महाराष्ट्र जीवन प्राधिकरण

मुख्य अभियंता, पुणे प्रादेशिक विभाग पुणे,
नवीन प्रशासकीय इमारत, पुणे लष्कर पा.पु. केंद्र आवार,
४६३ स्टेव्हली रोड, सेंट मेरी चर्चशेजारी, कँप, पुणे-४११००१
दूरध्वनी : कार्यालयीन २६३५००६२ / २९७०६०६४
Email : cemjppn@gmail.com

जा.क्र :-मु.अ(पुणे)/चिशा/राज्य दरसूची /२०२३ - २४/२१२३/२०२४ दि २० डिसेंबर २०२४

शुद्धीपत्रक क्र ५

विषय :- मजीप्राच्या सन २०२३ - २४ च्या दरसूचीमध्ये CAMUS Technology for STP चा समावेश करणेबाबत

संदर्भ :-१) अ.अ.(मु), म.जी.प्रा, यांचे पत्र जा.क्र :-मजीप्रा/सस/तांशा-३/१८३८/२२ दि २८/१०/२०२२
२) या कार्यालयाचा डॉकेट स्वरूपातील प्रस्ताव जा.क्र २५५६ दि १९/१०/२०२३
३) म.जी.प्रा. मुख्यालय (मुंबई) कार्यालयाची टिप्पणी दि १८/३/२०२४
४) या कार्यालयाचा डॉकेट स्वरूपातील प्रस्ताव जा.क्र १०३९ दि ९/५/२०२४
५) अ.अ.(मु), म.जी.प्रा, यांचे पत्र जा.क्र :-मजीप्रा/सस/तांशा-३/९७६ १६/१०/२४
६) या कार्यालयाचा डॉकेट स्वरूपातील प्रस्ताव जा.क्र २५४६ दि २८/१०/२०२४
७) या कार्यालयाचे पत्र जा.क्र २५५२ दि २९/१०/२०२४
८) या कार्यालयाचा डॉकेट स्वरूपातील प्रस्ताव जा.क्र २५७१ दि ३०/१०/२०२४
९) म.जी.प्रा मुख्यालय (मुंबई) यांची टिप्पणी दि १९/११/२०२४ आणि म. सदस्य सचिव यांची मान्यता दि २२/११/२०२४

विषयांकीत आधुनिक तंत्रज्ञानाचा म.जी.प्रा दरसूचीमध्ये समावेश करण्याबाबतचा प्रस्ताव उपरोक्त संदर्भ क्र ८ अन्वये डॉकेट स्वरूपात म.जी.प्रा मुख्यालयास सादर करण्यात आला होता. त्यास संदर्भ क्र ९ अन्वये मान्यता प्रदान करण्यात आली असून शुद्धीपत्रक निर्गमित करणेबाबत निर्देशित करण्यात आले आहे.

या अनुषंगाने आता दरसूची मध्ये या शुद्धीपत्रक क्र ५ व्दारे विषयांकीत बाबीचा समावेश खालीलप्रमाणे करण्यात येत आहे.

Sr No	Description	Unit	Rate (Rs) २०२३ - २४		Rate (Rs) २०२४ - २५	
			Complete	Labour	Complete	Labour
I	CAMUS (Patent ४१४३३९) Technology based Sewage Treatment Plant:					

	Designing, providing, constructing, hydraulic testing, commissioning and giving satisfactory trials of Continuous Advanced Mite Utilizing System (CAMUS : Patent ४१४३३९) technology based Sewage Treatment Plant (STP) consisting Screen, Equalization Tank, Tube Setller Tank, Bio Mound (including media), Collection Tank, E&M works, piping work, etc. complete as turnkey job with all involved civil, electrical and mechanical works inclusive of following items, units as per detailed specifications for civil, electrical and mechanical components with all duties and taxes, etc. complete as directed by Engineer-In-charge. Allied structure shall be constructed as per the provision in appropriate and relevant standards and design guidelines of respective authorities. RCC and civil works will be as directed by Engineer-in-charge. Sewage Treatment Plant (STP) to be designed to treat the raw water sewage with following standards.					
	Treated Sewage standards					
	pH		५.५-९.०			
	Bio Chemical Oxygen Demand (BOD)	mg/L	९०			
	Chemical Oxygen Demand (COD)	mg/L	५०			
	Total Suspended Solids (TSS)	mg/L	२०			
	Nitrogen - Total	mg/L	९०			
	Phosphorus - Total (for discharge into Ponds, Lakes)	mg/L	९.०			
	Faecal Caliform (FC) (Most Probable Number per 100 mililiter, MPN / 100 ml)	No / ९०० mililiter, MPN / ९०० ml	Desirable ९०० Permissible २३०			
II	FOLLOWING COMPONENTS ARE INCLUDED	COMPONENTS				
	९. Self Cleaning Coanda Effect Screen (SCCS): The Raw Sewage from the wet well is received into the STP at a height of ६ m in an intake weir of the SCCS placed on a platform above the Equalization tank. The Self Cleaning Coanda Effect Screen is designed with screen element of २mm slot size in SS३०४. SCCS are known to be very efficient in terms of separation as compared to a pass-through screen of the same slot					

	opening. The key advantage of the screen is due to its that takes advantage of the Coanda effect to increase the screening efficiency. The screen is designed to remove both floating and settling particulates. The function of the २mm screen is to protect the Bio Mound distributor systems of ४-६mm apertures from clogging by such particulates. The screen hydraulic loading rate (KL/sqm/hr) or screen velocity (m/hr) is dependent on the slot opening size, open area of screens and curvature of the screen. SCCS screens are constant head loss units and typically have a fixed head loss of १.५-२m. Screen Hydraulic loading rates are available from manufacturers. SCCS is used to prevent clogging and have a TSS removal efficiency (५%-३०%) and BOD removal efficiency of (५%-२०%) (ref: Metcalf and Eddy Table ५-५ Pg ३२२-३२३ ४th Edition २००३). Each screen is provided with ball valves for hydraulic isolation.					
	२. EQUILIZATION TANK (EQT): Equalization tank is designed to handle peak flows that is received from the wetwell. From the Equalization tank onwards the entire system is operated at average flow by EQT Pumps. The water is pumped to an elevated Tube settler to separate out suspended solids. The tube settler is designed in such a way that the outfall of tube settler has sufficient gravity head to allow the screen and settled sewage to distribute itself across the BioMounds. In order to avoid EQT odor an intermittent aeration as required optionally is provided via venturi aerator attached to the bypass line of the EQT-TS pumps. From the Tube settler outfall through an appropriate gate and valve system we distribute ५०% of (selection ratio ४०%-६०%) of the daily Waste Water over BM१ and the residual ~५०% is transferred to BM२. As the Waste Water in BM१ percolates downward in contact with the (CAMUS) Bio Media (enriched with Vision Earthcare's proprietary cultures and catalyst) substantial reduction of BOD/COD is achieved along with Nitrification of Ammoniacal Nitrogen. The resultant low COD and Nitrified intermediate Water is collected in the Collection Tank (CT१) via a gravity					

	weephole arrangement at the bottom of BM१ to intermediate collection tank CT१. The TS to BM१ and TS to BM२ Distribution system (Headers and Distributors) is a critical equipment that is capable of uniformly distributing clarified wastewater using the low water head (१.५m-२m) between TS and BM१/२ and is designed, certified and implemented by Technology Provider.					
	३. TUBE SETTLER (TS): The screened sewage is allowed to pass into a tube settler tanks wherein specially designed inclined media helps in fast separation of TSS it is to be noted that for CAMUS process the TS employs ballasted settling of the organic TSS (TOSS) by using the fine inorganic TSS (TISS/Grit). The settled slurry containing both organic and inorganic TSS is removed as a solid rich slurry in the TS. Removal efficiency TOSS and COD from the sewage removal is around ६० % TOSS and ३०% of COD/BOD (ref: Metcalf and Eddy Table ५.२४ Pg ४९५ ४th Edition २००३). It is to be noted since the critical settling velocity of heavy inorganic particles in TISS is greater than the hydraulic loading rate in TS. Hence nearly all of the TISS is settled in the slurry with १०० % separation efficiency. We assume a typical concentration of ५ % or ५०००० mg/L for the TOSS (ref: Metcalf and Eddy Table ५.२२ Pg ४९१ ४th Edition २००३). Consequently, the solid slurry obtained at the bottom is between ८ %-१२ % in which ५% is TOSS and the rest of TISS. The tube settler is designed to remove all settling TOSS particles of size greater than १०० microns from the incoming waste water. The Tube Settler (TS१ & TS२) Sludge blanket is populated with Phosphate accumulating organisms PAO which biologically removes phosphate from the incoming wastewater under anoxic/anaerobic conditions with up to ८५ % efficiency. The TSS slurry is harvested from the bottom of the TS tank as primary sludge and taken for processing to a Vermicomposting Bed (VCB) which is part of BM१.					

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	४. BIOMEDIA DESCRIPTION: The main biological aeration engines for CAMUS process is the CAMUS type BioMedia installed in the two Liquid processing BMs (BM१ and BM२). The CAMUS BioMedia installed in BM१ and BM२ is created by the installation of suitable quantity of high hydraulic conductivity porous granular media as certified by the Technology provider, The CAMUS Biomedia is typically a mixture of hard, water stable artificial and mined granular porous biomedia consisting of fired clay brickbats, hard murrum and Laterites chips. The mix and layout design for each site is certified and provided by the technology provider. The specially selected, graded, formulated, catalytically enhanced, CAMUS media is typically created from a mix of local sources and is tested and certified by technology provider before installation as CAMUS Media. Based on the media chosen a formulation of micronutrients required for soil ecology and catalysts to enhance oxygen transfer is also provided. Apart from catalyst a specially formulated blend of AOSM culture is incorporated into the CAMUS media for providing the biological process control. CAMUS media selected has the following physiochemical properties १) suitable micro and macro porosity (०.५ mm to २ mm pores) capable hosting the Acarine Orbatid Soil Mite (AOSM) ecology that is instrumental in process control २) Suitably low bio regeneratable surface energy ३) high specific Organic Adsoption and Absorption capacity for uptake of the organic loads ४) has suitable high hydraulic conductivity ५) suitable water retention. Technology provider will provide suitable manufactured GeoFoam additives to modify properties of selected media to match desired properties.					

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	BM१: The Nitrifying Bio Mound १ (BM१) is constructed using the CAMUS type Bio Media as described above. Typically the BM१ receives part (approximately ५०% of the feed outflow from the Tube settler (TS) to the top of the BM१ Distributor. The Top of the Bio Mound १ is equipped with a specially designed Low head loss gravity Distributor system which distributes the wastewater uniformly throughout the BM१ top of BM१. The distributed clarified waste water percolates through the Bio media installed in BM१. The percolated media exchanges the organic load on the Bio Media surfaces. The high surface area The operating hydraulic load /organic load of BM१ allows complete nitrification of the ammonia in the effluent to Nitrate and near full reduction of the COD. The percolated water from BM१ is collected at the raft/floor of BM१ which is water proof until २०cm level. The intermediate nitrified water is conveyed to the CT१ using a gravity wee phole system.					
	BM२: The Denitrifying BM२ takes in a mix of nitrified water from BM१ and Ammonical water from the TS directly into BM२ header. The mix of nitrified and ammonical water in an approximately is spread uniformly over BM२ using the low head loss BM२ header. As the mix of nitrified and ammonical water percolates through BM२ and waste water is denitrified by harnessing the COD from the TS-BM२ stream as the carbon source following the denitrification reaction NH४+ + NO३- > N२ + २H२O + १/२O२. The denitrified Nitrogen leaves as Nitrogen gas and the Oxygen released in the process appears as Dissolved Oxygen in the treated water. The BM२ also removes the residual COD / BOD of the Water to meet the treatment norms as specified in tender. The treated water from BM२ is continuously collected in a Treated Water Tank (TWT) via a gravity wee phole arrangement at the bottom of the BM२ similar to BM१.					

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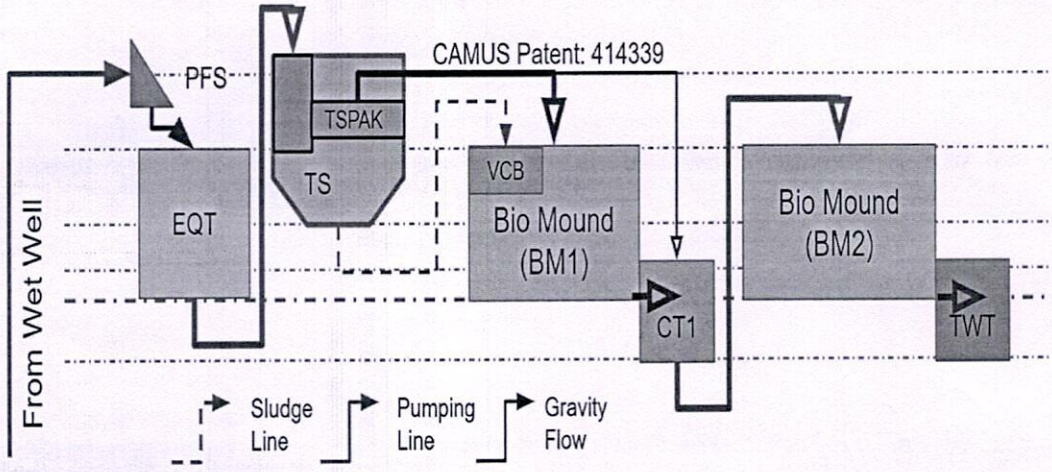
	VCB: The Solids at the bottom of Tube Settler are harvested using the gravity head available in the Tube settler to transfer sludge to the Vermi Composting Bed (VCB) which is part of BM१. In the VCB area biological decomposition of volatile organics takes place releasing heat and killing pathogens. Typically around ०.२%-०.५% of volumetric flow into STP is transferred as slurry into the VCB with a typically TOSS of ५% and TISS of ५% and ९०% moisture. The VCB physically dewaters the primary sludge via (gravity cake filtration). The residual drip water from the VCB percolates down and is collected into CT१ along with the percolate water in BM१. Drip free sludge cake is formed in VCB within a few hours with a volume reduction of ३-५ times depending on TS slurry concentration forming a ३०% (TOSS), ३०% (TISS) and ६०% moisture drip free sludge. The sludge cake consists of grit and volatile organics which is ideal for vermicomposting using Pheretima Elongata Earth Worms (PEEW) / Eisenia Fetida Redworms (EFRW) ecology and associated bacterial cultures provided by the Technology provider. The VCB aerobically degrades the sludge in ७-१० days in the process losing residual water to evaporation and converts the sludge cake into an earthy compost containing humus and phosphates. The compost is a phosphate rich soil conditioner containing the inorganic grit ८०% (w/w) and १०% (w/w) organics and १०% (w/w) moisture १००-१३५ Kg/day/MLD of vermi compost containing around ८०-१२५ Kg/day/MLD of grit will be produced in process. It is to be noted that the solids from the bottom of the tube settler will also contain the majority of Phosphates accumulated via PAO that is removed in the process. The subsequent vermi composted primary sludge then constitutes a very good phosphate rich soil conditioner.					
	५: TWT: The Final treated water tank is designed to be used as the disinfection tank. Due to the high DO of treated effluent the water from the BM२ typically has very low Fecal Coliforms level meeting the discharge limits. However additional UV disinfection /					

	hypochlorite / gas chlorination system is provided as required by regulatory authorities.					



- PFS: Parabolic Fine Screen
- TS: Tube Settler
- EQT: Equalization Tank
- BM: Bio Mound
- VCB: VermiComposting Bed
- CT1: Collection Tank 1
- TWT: Treated Water Tank

III	PRICE SCHEDULE:						
	Capacity Of Plant in MLD	Area Required in SQM	Unit	CAPEX Rs. Lakhs			
	०.५	२८८	MLD	१२५.३२			
	१.०	५७७	MLD	२०४.७७			
	To get the Capex Cost=Multiply Capacity in MLD into (*) Rate per MLD						
IV	NOTES						
१	Screen Type is of Prefab Self Cleaning Coanda Effect Screen (SCCS) as per technology provider design						
२	Sodium hypochlorite dosing is adopted						
३	Area required can be reduced by ३०% with special deep bed designs. These solutions are १०-२०% more expensive than standard designs and may be procured from Technology provider						
४	Dedicated sludge management is provided as Vermi Composting Bed (VCB) using PEEW / EFRW culture. Compost from VCB bed will be removed and can be used as garden soil						
५	No separate Independent laboratory and administrative building required.						

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६	All water retaining structures (TS, EQT, CT१, TWT) are in M३० grade of concrete.BM१, BM२/VCB are not water retaining structures and are designed as media retaining structures only the floor raft and up to २०cm of BM१ and BM२ walls are water proofed to convey water to the gravity were holes and then onto the CT१ and TWT.					
७	Water table is considered ५m below Finish Ground Level (FGL) for design					
८	Soil bearing capacity is considered as २० T/m२ at १.५m below from Ground Level (GL)					
९	Grade of cement used is OPC ४३ grade. (Contractor can use higher grade).					
१०	Grade of steel is used as Fe ५००					
११	Peak factor considered in design of STP as per CPHEEO manual guideline					
१२	Hypo dosing material and required manpower during trial run (९०days) and commissioning is considered in scope of work					
१३	Water and power during construction, trial run and commissioning shall be provided by client/ local body					
१४	Power supply to STP is assumed to be LT power ४४०V three phase supply					
१५	All CAMUS STP designs, specifications, critical equipment will be provided by Technology Provider					
१६	Operation, Maintenance and Repair work of CAMUS shall be the responsibility of the contractor and technology provider combined. Contractor will issue AMC to Technology Provider to guarantee performance and supervise Operations of Contractor.					
V	EQUIPMENTS OF FOLLOWING MAKES SHALL BE USED					
१	Centrifugal Pumps/ Submersible Pumps	Kirloskar, Johnson, Kishor, Crompton or as per MJP APPROVED MAKE				
२	Dosing pumps	Milton Roy pumps, VK Pumps or equivalent				
३	Self Cleaning Coanda Effect Screen (SCCS)	To be fabricated as per technology provider				
४	Cables	Finolex, Polycab, Supreme or as per MJP standard				
५	Valves	management unit Intervalve, BDK, Procon OR AS PER MJP				
६	Gravel media	As per design and as approved by technology				

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७	Distributor in UPVC or HDPE	As per Technology provider specifications using standard makes MJP
८	CAMUS Bio Media (Granular Porous High Hydraulic Percolation Rate) (patent ४१४३३९)	As per standard specification and supplied by technology provider
९	CAMUS Catalyst (Patent ४१४३३९)	As per standard specification and supplied by technology provider
१०	Acarine Orbatid Soil Mite (AOSM) Culture for BM१ and BM२ : Patent ४१४३३९	As per standard specification and supplied by technology provider
११	Eisenia Fetida Redworm (EFRW) and Pheretima Elongata Earthworm Cultures (PEEW) Cultures for VCB	As per standard specification and supplied by technology provider

(वैशाली आवटे)
मुख्य अभियंता (प्र)

प्रत:- मा. सदस्य सचिव, म.जी.प्रा. मुंबई - यांना माहितीसाठी सविनय सादर.

प्रत:- मुख्य अभियंता, म.जी.प्रा. प्रा.वि.ठाणे/नाशिक/छत्रपती संभाजी नगर/ अमरावती/नागपूर - माहीती आणि पुढील कार्यवाहीसाठी

प्रत:-अ.अ.(मु) /अ.अ. म.नि.सं.व सं. कक्ष, मजीप्रा, मुंबई - यांना माहितीसाठी

प्रत :- अ.अ.मजीप्रा, मंडळ, पुणे, सांगली - यांना माहीती आणि पुढील कार्यवाहीसाठी