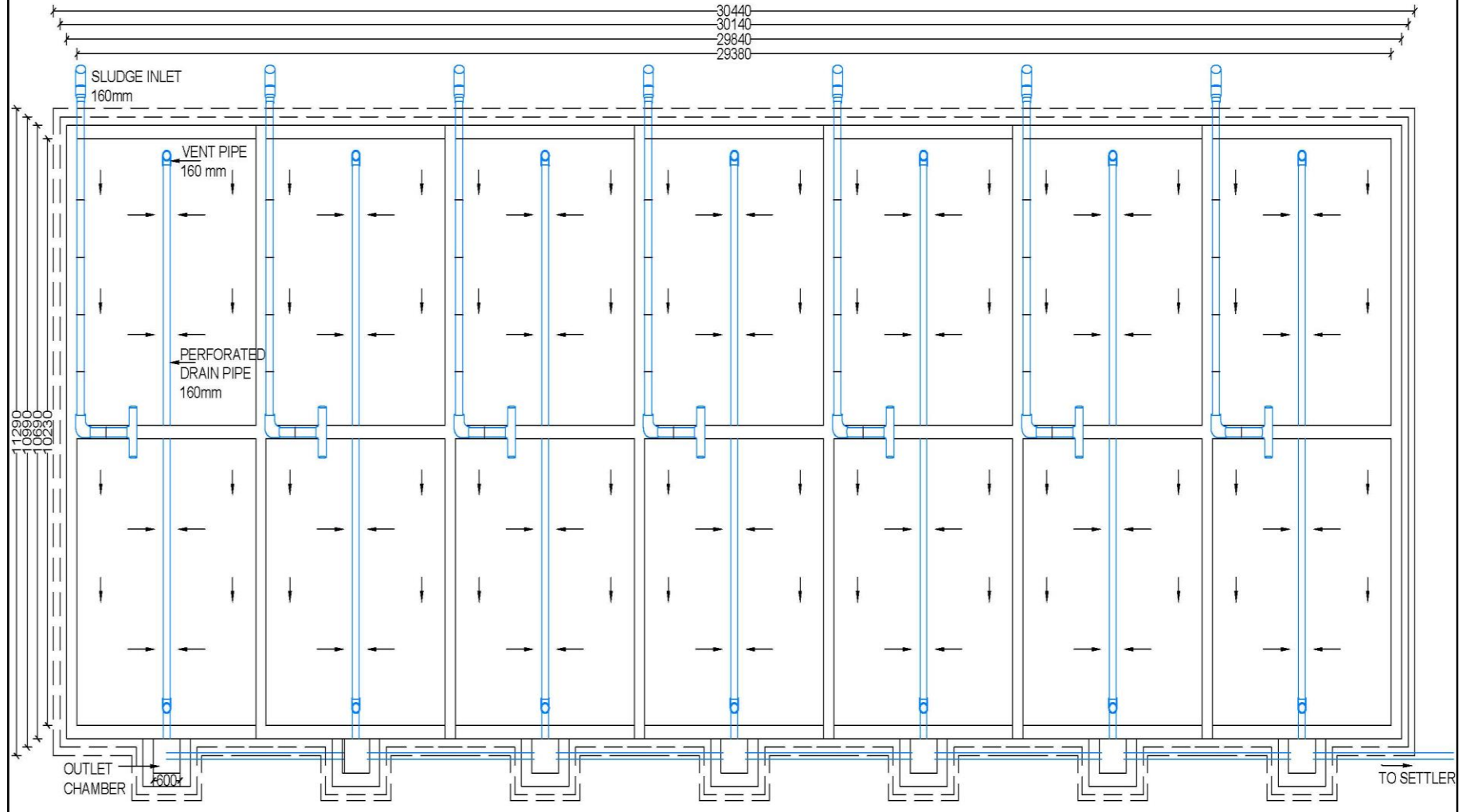
Providing and fixing reinforced cement concrete cover of size 90 cm x 45 cm with frame over inspection chamber etc. complete. Medium duty (140 Kilogram)

	7									=	7.00	Nos.
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# Unplanted Sludge Drying Bed

PLAN OF UNPLANTED SLUDGE DRYING BED



<b>Unplanted Sludge Drying Beds</b>			
<b>Design Calculations for Settler</b>			
	<b>Design Flow</b>	<b>5.2</b>	<b>m3/day</b>
	say	<b>5.5</b>	<b>m3/day</b>
		0.3	m3/hr
	HRT	1.5-2	hrs
	Say	2	hrs
	SRT (assumed)	21	months
	BOD	6,480	
	COD	31,900	
	COD/BOD	4.93	
	TSS	34,106	
	Factor removal to HRT	0.35	
	ss/COD ratio	0.25	
	Surface Load factor	0.6	
	COD removal rate	0.15	
	COD out	27115	
	Factor of Efficiency ratio of BOD removal to COD removal	1.06	
	BOD removal rate	0.159	
	BOD out	5450	
	<b>Water depth at outlet</b>	<b>2</b>	<b>m</b>
	Sludge and storage volume		
	reduction of sludge volume during storage	0.706	
	Sludge volume (l/g BOD removed)	0.005	
	Sludge volume per BOD removal	0.00353	
	reduction in BOD	1,030	
	Sludge volume from BOD reduction	0.00515	
	Sludge volume	16.88	
1	Settler volume		
	Water volume	0.6	
	Water volume + sludge volume	17.48	
	Settler surface area	8.74	
	Ht of scum	0.2	
	Scum volume	1.748	
	Total volume of settler	19.228	
2	Size of chamber		

Widht of chamber assumed	2.5	
<b>Length of 1st chamber</b>	<b>2.57</b>	
say	<b>2.75</b>	
<b>Length of 2nd chamber</b>	<b>1.375</b>	
Say	<b>1.4</b>	
Surface area of the settler	10.375	
Volume of settler	20.75	

The design criteria as per thumb rule mentioned in the FSM manual by Gol and consultation with field experts

Name of Work:- CONSTRUCTION OF SETTLER FOR USDB					
ABSTRACT for SETTLER FOR USDB					
Quantity		Particulars	Rate	Unit	Amount
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
		Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)			
37.69	CuM	Lift 0 to 1.5 M	150	CuM	5653.44
34.67	CuM	Lift 1.5 to 3.0 M	164	CuM	5686.61
		(MJP SSR 2021-22 P NO 42 I No 1)			
		<b><u>Item No 2. :-</u></b>			
		Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B-7, Page No. 38			
2.91	CuM		5185.00	CuM	15088.35
		<b>In PCC M-100</b>			
		(MJP SSR 2021-22 P NO 49 I No 1)			
		<b><u>Item No 3. :-</u></b>			
		Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)			
3.86	CuM		7206.00	CuM	27815.16
		In RCC M-250			
		(MJP SSR 2021-22 P NO 49 I No 2)			

		<b><u>Item No 4. :-</u></b>			
2.40	Nos.	Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)	8046.00	Nos.	19310.40
		In RCC M-150			
		(MJP SSR 2021-22 P NO 49 I No 5)			
		<b><u>Item No 5. :-</u></b>			
0.50	MT	Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306)	66218.00	MT	33161.97
		<b>ToR Steel</b>			
		(MJP SSR 2021-22 P NO 52 Sr No 08 b)			
		<b><u>Item No 6. :-</u></b>			
11.09	CuM	Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc. complete.	7407.00	CuM	82143.63
		(PWD SSR 2021-22 P NO 167 Sr No 888)			

		<b><u>Item No 7. :-</u></b>			
96.43	SqM	Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1Kilogramper cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.complete.	599.00	SqM	57759.17
		(SSR PWD 2020-21 P NO 177 I No 32.04)			
		<b><u>Item No 8. :-</u></b>			
10.00	RM	Providing & Supplying HDPE Pipe of 160 mm diametre (Pressure 6 kg / Sq. cm)	615.00	RM	6150
		(SSR PWD 2020-21 P NO 113 Sr No 1.A. vii)			
		<b><u>Item No 9. :-</u></b>			
2.00	Nos.	Providing & Supplying TEE of 160 mm at inlet & outlet	600.00	Nos.	1200
		Market Rates			
<b>Total Cost of 1 Settler in Rs:-</b>					<b>253968.74</b>

<b>MEASUREMENTS FOR CONSTRUCTION OF SETTLER FOR USDB</b>													
<b>Particulars</b>	<b>Nos.</b>	<b>L</b>	<b>B</b>	<b>D</b>							<b>Quantity</b>		
1	2	3	4	5							6		
<b>Item No:-1</b>													
Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)													
0-1.5 M	1	x	6.04	x	4.16	x	1.5				=	37.69	CuM
1.5-3 M	1	x	6.04	x	4.16	x	1.38				=	34.67	CuM
Total Excavation Quantity 0-1.5 M												37.69	CuM
Total Excavation Quantity 1.5-3 M												34.67	CuM
<b>Item No:-2</b>													
Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38													
<b>In PCC M-100</b>													
<b>Total PCC Work</b>	1	x	5.44	x	3.56	x	0.15				=	2.91	CuM
<b>Item No:-3</b>													
Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)													
<b>In RCC M-250</b>													
RCC Raft for Chamber 1	1	x	5.14	x	3.26	x	0.23				=	3.86	CuM
<b>Total RCC Work</b>												<b>3.86</b>	<b>CuM</b>
<b>Item No:-4</b>													
Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works in <b>Slabs / Landings / Vertical Walls / Waist Slabs / Steps</b> for Staircase as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)													
<b>In RCC M-150</b>													
Top Slab RCC	1	x	4.84	x	2.96	x	0.15				=	2.15	CuM
RCC Cover	2	x	0.9	x	0.9	x	0.15				=	0.25	CuM
<b>Total RCC Work</b>												<b>2.40</b>	<b>CuM</b>
<b>Item No:-5</b>													

Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306) ToR Steel

<b>Reinforcement @80kg/m3</b>												<b>0.50</b>	<b>MT</b>
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**Item No:-6**

Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc. complete.

Long Wall	2	x	4.84	x	0.23	x	2.85			=	6.35	
Short Wall	2	x	2.5	x	0.23	x	2.85			=	3.28	
Wall with cavity	1	x	2.5	x	0.23	x	2.85			=	1.64	
Cavity	1	x	1.5	x	0.23	x	0.5			=	0.18	
<b>Total Brick Masonry Work</b>											<b>11.09</b>	<b>CuM</b>

**Item No:-7**

Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1Kilogramper cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc. complete.

Long Wall	4	x	4.84			x	2.85			=	55.18	SqM
Short Wall	4	x	2.5			x	2.85			=	28.50	SqM
Wall with cavity	2	x	2.5			x	2.85			=	14.25	SqM
Deduction of cavity	2	x	1.5			x	0.5			=	1.50	SqM
<b>Total Plastering Work</b>											<b>96.43</b>	<b>SqM</b>

**Item No:-8**

Providing & Supplying HDPE Pipe of 160 mm diametre (Pressure 6 kg / Sq. cm)

	10									=	<b>10.00</b>	<b>RM</b>
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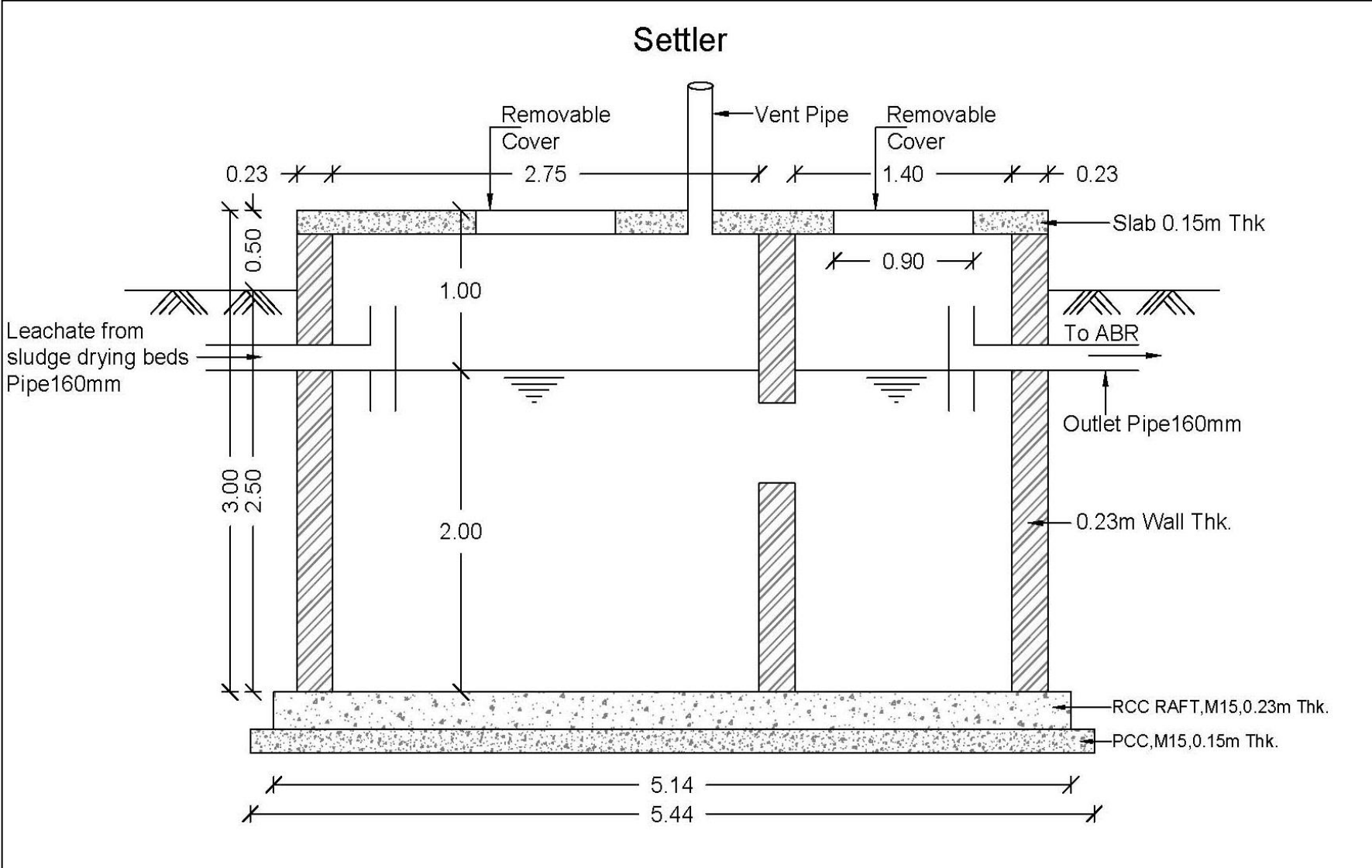
**Item No:-9**

**TEE at inlet and outlets (160mm)**

<b>Total TEE</b>	<b>2</b>										<b>2.00</b>	<b>Nos.</b>
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# SETTLER FOR USDB



<b>Unplanted Sludge Drying Beds</b>		
<b>Design Calculations for Anaerobic Baffled Reactor</b>		
<b>Inflow</b>	<b>5.2</b>	<b>m3/day</b>
<b>say</b>	<b>5.5</b>	<b>m3/day</b>
	<b>0.3</b>	<b>m3/hr</b>
Area required	3.7	m2
W/L	1.5-2	
say	1.5	
<b>length</b>	<b>1.6</b>	
<b>Width</b>	<b>2.4</b>	
total surface area of chamber	3.84	
<b>Say, depth of tank</b>	<b>2</b>	
volume of 1chamber	7.68	m3
say, SRTof digestion chamber	5	days
total volume of digestion chamber	27.5	
<b>No. of chambers required for digestion</b>	<b>4</b>	
area required for digestion chamber	15.36	m2

The design criteria as per thumb rule mentioned in the FSM manual by Gol and consultation with field experts

Name of Work:- CONSTRUCTION OF ABR					
ABSTRACT for ABR					
Quantity		Particulars	Rate	Unit	Amount
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
		Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)			
45.63	CuM	Lift 0 to 1.5 M	150	CuM	6844.14
35.29	CuM	Lift 1.5 to 3.0 M	164	CuM	5786.80
		(MJP SSR 2021-22 P NO 42 I No 1)			
		<b><u>Item No 2. :-</u></b>			
		Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38 a)			
4.05	CuM	In PCC M-100	5185	CuM	20999.25
		(MJP SSR 2021-22 P NO 49 I No 1)			
		<b><u>Item No 3. :-</u></b>			
		Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.)			
5.45	CuM	(Excluding M.S. or Tor reinforcement)	7206	CuM	39272.70
		In RCC M-250			
		(MJP SSR 2021-22 P NO 49 I No 2)			
		<b><u>Item No 4. :-</u></b>			

		Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)			
2.60	Nos.		8046	Nos.	20919.60
		In RCC M-150			
		(MJP SSR 2021-22 P NO 49 I No 5)			
		<b>Item No 5. :-</b>			
		Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardies, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306)			
0.64	MT		66218	MT	42644.39
		ToR Steel			
		(MJP SSR 2021-22 P NO 52 Sr No 08 b)			
		<b>Item No 6. :-</b>			
		Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc. complete.			
15.27	CuM		7407	CuM	113104.89
		(MJP SSR 2021-22 P NO 167 Sr No 888)			
		<b>Item No 7. :-</b>			

151.46	SqM	Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1Kilogramper cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.complete.	599	SqM	90726.70
		(SSR PWD 2020-21 P NO 177 I No 32.11)			
		<b><u>Item No 8. :-</u></b>			
8.00	RM	Providing & Supplying HDPE Pipe of 110 mm diametre (Pressure 6 kg / Sq. cm)	615	RM	4920
		(SSR MJP 2021-22 P NO 113 Sr No 1.A. vii)			
		<b><u>Item No 9. :-</u></b>			
5.00	Nos.	Providing & Supplying TEE of 160 mm	600	Nos.	3000
		Market Rates			
		<b><u>Item No 10. :-</u></b>			
4.00	Nos.	Providing and fixing reinforced cement concrete cover of size 90 cm x 45 cm with frame over inspection chamber etc. complete. Medium duty (140 Kilogram)	3547	Nos.	14188
		(SSR PWD 2020-21 P NO 235 I No 42.69 )			
<b>Total Cost ABR in Rs:-</b>					<b>362406.46</b>

MEASUREMENTS FOR CONSTRUCTION OF ABR-AF												
Particulars	Nos.	L	B	D							Quantity	
1	2	3	4	5							6	
<b>Item No:-1</b>												
Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)												
0 -1.5 M	1	x	8.09	x	3.76	x	1.5			=	45.63	CuM
1.5-3 M	1	x	8.09	x	3.76	x	1.16			=	35.29	CuM
<b>Total Excavation Quantity 0-1.5 M</b>											<b>45.63</b>	<b>CuM</b>
<b>Total Excavation Quantity 1.5-3 M</b>											<b>35.29</b>	<b>CuM</b>
<b>Item No:-2</b>												
Providing and laying in situ Cement Concrete M-15 of trap/ granite / quartzite / gneiss metal for foundation and bedding including bailing out water, form work, compaction, curing, etc. complete. (Cement 5.90 bags / cum) Spec. No. - Bd E /1 Page No. 287 and B- 7, Page No. 38 a) In PCC M-100												
<b>Total PCC Work</b>	1	x	7.79	x	3.46	x	0.15			=	4.05	CuM
<b>Item No:-3</b>												
Providing and laying in situ Cement Concrete of trap/ granite / quartzite / gneiss metal for RCC work in foundation like raft, grillage, strip foundation and footing of RCC columns and steel stanchions including normal dewatering, form work, compaction, finishing and curing, etc. complete. (By weigh batching and mix design for M250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)												
<b>In RCC M-250</b>												
Raft RCC	1	x	7.49	x	3.16	x	0.23			=	5.45	CuM
<b>Total RCC Work</b>											<b>5.45</b>	<b>CuM</b>
<b>Item No:-4</b>												
Providing and casting in situ C.C. of trap / granite/ quartzite / gneiss metal of approved quality for RCC works in <b>Slabs / Landings / Vertical Walls / Waist Slabs / Steps</b> for Staircase as per detailed drawings and designs or as directed by Engineer-in-charge including normal dewatering, centering, form work, compaction, finishing the formed surfaces with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface wherever necessary or roughening if special finish is to be provided and curing, etc. complete. (By weigh batching and mix design for M-250 and M-300 only. Use of L&T, A.C.C., Ambuja, Birla Gold, Manikgad, Rajashree, etc. cement is permitted.) (Excluding M.S. or Tor reinforcement)												
<b>In RCC M-150</b>												
Top Slab RCC	1	x	7.19	x	2.86	x	0.15			=	3.09	CuM
Deduction of RCC Cover	4	x	0.9	x	0.9	x	0.15			=	0.49	CuM
<b>Total RCC Work</b>											<b>2.60</b>	<b>CuM</b>

**Item No:-5**

Providing and fixing in position steel bar reinforcement of various diameters for RCC piles, caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardiess, copings, fins, arches, etc. as per detailed designs, drawings and schedules; including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required, etc. complete (including cost of binding wire). (Bd-F 17/306) Mild Steel

<b>Reinforcement @80kg/m3</b>																		<b>0.64</b>	<b>MT</b>
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**Item No:-6**

Providing first class Burnt Brick masonry with conventional / I.S. type bricks in cement mortar 1:4 including scaffolding, racking out joints pointing in C.M. 1:3 and watering in pillars of rectangular or square shape as shown on the drawing or as directed etc.complete.

Long Wall	2	x	7.19	x	0.23	x	3.01				=	9.96	
Short Wall	2	x	2.4	x	0.23	x	3.01				=	3.33	
Baffle walls	3	x	2.4	x	0.11	x	2.5				=	1.98	
<b>Total Brick Masonry Work</b>												<b>15.27</b>	<b>CuM</b>

**Item No:-7**

Providing sand faced plaster externally in cement mortar using approved screened sand, in all positions including base coat of 15 mm thick in cement mortar 1:4 using waterproofing compound at 1Kilogramper cement bag curing the same for not less than 2 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in cement mortar 1:4 finishing the surface by taking out grains and curing for fourteen days scaffolding etc.complete.

Long Wall	4	x	7.19			x	3.01				=	86.57	SqM
Short Wall	4	x	2.4			x	3.01				=	28.90	SqM
Baffle walls	6	x	2.4			x	2.5				=	36.00	SqM
												151.46	SqM

**Item No:-8**

Providing & Supplying HDPE Pipe of 160 mm diametre (Pressure 6 kg / Sq. cm) for internal flow

	4	x	2.00									=	<b>8.00</b>	<b>RM</b>
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**Item No:-9**

**TEE at inlet and outlets (160mm)**

<b>Total TEEs</b>	<b>5</b>												<b>5.00</b>	<b>Nos.</b>
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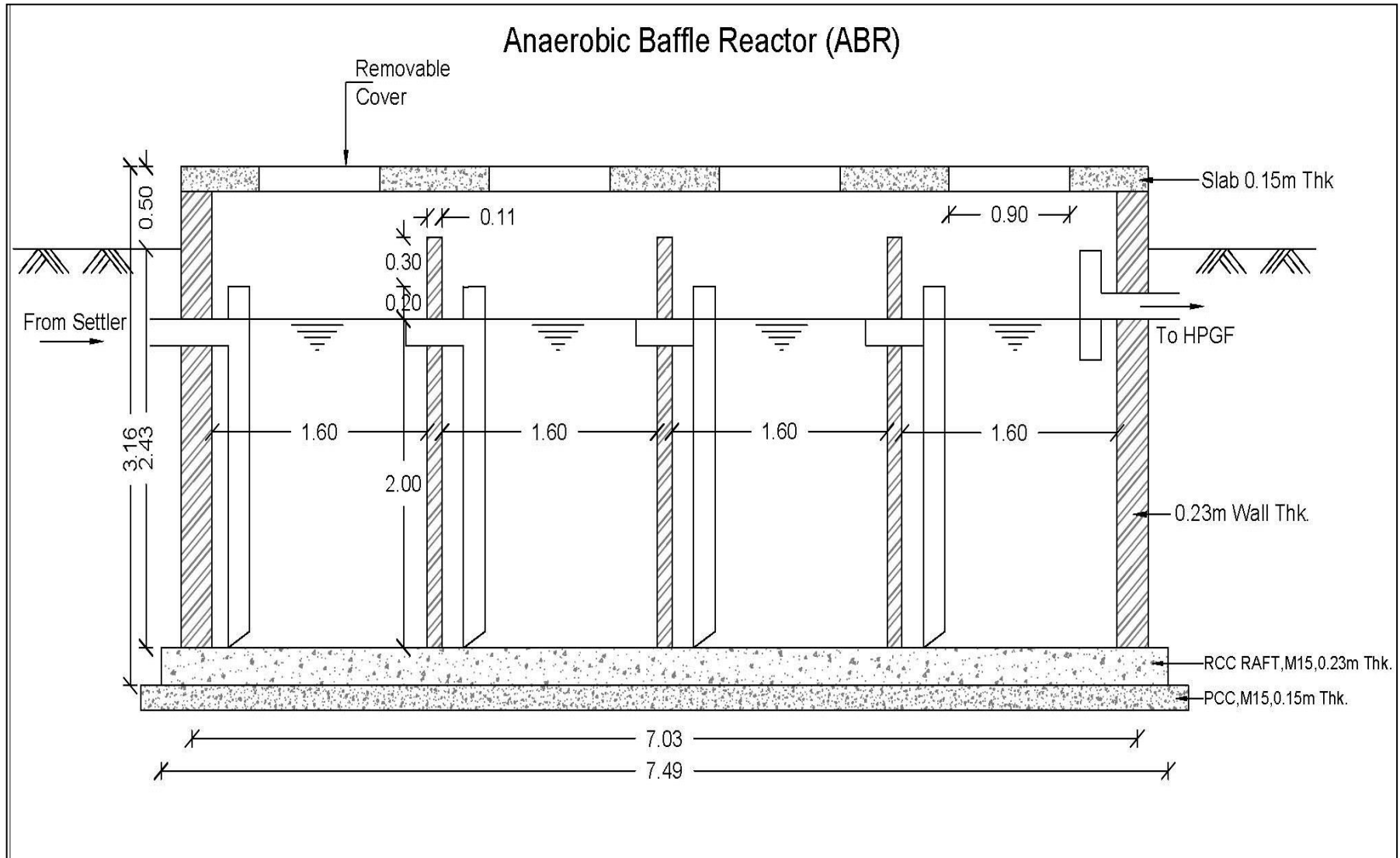
**Item No:-10**

Providing and fixing reinforced cement concrete cover of size 90 cm x 45 cm with frame over inspection chamber etc. complete. Medium duty (140 Kilogram)

	4												=	<b>4.00</b>	<b>Nos.</b>
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# ABR

## Anaerobic Baffle Reactor (ABR)





<b>Unplanted Sludge Drying Beds</b>		
<b>Design Calculations for Horizontal Planted Gravel Filter (HPGF)</b>		
<b>Inflow</b>	<b>5.2</b>	<b>m<sup>3</sup>/day</b>
say	5.5	m <sup>3</sup> /day
<b>depth at inlet</b>	<b>0.6</b>	
Hydraulic loading rate	30	m <sup>3</sup> /m <sup>2</sup> /day
Organic loading at surface	10	g/m <sup>2</sup>
Organic loading at cross section	150	g/m <sup>2</sup>
Area required	0.2	m <sup>2</sup>
Say BOD at Inlet	100	mg/l
total organic load	550	gm/day
Surface area required	55	m <sup>2</sup>
Cross sectional area required	3.7	m <sup>2</sup>
<b>Length of pond</b>	<b>6.2</b>	<b>m</b>
say	6.5	
<b>Width of pond</b>	<b>8.5</b>	<b>m</b>
<b>effective Pond dimensions</b>	<b>8.5x6.5x0.6</b>	

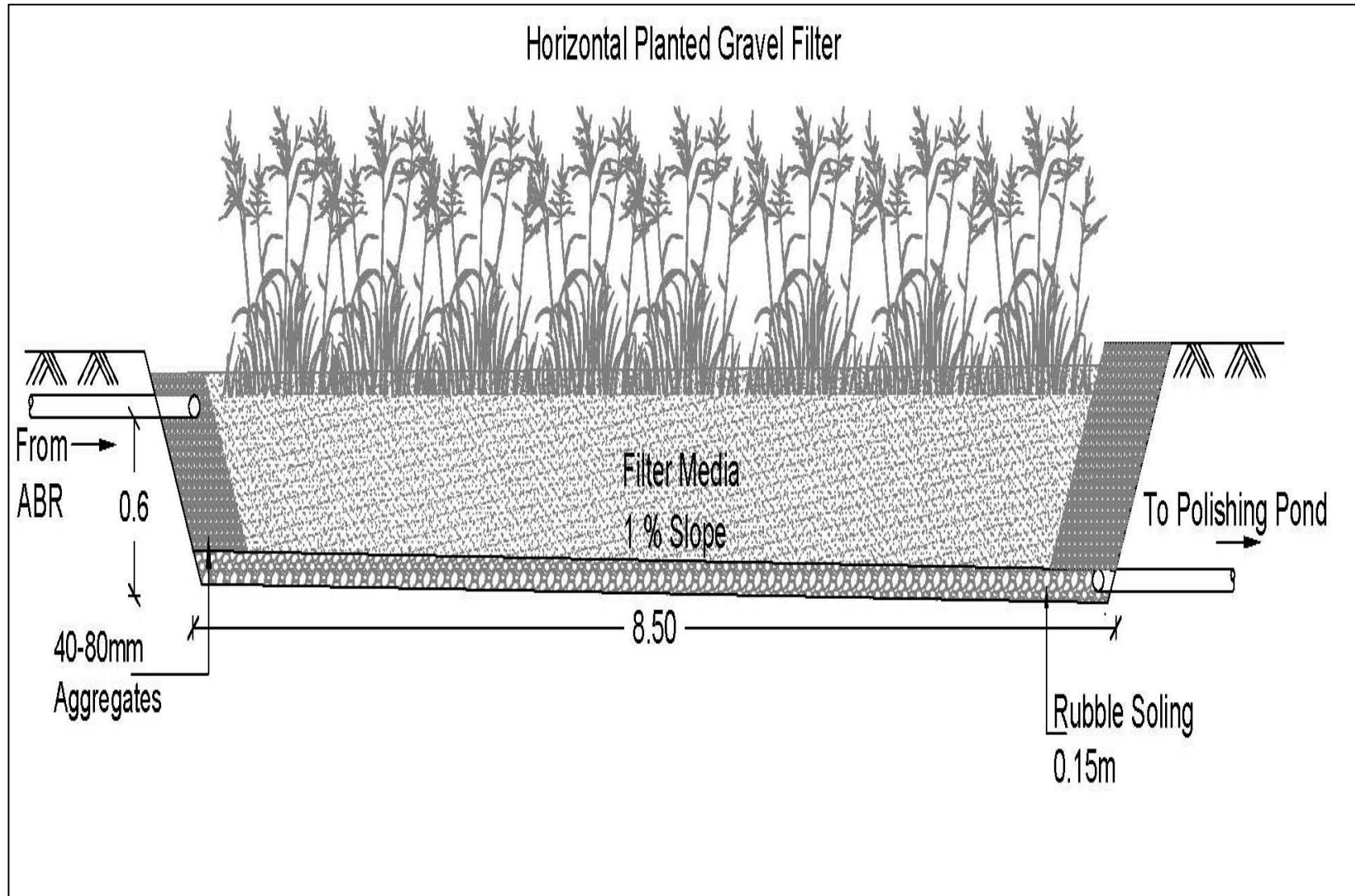
The design criteria as per thumb rule mentioned in the FSM manual by Gol and consultation with field experts

Name of Work:- CONSTRUCTION OF HPGF					
ABSTRACT for HPGF					
Quantity		Particulars	Rate	Unit	Amount
1	2	3	4	5	6
		<b><u>Item No 1. :-</u></b>			
		Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)			
71.25	CuM	Lift 0 to 1.5 M	150	CuM	10687.50
		(MJP SSR 2021-22 P NO 42 I No 1)			
		<b><u>Item No 2. :-</u></b>			
		Providing dry trap/ granite/ quartzite/ gneiss, rubble stone soling in 15 cm to 20 cm thick layers including hand packing and compacting, etc. complete. (Bd-A-12/264)			
8.29	CuM		1175	CuM	9740.75
		(MJP SSR 2021-22 P No 46 No 18)			
		<b><u>Item No 3. :-</u></b>			
4.28	CuM	Filter media at inlet and outlet zone	900	CuM	3852
		MJP SSR 2021-22 P No 13 Sr No 49			
		<b><u>Item No 4. :-</u></b>			
64.06	CuM	Sand media	1343	CuM	86032.58
		MJP SSR 2021-22 P No 13 Sr No 63			
		<b><u>Item No 5. :-</u></b>			
5.00	RM	Providing & Supplying HDPE Pipe of 110 mm diametre (Pressure 6 kg / Sq. cm)	615	RM	3075
		(SSR MJP 2021-22 P NO 113 Sr No 1.A. vii)			
		<b>Total Cost of HPGF in Rs:-</b>			<b>113387.83</b>

MEASUREMENTS FOR CONSTRUCTION OF HPGF													
Particulars	Nos.		L		B		D					Quantity	
1	2		3		4		5					6	
<b>Item No:-1</b>													
Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)													
0 -1.5 M	1	x	9.5	x	7.5	x	1				=	71.25	CuM
<b>Total Excavation Quantity 0-1.5 M</b>												<b>71.25</b>	<b>CuM</b>
<b>Item No:-2</b>													
Providing dry trap/ granite/ quartzite/ gneiss, rubble stone soling in 15 cm to 20 cm thick layers including hand packing and compacting, etc. complete. (Bd-A-12/264)													
<b>Total Rubble soiling</b>	1	x	8.5	x	6.5	x	0.2				=	<b>8.29</b>	<b>CuM</b>
<b>Item No:-3</b>													
Filter media at inlet and outlet zone													
Aggregate at inlet and outlet zone (40-80mm)	2	x	9.5	x	0.3	x	0.8				=	<b>4.28</b>	<b>CuM</b>
<b>Item No:-4</b>													
Sand media													
												<b>64.06</b>	<b>CuM</b>
<b>Item No:-5</b>													
Providing & Supplying HDPE Pipe of 160 mm diameter (Pressure 6 kg / Sq. cm) for internal flow													
	1	x	5.00								=	<b>5.00</b>	<b>RM</b>

# HPGF

## Horizontal Planted Gravel Filter



<b>Unplanted Sludge Drying Beds</b>		
<b>Design Calculations for Polishing Pond</b>		
<b>Inflow</b>	<b>5.2</b>	<b>m3/day</b>
<b>say</b>	<b>5.5</b>	<b>m3/day</b>
Retention time	2	days
Volume of pond required	11	m3
<b>say Depth of pond</b>	<b>1</b>	<b>m</b>
Area of pond	11	
<b>say Length of pond</b>	<b>2.5</b>	<b>m</b>
<b>Width</b>	<b>4.4</b>	<b>m</b>

The design criteria as per thumb rule mentioned in the FSM manual by Gol and consultation with field experts

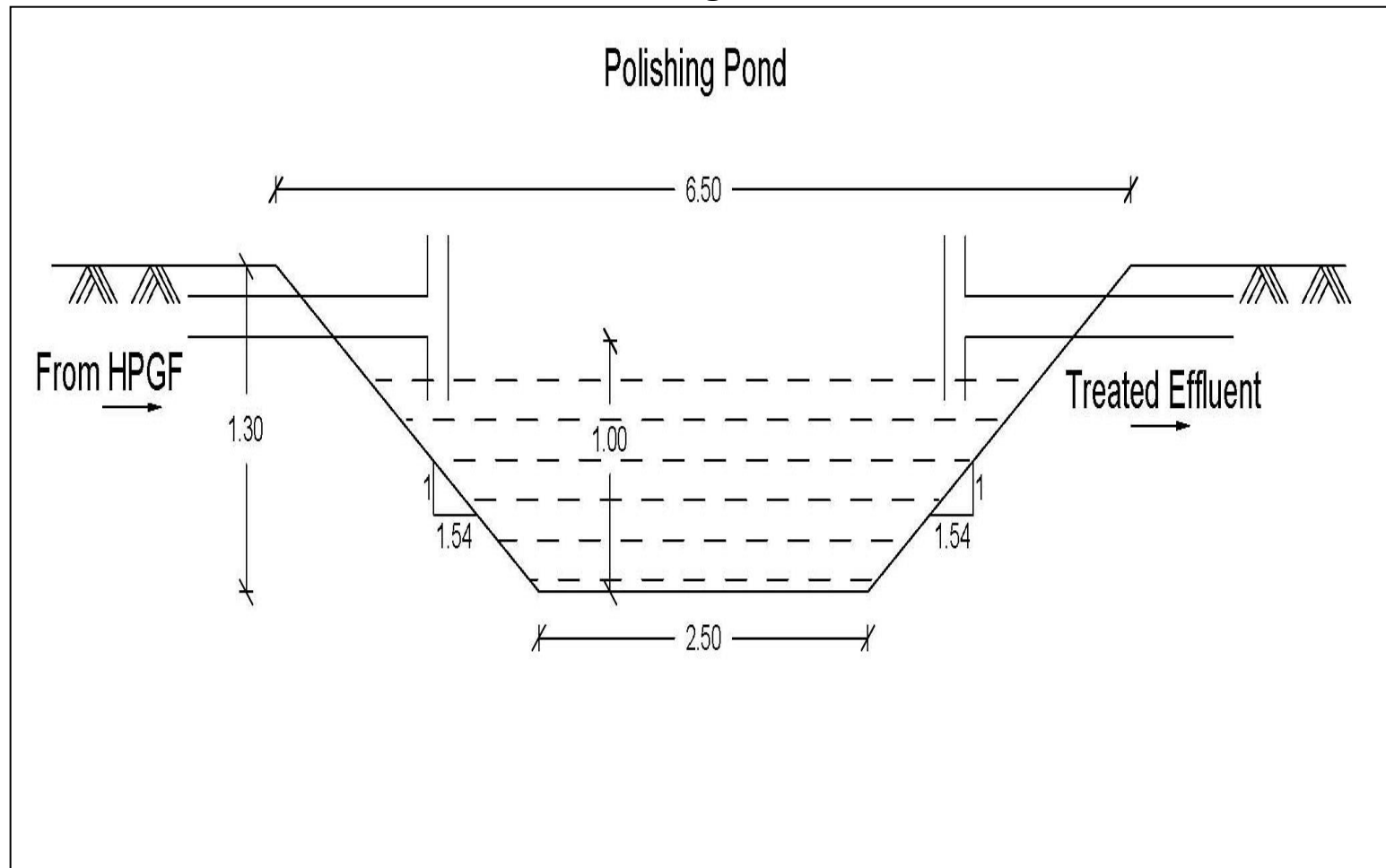
## Name of Work:- CONSTRUCTION OF POLISHING POND

### ABSTRACT

Quantity		Particulars	Rate	Unit	Amount
1	2				
		<b><u>Item No 1. :-</u></b>			
		Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)			
496.13	CuM	Lift 0 to 1.5 M	150	CuM	74418.75
		(MJP SSR 2021-22 P NO 42 I No 1)			
		<b><u>Item No 2. :-</u></b>			
		Providing dry rubble stone pitching 23 cm (about 9 ) thick including all material, quarry spalls, labour etc. complete.			
52.00	SqM		334.00	SqM	17368.00
		(PWD SSR 2020-21 P NO 29 I No 2.34)			
		<b><u>Item No 3. :-</u></b>			
		Providing & Supplying HDPE Pipe of 160 mm diametre (Pressure 6 kg / Sq. cm)			
10.00	RM		615.00	RM	6150
		(SSR MJP 2021-22 P NO 113 Sr No 1)			
		<b><u>Item No 4. :-</u></b>			
		Providing & Supplying TEE of 160 mm			
2.00	Nos.		600.00	Nos.	1200
		Market Rates			
<b>Total Rs:-</b>					<b>99136.75</b>

MEASUREMENTS FOR CONSTRUCTION OF POLISHING POND													
Particulars	Nos.	L	B	D								Quantity	
1	2	3	4	5								6	
<b>Item No:-1</b>													
Excavation for foundation / pipe trenches in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50 metres and lifts as below, stacking and spreading as directed, normal dewatering, preparing the bed for foundation and excluding backfilling, etc. complete. (Bd-A 1/259)													
0 -1.5 M	1	x	6.5	x	7.5	x	1.3				=	63.38	CuM
<b>Total Excavation Quantity 0-1.5 M</b>												<b>63.38</b>	<b>CuM</b>
<b>Item No:-2</b>													
Stone Pitching													
Area of long wall	2	x	7.5	+	3.5	x	1.3	x	0.5		=	14.3	CuM
Area of short wall	2	x	6.5	+	2.5	x	1.3	x	0.5		=	11.7	CuM
<b>Total Stone Pitching</b>												<b>52</b>	<b>CuM</b>
<b>Item No:-3</b>													
Providing & Supplying HDPE Pipe of 110 mm diametre (Pressure 6 kg / Sq. cm) for internal flow													
	10										=	10.00	RM
<b>Item No:-4</b>													
<b>TEE at inlet and outlets (160mm)</b>													
<b>Total TEE</b>	<b>2</b>											<b>2.00</b>	<b>Nos.</b>

## Polishing Ponds





### **Tiger Bio Filter (TBF) Technology Based Faecal Sludge Treatment Plant (FSTP)**

Designing, providing, constructing, installation, commissioning and giving satisfactory trials of Faecal Sludge Treatment Plant (FSTP) based on Tiger Bio Filter (TBF) technology consisting of RCC Screen Chamber (including manual screen), RCC Sludge Storage Tank (including manholes, ASR feed pumps), RCC Anaerobic Stabilization Reactor (including manholes, bacterial culture), RCC Liquid Storage Tank I (including manholes, TBF I feed pumps), RCC subbase and IInd class BBM Masonry Tiger Bio Filter bed with shed (including specially designed layered and zoned TBF biomedica and culture, filter media consisting gravel of suitable size), RCC Liquid storage Tank II (including manholes, TBF II feed pumps), RCC subbase and II<sup>nd</sup> class BBM Masonry/Zinc Aluminum Tiger Bio Filter Bed/ Tank with shed (including specially designed crates/containers for TBF bio media and culture, filter media consisting gravel of suitable size), Tertiary Treatment Units such as RCC Filter Feed Tank (including manholes, Filter feed pumps), Pressure Sand Filter, Activated Carbon Filter, Sodium hypo-chlorite dosing (including pump and tank), RCC treated water tank (including manholes, treated water pumps) with necessary piping arrangement and electromechanical work with required valves, gates, drains, control panel room, control panel, cabling, tools and plants, spare Parts, etc. with required allied works including compound wall and internal roads, area lightening and site investigation complete as turnkey job with all involved civil, electrical, mechanical, plumbing and transportation works etc. complete.

**Other Technological details are given in**

**Booklet 2**

#### **PRICE SCHEDULE**

<b>Sr. No.</b>	<b>Capacity of plant in KLD</b>	<b>Area Requirement in Sqm</b>	<b>Rate (Complete)</b>
1	5	220	87,34,230.00
2	10	324	1,11,94,875.00
3	15	396	1,33,32,078.00
4	20	486	1,55,78,183.00