



:: Name of Work ::

**Construction of STP, Pond development
and CD work in KSU main campus at
shilaj.**

ADDITIONAL TECHNICAL
ADDITIONAL
SPECIFICATION

Itemwise Detailed Specifications for Civil work

CONCRETE WORKS

General Note :

- 1) *All Concrete shall be machine batched, machine mixed and machine vibrated design mix fair finish / smooth finish reinforced cement concrete with minimum cement content as per grade (with /without fly ash as per item description) and as per latest IS 456 for all PCC & RCC elements of all shape, all size, at all places and heights/ depths including transporting, laying of concrete to site by any means like pumping or tower crane etc., finishing and curing etc. and including Admixtures, plasticizers in recommended proportions as per IS 9103 to accelerate, retard setting of concrete as per direction of Engineer-in-charge.*
- 2) *Rate shall be inclusive of formwork. All formwork should be rigid & water tight using best quality of ordinary shuttering ply/ steel plates with supporting system of MS adjustable steel props/ H-Frame/ Cup-locks/ spans/ frames for any shapes, sizes, planes including strutting, propping, bracing, staging etc., complete to give smooth & fair finish upto all floor all heights.*
- 3) *Rate shall be inclusive of providing grooves, drip moulds, ghisis, pockets, cutouts etc. and labour for insert sleeves if any wherever required while casting. Rate also to include lift charges and scaffolding for all heights / depths from FFL / GL. (unless otherwise specified)*

Item No. 07 to 09

Providing and laying in position Ready Mixed M-300 grade concrete for reinforced cement concrete work , using cement content as per approved Design Mix manufactured in fully automatic batching plant and transported to site of work in transit mixer for a lead up to 10 kms having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cementconcrete work including pumping of R.M.C. from transit mixer to site of laying, including the cost of centering shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in - charge. Without Fly Ash (Min cement level as per latest IS 456 shall be maintained) (Cement level 475 kg)

(A) Foundations, footings, Base of columns and Mass concrete.

(B) Walls, from top of foundation level upto floor two level

(C) Slabs, landing, shelves, Balconies Lintels, Beams, Girders and Cantilever upto floor two level.

Refer general technical specification booklet item IN. no. 5.8.3+9.1 /Pg. No. 47+63 of General Technical Specifications for building work. Work shall be carried out for RCC work for Footing

Mode of measurement and payment:

Measurement will be: on Cum

Item No. 14

Providing 20 mm thick water proof cement plaster using water proofing powder 1Kg/1bag of cement for all floors on brick / concrete wall work using water proofing materials in C M 1: 4 (1 cement 4 coarse sand) including finishing with a floating coat of neat cement slurry etc complete for all floor. and shall be guaranteed for minimum period of 10 years after handing over the completed building by the main contractor to be finished as directed. Stamp paper guarantee 10 years to be furnished before receiving any payment from the client.

Specification for 20 mm thick cement plaster shall conform to item no. 17.61(II), 17.69 & item no. 17.70 of General Technical Specifications for building work.

Rate shall be for a unit of one sq. meter.

Item No. 18

STP on MBBR_Technology(75_KLD) PART -A, MEP WORK Planning, Designing, Detailing, Manufacturing, Supplying, Erection, Testing and Commissioning of Sewage Treatment Plant (STP) of 75 cu mt per day , including all electrical ,mechanical equipment, interconnected piping, valves,pumps,instruments. Design and construction of RCC tanks i.e. oil & grease chamber , collection tank, bio reactor tank , tube settler , chlorine contact tank and final treated water tank with manhole cover & all other civil structure of the pump room of the plant to complete the job. Connection of the underground sewage line to STP as well as connection of treated water of STP to nearest drain and Bypass connection of STP to the drain point with required civil,piping work & accessories all included in the scope of work. Suitable size of Shade to be provided to cover up the entire STP plant. Aeration should be provided in both Collection as well as Bio-Reactor Tank. All wetted parts should be in SS304. STP should be based on MBBR Technology including primary treatment secondary treatment and tertiary treatment of having Multi Grade Filter, Activated Carbon Filter with necessary chlorine contact system , Poly Electrolyte Dosing system complete to treat raw sewage from Domestic liquid waste with output characteristics as follows : Parameter
pH : 7 to 7.5
B.O.D. (mg / Lit) : < 5 to 20 mg/Lit
C.O.D. (mg / Lit) : < 10 to 30 mg/Lit
Suspended Solids : < 25 mg/Lit
Oil & Grease (mg / Lit) : < 5 mg/Lit. It also includes operation and maintenance cost of STP for 3 years from the actual date of completion without any extra cost

STP DESIGN BASIS (Should meet desired quality of Treated effluent as per below Table)

Sr. No.	Parameter	Waste Water Characteristics	Outlet from STP (Treated Water Characteristics)
01	pH	6.5 to 7.5	7 to 7.5

02	B.O.D. (mg / Lit)	< 300 mg / Lit	< 5 to 20 mg/Lit
03	C.O.D. (mg / Lit)	< 500 mg / Lit	< 10 to 30 mg/Lit
04	Suspended Solids	150-200 mg / Lit	< 25 mg/Lit
05	Oil & Grease (mg / Lit)	<20 mg / Lit	< 5 mg/Lit

STP TREATMENT SCHEME

(1) Preliminary Treatment: This includes removal of waste water constituents such as rags, sticks, floatable, grit and grease that may cause maintenance or operational problems with the treatment operations, processes and ancillary systems. In normal sewage application with less flow, this can become part of screen chamber itself. If need be, this may be incorporated with primary clarifier as well.

(2) Primary Treatment: This involves removal of a portion of the suspended solids and organic matter from the waste water. Effluent where Oil & Grease contamination is very high, special mechanism can be installed to remove these impurities. As far as Sewage is concerned, design shall ensure no requirement for Oil and Grease removal. Majority of quantity is removed in collection tank itself; balance quantity is removed in bio-reaction unit.

(3) Bio Reaction (Treatment): Bio Reactor & Secondary Clarifier forms "STP". Bio Reactor is a heart for effluent treatment plant. Organic matter from collection tank is pumped with balanced flow to Bio Reaction Chamber (Also called Aeration Tank). In Bio Reactor, designed quantity of Oxygen is supplied with the help of machines to ensure that proper generation of Bio-mass / Bacteria takes place. These bacteria consume organic matter as their food intake. In the process, aeration tank has clear water and sludge (Digested Bio Mass), this water has high quantum of suspended solids due to sludge that has been produced by digestion process. Bio Reaction Tank has arrangement where water overflows to secondary clarifier through outlet launder.

(4) Secondary Treatment: Sludge from effluent water from the Bioreactor is removed in secondary clarifier. Clarifier, depending on flow quantity may have tube Settler that pushes the sludge at hopper bottom. There is a mechanism in clarifier at the bottom that removes the excess sludge by pumping system and the same is fed to sludge dewatering machine. The sludge may directly be discharged to nearby vegetation as this can be used as manure.

(5) Tertiary Treatment: From Clarifier outlet launder, the treated effluent flows to buffer tank. This is also called Chlorine Contact Tank or Pre-Filter Tank. In order to disinfect the water, Chlorine is dosed in this tank. This ensures proper disinfection of treated effluent. Since there will be left out load of suspended solids, this effluent is pumped to Multi Grade Filter followed by bag Filter Unit. Chlorine also can be injected online during this filtration process.

SCOPE OF WORK

Task-1: Designing of STP

- The work includes design of STP.

Task-2 Installation of STP

- The work includes complete installation of MBBR technology based STP at location directed by client.
- Electric connection will be provided by client on location at fix point.
- Arrangement of discharge of Treated water consumption will be made for Gardening by client and for other than gardening, Contractor will arrange system of his own.

TASK 3- COMMISSIONING

- The works include successful commissioning and testing of discharge of STP as per current Pollution control norms.

SPECIFICATION

1. Bar Screen – 2 Nos **Specifications:**

MOC: SS 304

Spacing: Spacing between bars - 15 mm & 10 mm

With Lifting arrangement for cleaning.

2. Effluent Lifting Mechanism and lifting arrangement – 2 Nos (1W + 1S) **Specifications:**

MOC: CI,

Type: Submerged

Solid Handling Capacity: Up to 35 mm

Capacity: 50 - 66 LPM,

Head: ~ 6 – 08 Meters:

Make : Wilo /Lubi / Xylem /Kirloskar

Discharge Header in UPVC, Valves, NRV, necessary rope, fittings shall be included in this system.

3. Sludge Recirculation Pump and lifting arrangement – 2 Nos (1W + 1S)

Specifications:

MOC: CI,

Type: Monoblock

Solid Handling Capacity: Up to 10 mm

Capacity: 50 - 66 LPM,

Head: ~ 6 – 08 Meters:

Make : Wilo /Lubi / Xylem / Kirloskar

Discharge Header in UPVC, Valves, NRV, necessary rope, fittings shall be included in this system.

4. Air Blower for Aeration – 2 Nos (1W + 1S)

Air blower for biological section (Working & Standby set should be provided)

Specifications:

Type: Twin Lobe Type Blower,

Capacity: 100-120 m³ / hr @ 4.5 MWC

Motor RPM: should be **less than 1500 RPM**

Make: Akash, A1 or equiv.

5. Air Dispersion system: 1 Lot (For Collection/Equalization tank & Aeration Tank)

Specifications:

MOC: **SS 304** fully submerged air grid for coarse & fine bubbling effect

(Diffusor / UPVC Lateral will not be accepted.)

6. Tube Sattler & MBBR Media – 1 Lot

Specifications:

Make: Chasten or Pharma tech, MM Aqua, PP Aqua

MOC: PVC/PP

7. Chlorine Dosing System – 1 Lot.

Specifications:

Metering Pump: 0 – 5 LPH

Dosing Tank: HDPE 100 L

Make: Pump - ANT/I-dose, Dosing Tank - Sintex or Eq.

8. Filter Feed Pump – 2 Nos (1W + 1S).

Specifications:

MOC: CI,

Type: Centrifugal Monoblock

Capacity: 50 - 66 LPM,

Head: ~ 25 – 30 Meters:

Make : Kirloskar or Eq.

Discharge Header in UPVC, Valves, NRV, necessary, fittings shall be included in this system.

9. Multi Grade Filter Unit – 1 Set

Specifications:

MOC: FRP,

DIA: 600 mm

HOS: 1800 mm,

Make: Starlite/ Pentair/TATA or eq.

Complete with Frontal Piping, Valves, NRV, MPV, Sand Media etc.

10. Activated Carbon Filter Unit – 1 Set

Specifications:

MOC: FRP,

DIA: 600 mm

HOS: 1800 mm,

Make: Starlite/ Pentair/TATA or eq.

Complete with Frontal Piping, Valves, NRV, MPV, Activate Carbon Media etc.

11. Polishing filter Unit – 1 Set

Specifications:

MOC: 50 micron elements with PVC HOUSING,

Flow: 50 - 66 LPM

Make: Rep

Complete with Piping, support fittings etc.

12. Ultra Violet Disinfection System – 1 Set
Specifications:

Flow: 2 – 3 m³ / HR

Make: Alpha UV / Sukrut

Complete with Piping, support fittings etc.

13. Sludge Decanter Unit – 1 Set
Specifications:

Capacity: Suitable for 75 KLD Plant

MOC: Membrane Bag Filter with SS Skid,

Make: Rep

Complete with SS clamps and holders, bags etc.

14. Poly Dosing System – 1 Lot.
Specifications:

Metering Pump: 0 – 5 LPH with

Dosing Tank: HDPE 100 L

Make of Pump: ANT/I-dose

Dosing Tank Make: Sintex or eq.

15. Flow Measuring Device (Inlet) – 1 Nos.

Type : Electro – Magnetic Type

Capacity: Suitable for 75 KLD STP

Make: S'Kon / Addmass / Forbes Marshall

16. All plant interconnection Piping & Fittings – 1 Lot
Specifications:

All interconnection Piping: UPVC SCH 80

Air Grid: SS 304 for Wet Area. MS C Class for Dry Area

17. Control Panel – 1 Nos

Specifications:

MS Powder Coated electrical Panel.

Switch Gears: L&T or Siemens.

Make: As per OEM

Timer Control for Sewage Lifting Pump

18. Cables – 1 Lot

Specifications:

Appropriate size cable for each feeder.

Make: Polycab, Finolex or Eq. ISI Mark

19. Cable Tray – 1 Lot

Specifications:

MOC: FRP Perforated

Size: 100mmx25mm and 50mmX25mm respective line across the plant room area

Make: Plexxe Composite or eq.

20. Support for interconnecting piping's – 1 Lot

Specifications:

Square pipe-SS

U Clamp GI/SS (for Submerged parts)

Anchor Fasteners-MS/ SS (for submerged parts)

Z Patti- GI

Make: Reputed.

21. Support for Cable Trays – 1 Lot

Specifications:

Z-Patti-GI

L-Clamp-MS

Make: Reputed.

Item No. 26

Providing & Filling farm clay or selected soil (Outside earth) in including watering with any lead & lift as directed by EIC etc. complete.

1.0. Materials:

1.1. Selected soil/farm clay shall be clean, of good binding quality, and of approved quality obtained from approved pots/quarries of disintegrated rocks which contain silicones materials and natural mixture of clay of calcareous origin. The size of soil shall not be more than 20 mm.

2.0 WORKMANSHIP:

2.1 The earth to be used for filling shall be free from salts, organic or other foreign matter, All clods of earth shall be broken.

2.2 As soon as the work in foundation has been completed and measured, the site of foundation shall be cleared of all debris, brick bats, mortar dropping etc; and filled with earth in layers not exceeding 20 Cms. Each layer shall be adequately watered rammed and consolidated before the succeeding layer is laid. The earth shall be rammed with iron rammers where feasible and with the butt ends of crow-bars, where rammer cannot be used.

2.3 The plinth shall be similarly filled with earth in layers not exceeding 20 Cms Adequately watered and consolidated by ramming with iron or wooden rammers. When in filling reaches finished level, the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated.

2.4 The finished level of filling shall be kept to shape intended to be given to floor.

2.5 In case of large heavy duty flooring like factory flooring, the consolidation may be done by power rollers, where so specified. The extent of consolidation required shall also be as specified.

2.6 The excavated stuff of the selected type shall be allowed to be used in filling the trenches and plinth. Under no circumstances black cotton soil be used for filling the plinth.

3.0 Mode of measurements and payment:

3.1 The rate shall be for a unit of one Cumt

Item No. 27

Providing pure doob (dharo)grass including watering and maintenance of the lawn for 1 year or more till the grass forms a thick lawn, freefrom weeds and fit for mowing including supplying necessary farm clay , sludge, manure, pesticides , extra earth, disposal of rubbish, trench excavation and all labour with lead and lift etc. complete as directed by EIC.

Horticultural operations shall be started on ground previously levelled and dressed to required formation levels and slopes.

In case where unsuitable soil is met with, it shall be either removed or, replaced or it shall be covered over to a thickness decided by the Engineer-in-charge with good earth. In the course of excavation or trenching during horticultural operations, any walls, foundations, etc. met with shall not be dismantled without pre-measurement and prior to the written permission of the Engineer-in-charge.

23.2 TRENCHING IN ORDINARY SOIL

23.2.1 Trenching is done in order to loosen the soil, turn over the top layer containing weeds etc. and to bring up the lower layer of good earth to form a proper medium for grassing, regrassing, hedging and shrubbery.

Trenching shall be done to the depth ordered by the Engineer-in-charge. The depth is generally 30 cm for grassing and 60 cm for regrassing in good soil.

23.2.2 The trenched ground shall, after rough dress, be flooded with water by making small kiaries to enable the soil to settle down. Any local depression unevenness etc. shall be made good by dressing and/or filling with good soil.

23.2.3 Weeds or other vegetation which appear on the ground are then uprooted and removed and disposed off and paid.

23.2.4 Trenching

Trenching shall consist of the following operations:

1. The whole plot shall be divided into narrow rectangular strips of about 1.5 m width or as directed by the Engineer-in-Charge.
2. These strips shall be sub-divided lengthwise into about 1 m long sections. Such sections shall be excavated serially and excavated soil deposited in the adjacent section preceding it.
3. In excavating and depositing care shall be taken that the top soil with all previous plant growth including roots, get buried in the bottom layer of trenched area, the dead plants so buried incidentally being formed into humus.
4. The excavated soil shall be straight away dumped into the adjoining sections so that double handling otherwise involved in dumping the excavated stuff outside and in back filling in the trenches with leads is practically eliminated.

23.2 GOOD EARTH

23.2.1 The earth shall be stacked at site in stacks not less than 50 cm high and of volume not less than 3.0 cum.

23.3 SUPPLY AND STACKING OF SLUDGE

23.3.1 It shall be transported to the site in lorries with efficient arrangement to prevent spilling enroute. It shall be stacked at site. Each stack shall not be less than 50 cm height and volume not less than 3 cum.

23.4 SUPPLY AND STACKING OF MANURE

23.4.1 Farmyard Manure: Same as 23.4.1.

23.5 ROUGH DRESSING OF THE TRENCHED GROUND

23.6.1 Rough dressing of the area shall include making kiaries for flooding.

23.6.2 The trenched ground shall be leveled and rough dressed and if there are any hollows and depressions resulting from subsidence which cannot be so levelled, these shall be filled properly with earth brought from outside to bring the depressed surface to the level of the adjoining land and to remove discontinuity of slope and then rough dressed again. The supply and spreading of soil in such depressions is payable separately. In rough dressing, the soil at the surface and for 75 mm depth below shall be broken down to particle size not more than 10 mm in any direction.

23.7 UPROOTING WEEDS FROM TRENCHED AREAS

23.7.1 After 10 days and within 15 days of flooding the rough dressed trenched ground with water, the weeds appearing on the ground shall be rooted out carefully and the rubbish disposed off as directed by the Engineer-in-charge.

23.8 FINE DRESSING THE GROUND

23.8.1 Slight unevenness, ups, and downs and shallow depressions resulting from the settlement of the flooded ground, in drying and from the subsequent weeding operations, shall be removed by fine dressing the surface to the formation levels of the adjoining land as directed by the Engineer-in-charge, and by adding suitable quantities of good earth brought from outside, if necessary.

23.9 SPREADING GOOD EARTH

23.9.1 Good earth shall be removed from stacks by head load and spread evenly over the surface to the thickness ordered by the Engineer-in-charge. It shall be spread with a twisting motion to avoid segregation and to ensure that spreading is uniform over the entire area.

23.9.A SPREADING SLUDGE/MANURE

23.8.A.1 Good earth shall be thoroughly mixed with sludge or manure in specified proportion as described in the item or as directed by the Engineer-in-Charge. The mixing shall be spread as described in 23.9.1 to the thickness ordered by the Engineer-in-Charge.

23.10 MIXING OF GOOD EARTH AND SLUDGE/MANURE

23.10.1 The stacked earth shall, before mixing be broken down to particles of sizes not exceeding 6 mm in any direction. Good earth shall be thoroughly mixed with sludge or manure in specified proportion as described in the item or as directed by the Engineer-in-charge.

23.11 GRASSING WITH SELECT GRASS NO. 1

23.11.1 The area from where the grass roots are to be obtained shall be specified by the Engineer-in-Charge at the time of execution of the work and no royalty shall be charged on this account from the contractor. Grass is to be arranged by contractor (cost of grass to be paid separately).

23.11.2 The soil shall be suitably moistened and then the operation of planting grass shall be commenced. The grass shall be dibbled at 10 cm, 7.5 cm, 5 cm apart in any direction or other spacing as described in the item. Dead grass and weeds shall not be planted. The contractor shall be responsible for watering and maintenance of levels and the lawn for 30 days or till the grass forms a thick lawn free from weeds and fit for moving whichever is later. Generally planting in other direction at 15 cm, 10 cm, spacing is done in the case of large open spaces, at 7.5 cm spacing in residential lawn and at 5cm spacing for Tennis Court and sports ground lawn. Rates are including cost of labour and material (grass shall be paid separately.)

23.11.3 During the maintenance period, any irregularities arising in ground levels due to watering or due to trampling by labour, or due to cattle straying thereon, shall be constantly made up to the proper levels with earth as available or brought from outside as necessary, Constant watch shall be maintained to ensure that dead patches are replanted and weeds are removed.

23.13 UPROOTING RANK VEGETATION AND WEEDS AND PREPARING THE GROUND FOR PLANTING „SELECT GRASS NO. 1“

23.13.1 Initially the area shall be dug up to a depth of 30 cm. and weeds and rank vegetation with roots removed thereon by repeated forking. The whole area then shall be retrenched to a depth of 60 cm in the same manner as described in 23.1. Clods of excavated earth shall then be broken up to the size not more than 75 mm in any direction. The area shall then be flooded with water and after 10 days and within 15 days of flooding, weeds shall be uprooted carefully. The rubbish arising from the above operations shall be removed and disposed off in a manner directed by the Engineer-in-charge, away from the site. The earth shall then be rough dressed and fine dressed as described in 23.6 & 23.8.

Measurements

Length, breadth of area shall be measured correct to 0.1 meter and the area shall be calculated in sqm. Correct to two places of decimal.

Rate

The rate shall include the cost of all the labour and material involved in all the operations described above