KERALA WATER AUTHORITY

DETAILED ENGINEERING REPORT

3.5 MLD CAPACITY SEWAGE TREATMENT PLANT AND SEWERAGE SYSTEM FOR PONNANI MUNICIPALITY (HARBOUR ZONE) – SBM 2 URBAN

Prepared by:

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We extend our sincere gratitude to M/S Ernad Engineering Consultant for timely completing the DGPS survey work. We trust that the project will become a reality as per the timeline shown, and it would be beneficial to reduce the pollution load on the Bharathapuzha river, Canoly canal and improve people's living standards in Ponnani municipality.

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CONTENTS

EXECUTIVE SUMMARY

PROJECT AT A GLANCE

ABSTRACT

ABSTRACT OF ESTIMATE

1. **CHAPTER 1**
   INTRODUCTION
   - 1.1. BACKGROUND AND PROJECT GENESIS
   - 1.2. NEED FOR A SEWAGE TREATMENT SYSTEM
   - 1.3. HUMAN DEVELOPMENT OUTCOMES FOR SEWERAGE INVESTMENTS
   - 1.4. OVERVIEW OF SITUATION AND GOALS
   - 1.5. VISION OF SEWERAGE STRATEGY
   - 1.6. SWACHH BHARAT MISSION - URBAN 2.0
   - 1.7. PROJECT COMPONENTS ELIGIBLE FOR FUNDING
     - 1.7.1.USED WATER PROJECT COMPONENTS ELIGIBLE FOR CENTRAL FUNDING
     - 1.7.2.USED WATER PROJECT COMPONENTS TO BE FULLY FUNDED BY STATES/ULBS
   - 1.8. ORGANIZATION OF DETAILED ENGINEERING REPORT
2. **CHAPTER 2**
   PLAN OF SEWAGE TREATMENT
   - 2.1. GENERAL
   - 2.2. PROJECT AREA
   - 2.3. PRESENT CONDITION OF SEWAGE COLLECTION AND DISPOSAL
   - 2.4. EXPECTED SEWER LOAD FROM PROJECT AREA
   - 2.5. SEWERAGE TECHNOLOGY
   - 2.6. STRATEGY FOR SEWERAGE SYSTEMS
   - 2.7. PLAN FOR AREAS DIRECTLY CONNECTED POLLUTION OF WATER BODIES
   - 2.8. PROGRAMME FOR ABATEMENT OF POLLUTION TO ENVIRONMENT
   - 2.9. OUTLINE OF SEWERAGE IMPLEMENTATION
   - 2.10. PLAN FOR REUSE OF SEWAGE
   - 2.11. INTEGRATION WITH OTHER PROJECTS
3. **CHAPTER 3**
   PLANNING AND DESIGNING OF SEWAGE NETWORK
   - 3.1. GENERAL
   - 3.2. COMPONENTS OF SEWAGE NETWORK
   - 3.3. DESIGN OF SEWAGE NETWORK
     - 3.3.1 CREATING PRIMARY MODEL FROM GIS
     - 3.3.2 TOPOGRPAHICAL SURVEY USING DGPS
     - 3.3.3 SOCIAL SURVEY
     - 3.3.4 HYDRAULIC SIMULATION OF SEWAGE NETWORK
   - 3.4. DESIGN OF MANHOLES AND LIFTING STATIONS
   - 3.5 DESIGN OF COLLECTION WELLS
   - 3.6. LAYING OF SEWER NETWORK
     - 3.6.1. EXCAVATION AND LAYING

3.6.2. SEWER CARRIAGE SYSTEM WITH PIPELINES AND CONNECTIONS TO HOUSES/OTHER UNITS

4. **CHAPTER 4**
   DESIGN OF UNIT OPERATIONS AND SEWAGE TREATMENT PROCESS
   4.1. GENERAL
   4.2. COMPONENTS OF TREATMENT SYSTEM
   4.3. INITIAL COMPONETS OF TREATMENT
      4.3.1.UNIT OPERATIONS
   4.4. DESIGN OF CO-TREATMENT UNIT FOR SEPTAGE
      4.4.1 UNIT OPERATIONS
   4.5. DESIGN OF EQUALISATION TANK
      4.5.1.UNIT OPERATIONS
   4.6. DESIGN OF MBBR UNITS
      4.6.1.PROCESS ANALYSIS AND DESIGN
   4.7. DESIGN OF CLARIFIER
      4.7.1.UNIT OPERATIONS
   4.8. DESIGN OF FILTER FEED, CHLORINE CONTACT UNITS AND PRESSURE FILTERS
      4.8.1.UNIT OPERATIONS AND STRUCTURAL DESIGN
   4.9. SLUDGE DISPOSAL PLAN
   4.10. PRELIMINARY STRUCTURAL DESIGN OF COMPONENTS
   4.11. SITE PROPOSED FOR COLLECTION WELLS AND STP
   4.12. DIMENSIONS AND MATERIAL OF CONSTRUCTION OF STP UNITS
5. **CHAPTER 5**
   DETAILED ESTIMATES
   5.1. GENERAL
   5.2. DETAILED ESTIMATE OF COMPONENTS
   5.3. ABSTRACT OF COST
6. **CHAPTER 6**
   OPERATION AND MAINTENANCE
   6.1. GENERAL
   6.2. PLANNING FOR EFFECTIVE OPERATION AND MAINTENANCE
   6.3. TYPE OF MAINTENANCE
   6.4. INSPECTION AND EXAMINATION OF SEWER
   6.5. SEWER CLEANING
   6.6. PROTECTION OF SEWER SYSTEMS
   6.7. INSPECTION OF MANHOLES AND APPURTENANCES
   6.8. CLEANING OF MANHOLES
   6.9. SAFTEY PRACTICES
   6.10.OPERATION AND MAINTENANCE OF LIFTING STATIONS
   6.11.OPERATION AND MAINTENANCE OF PUMPING STATIONS
      6.11.1 OPERATION OF PUMPS
   6.12.SMART MANAGEMENT AND ONLINE MONITORING USING IoT
   6.13.ODOUR CONTROL METHODS
      6.13.1 PREVENTION OF ODOUR
      6.13.2 CONTROL OF ODOUR BY CHEMICAL ADDITION
   6.14.MAINTAINING AN ECO-FRIENDLY SYSTEM
   6.15.OCCUPATIONAL HEALTH HAZARDS AND SAFTEY MEASURES
   6.16.COST ANALYSIS
7. **CHAPTER 7**
   CONCLUSIONS

7.1. OBSERVATIONS FROM ANALYSIS
7.2. INSTITUTIONAL ARRANGEMENTS
7.2.1 DISTRICT LEVEL APPROACH
7.2.2 URBAN LOCAL BODY (ULB) LEVEL APPROACH
7.3. PLANNING FOR IMPLEMENTATION
7.4. DATA INFORMATION AND MANAGEMENT
7.5. FINANCIAL PLANNING AND OUTCOMES
7.6. GENDER EQUALITY AND SOCIAL IMPLICATIONS
7.7. FINANCIAL PLANNING AND OUTCOMES
7.8. ACTION PLAN FOR IMPLEMENTATION
7.8.1 IMPLEMENTATION SCHEDULE
7.9. RECOMMENDATIONS

LIST OF FIGURES

Fig. 1 Human development outcomes for sewerage investments
Fig. 2 Ponnani Municipality located in Malappuram District Map
Fig. 3 Map of Ponnani Municipality and ward boundaries
Fig. 4 Ponnani Jum'ah Masjid
Fig. 5 Thrikkavu Temple
Fig. 6 Ponnani Beach
Fig. 7 Chamravattam Bridge
Fig. 8 Biyyam Kayal
Fig. 9 Ponnani Harbour
Fig. 10 Project area and ward map
Fig. 11 Pollution stretches in Canoly canal
Fig. 12 Drainages at various locations
Fig. 13 Parameters for analysing LSGI's for sewerage/FSSM system
Fig. 14 The strategy for abatement of pollution to environment
Fig. 15 Harbour zone and location of STP
Fig. 16 Harbour zone with STP, Collection wells and lifting stations – Submitted proposal
Fig. 17 Drain and their outfalls
Fig. 18 Ponnani Harbour zone SBM 2 schematic representations
Fig. 19 Schematic diagram
Fig. 20 Satellite imaginary of proposed STP location
Fig. 21 Base station setting for DGPS survey at Ponnani Municipality
Fig. 22 Social survey details in GIS
Fig. 23 SWMM model of full network with flow routing in gradation towards outfalls
Fig. 24 SWMM model of SBM-2 network with flow routing in gradation towards outfalls
Fig. 25 Map area in SWMM model with invert levels of nodes in gradation
Fig. 26 Map area in SWMM with capacities of pipelines during peak flow in gradation
Fig. 27 Map area in SWMM model with velocity profile in gradation
Fig. 28 Water elevation profile plotted in SWMM model of sewage network
Fig. 29 Water elevation profile plotted in SWMM model of sewage network
Fig. 30 Water elevation profile plotted in SWMM model of sewage network with lifting in between
Fig. 31 Sewerage zones with lifting station, collection wells and proposed STP

Fig. 32 Septage Management, Containment, Emptying, Transportation, Treatment, End Use / Disposal
Fig. 33 MBBR Carrier media in a MBBR tank
Fig. 34 The continuous data obtained through IoT is used by a customised algorithm for synthesis to impart a smart decision-making procedure (photo courtesy-google)
Fig. 35 Capital cost planning
Fig. 36 Operating cost planning
Fig. 37 Suggestions and recommendations

LIST OF TABLES

Table 1 Ward details in Ponnani Municipality

Table 2 Population projection and Sewerage load calculation of Ponnani Municipality

Table 3 Water demand and sewerage load calculation of Ponnani Municipality

Table 4 Population projection and Sewerage load calculation of Ponnani Harbour Zone

Table 5 Water demand and sewerage load calculation of Ponnani Harbour Zone

Table 6 Present sewage load generation of the scheme area obtained from social survey

Table 7 Septage load calculation

Table 8 STP capacity calculation

Table 9 Components of sewage network

Table 10 Details of social survey performed in the scheme area

Table 11 Hydraulic network flow route - Pumping

Table 12 Pipes proposed for sewage network-pressurised flow

Table 13 Pipes proposed for sewage network-interception chamber to manholes

Table 14 Pipes proposed for sewage network-gravity flow

Table 15 Sewage Network-Road category

Table 16 Details of manholes

Table 17 Components of sewage treatment system

Table 18 Site proposed for Lifting Stations, Collection Wells and STP

Table 19 Dimensions and material of construction of sewage treatment system

Table 20 Abstract of Cost

Table 21 Control of odour by chemical addition

Table 22 Action plan for implementation

Table 23 Implementation schedule

LIST OF ANNEXURES

1. Detailed Estimate
2. Schematic diagram
3. Process flow diagram
4. Structural components
5. Layout of Sewage Treatment Plant (STP)
6. Sectional elevation of STP
7. Manhole & Collection well
8. Hydraulic flow simulation model in compact disc

EXECUTIVE SUMMARY

The detailed engineering report has been prepared for providing a Sewage Treatment Plant (STP) for Ponnani Municipality in Malappuram District as per SBM 2 Urban guidelines. As an initial part of the study, the Sewerage vertical team of Kerala Water Authority visited the Municipality and conducted several discussions with the authority and collected all basic data and information for design of the system. Detailed Discussion were done with the officials involved in the project and visited site proposed for the Sewage Treatment Plant (STP). At present there is no planned sewage treatment facility for the entire project area. Under the above circumstances it has been planned to construct a STP for the liquid waste management within the project area covering the Harbour zone and part of Puthuponnani zone with sewage network as an initial step and remaining area in the subsequent stage.

The sewage and sullage load generated for the project area was determined from the water consumption analysis and expected future requirements was also considered. The interception and diversion of drains in the scheme area are also considered. It is observed that 3.5 million Liters per Day (MLD) capacity STP is required including septage for the Harbor zone of Ponnani Municipality and the unit operations, and the chemical and biological process were designed in accordance with all stipulations of accepted practice of design and Indian Standard Codes of practice. The effluent characteristics were adopted in accordance with the regulations, especially the NGT guidelines on it. The biological treatment unit consists of Moving Bed Biofilm Reactors (MBBR) with a facility for nitrification and de-nitrification also. For additional purification, clarifiers are designed as a modern plate settler. The plant is to be equipped with sludge handling and disposal units also. it is planned to provide ecofriendly units for the system with gardens especially for the exterior portions of the units. The total length of sewer network is 9670.3 Km. There are 3 collection wells, 2 lifting stations and 4 drain interceptors. Total estimated cost is observed to be **₹ 79,50,000,000 (Rupees Seventy-Nine Crores and Fifty Lakhs Only)** including 10 years operational expenses excluding power charges. For conserving energy and optimizing performance of the system solar energy source is also planned to be used. Also, for trouble free performance of the system, at all points of influence, sensors for measuring values of flow and required parameters are to be installed. Using Internet of Things (IoT) enabled software system, the control of the entire process can be performed effectively. It has been planned to implement the project within a short span of time.

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PROJECT AT A GLANCE

Sl. No.	Item	Description
1	Name of the Project	3.5 MLD Capacity Sewage Treatment Plant and Sewerage System for Ponnani Municipality (Harbour Zone) – SBM 2 Urban
2	Name of District	Malappuram
3	Name of Municipality	Ponnani
4	Project area covered (m^2)	2720000
5	Population benefitted	127619 (at 2056)
6	STP Capacity	3.5 MLD
7	Cotreatment unit capacity	0.43 MLD
8	Total Network Length	9670.3 m
9	Number of Wells	3
10	Number of Pumping Stations	2
11	Number of Interceptions and Diversions	4
12	Number of Manholes	347
13	Number of Connections	690
14	O&M cost for 10 Years including 18% GST (excluding electricity charges)	₹ 16,40,00,000
15	Electricity charge for one year	₹ 2,13,10,193
16	Land Acquisition	Land must be acquired and handed over by LSGD
17	Total cost including 10 years O&M cost	₹ 79,50,00,000
18	Implementation agency	As per the decisions of the Government of Kerala
19	Period of execution	36 Months

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ABSTRACT

Sl. No.	Item	Amount
1	Cost of STP	₹ 9,39,02,782
2	Cost of ELECTRO MECHANICAL ITEMS	₹ 6,91,72,156
3	Cost of NETWORK (including sewer connection charges)	₹ 30,48,75,106
4	O&M charges for 10 years (STP + Network) (Without GST)	₹ 13,83,91,965
5	Centage @ 10% (1+2+3+4)	₹ 6,06,34,201
	GST @ 18% (1+2+3+4)	₹ 10,91,41,562
6	*DPR PREPERATION CHARGES @ 2.5% (1+2+3)*	₹ 1,16,98,751
7	Unforeseen items (including LS round off)	₹ 71,83,478
	Grand Total	**₹ 79,50,00,000**

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ABSTRACT OF ESTIMATE

Sl. No.	ITEM	AMOUNT
	CIVIL ITEMS	
1	Soil Investigation	₹ 2,79,430
2	Site Preparation	₹ 15,27,049
3	Collection well at STP	₹ 29,71,592
4	OG Trap, Receiving Chamber, Screen, Grit Chamber	₹ 45,40,655
5	Equalisation Tank	₹ 92,22,242
6	Moving Bed Biofilm Reactors	₹ 1,87,97,329
7	Clarifier with Tube/Plate Settler	₹ 36,25,145
8	Sludge Sump and Thickener	₹ 22,40,591
9	Filter Feed Tank	₹ 10,57,081
10	Chlorine Contact Tank and Treated Water Tank	₹ 41,28,097
11	Pile foundation and PSF/ACF foundation	₹ 1,34,48,668
12	Dilution Tank and Receiving Chamber - CTU	₹ 26,27,878
13	Administrative/laboratory/chemical house /control room building/Security cabin/air blower room and control panel room/chlorination building/compound wall/internal roads/storm water drains/transformer building/dg room/centrifuge building/sludge shed	₹ 2,16,78,220
14	Landscaping and green belt formation	₹ 15,00,000
15	Provision for providing automated system to the entire plant by Scada/Automatic Control system for network	₹ 33,00,000
16	Stair & walk way	₹ 37,58,804
17	Sewer network with pipelines and chambers	₹ 26,29,89,605
18	Sewerage connection charges	₹ 2,76,00,000
19	Control Room, Generator Room and Compound wall with gate for Network	₹ 40,00,000
	TOTAL OF CIVIL ITEMS	**₹ 38,92,92,387**
	GST Component (18%)	₹ 7,00,72,630
	MECHANICAL ITEMS	
1	Gates and Screens	₹ 11,65,453
2	Pump sets and Aeration system	₹ 1,42,32,500
3	PSF & ACF	₹ 85,00,000

4	Centrifuge	₹ 8,00,000
5	Bypass arrangements, Ladder and frame work	₹ 9,34,195
6	Piping and Valves	₹ 10,00,000
7	MBBR Carrier and other items	₹ 1,01,59,706
8	Tube settler media/Odour control unit	₹ 24,82,800
9	Gritting Mechanism/Sludge Mechanism	₹ 36,10,000
10	Alum and Lime dosing systems	₹ 7,10,000
11	Tools and plant/Spare parts/safety items	₹ 15,55,000
12	Supply of GPS fitted vacuum truck	₹ 90,00,000
	TOTAL OF MECHANICAL ITEMS	**₹ 5,41,49,656**
	GST Component (18%)	₹ 97,46,938
	ELECTRICAL ITEMS	
1	Diesel Generator	₹ 44,90,000
2	Electrical works, IoT based sensor and control units	₹ 1,72,18,001
3	Suppling and installing solar panel with all accessories	₹ 28,00,000
	TOTAL OF ELECTRICAL ITEMS	**₹ 2,45,08,001**
	GST Component (18%)	₹ 44,11,440

ABSTRACT OF COST

Sl. No.	ITEM	AMOUNT
1	Civil Works	₹ 38,92,92,387
2	Mechanical Works	₹ 5,41,49,656
3	Electrical Works	₹ 2,45,08,001
4	O&M Charges for 10 years (STP + Network)	₹ 13,83,91,965
5	GST Component (18%)	₹ 10,91,41,562
6	DPR Preparation Charge @ 2.5%	₹ 1,16,98,751
7	Centage Charges@10%	₹ 6,06,34,201
8	Unforeseen	₹ 71,83,478
	GRAND TOTAL	**₹ 79,50,00,000**

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND PROJECT GENESIS

Kerala Water Authority (KWA) was established on 1st April 1984 under the Kerala Water and Wastewater ordinance, 1984 by converting the erstwhile Public Health Engineering Department to provide for the development and regulation of water supply and wastewater collection and disposal in the State of Kerala and for matters connected there with. To effectively address the emerging need of wastewater management, a Sewerage Vertical wing has been created in KWA with Chief Engineer, PPD, WASCON and Sewerage as its head.

KWA as a knowledge partner, service provider and a central agency for coordinating the activities related to the planning and implementation of sewerage systems for Local Self Government Institutions (LSGIs) can contribute in many ways. In the State of Kerala, KWA is providing sewerage system partly in Thiruvananthapuram and Kochi Corporations and a Sewerage system for Guruvayur Municipality has been completed.

1.2 NEED FOR A SEWAGE TREATMENT SYSTEM

Environment protection has become the most important aspect in the present era of sustainable development. With uncontrolled urbanization, contamination of drinking water sources by sewage and septage has become a major threat to public health and safety. Direct discharge of sewage to the water courses and discharges of septic tank effluents to the stream and canals polluted the entire water course.

Safe water supply and hygienic sanitation facilities are the two basic essential amenities for healthy living. In the developing world, sanitation has always been more unfortunate than its twin brother water supply. The water supply will have a measurable impact on health only if it is linked with sanitation facilities.

The objective of the present work is to prepare a Detailed Engineering Report (DER) and implementation of an STP for Harbour zone in Ponnani Municipality in Malappuram district. The major objective of establishing Sewage Treatment Plant is to treat the effluent (untreated wastewater) generated from Harbour and Puthuponnani areas of the town and its direct release into natural environment. Wastewater may have an adverse impact on human health and environments. Therefore, proper wastewater management in this area is essential. Other general objectives of the present works are:

1. To find appropriate methods for collection, treatment and disposal of wastewater generated from the project area of Ponnani Municipality.
2. Treat all the wastewater generated from houses, commercial establishments and public institutions etc. as per the norms laid by Pollution Control Board and other regulations.
3. To discuss possible options to improve management of wastewater in the project area.

1.3 HUMAN DEVELOPMENT OUTCOMES FOR SEWERAGE INVESTMENTS

Lack of access to improved sanitation costs countries up to 7% of their GDP annually. At the national and global levels, the human cost manifests in huge economic losses. These losses are mainly driven by premature deaths, health care treatment, lost time and productivity seeking treatment, and finding access to sanitation facilities in urban areas and thickly populated clusters of rural areas as well. In 2012, the World Health Organization (WHO) estimated that the global economic return on sanitation spending is US $5.5 for every one dollar invested, more than double the economic return on water spending (US$2.0). However, the UN 2012 Global Analysis and Assessment of Sanitation and Drinking Water indicates that only 10 out of 75 countries who participated in their survey reported to have more than 75% of the funds needed for sanitation.

Investment in safe water supply and access to improved sanitation has multiple economic returns. For every 1 US Dollar invested, there is a projected USD 3 to 34 benefits gained. The benefits range from time savings and productivity gains to budget savings on health-care. Per capita gains for the developing world population could reach at least USD 15 per capita per year. It is well established that aspects of women safety, dignity and well-being are intrinsically linked to improved availability, access and use of sanitation and drinking water facilities.

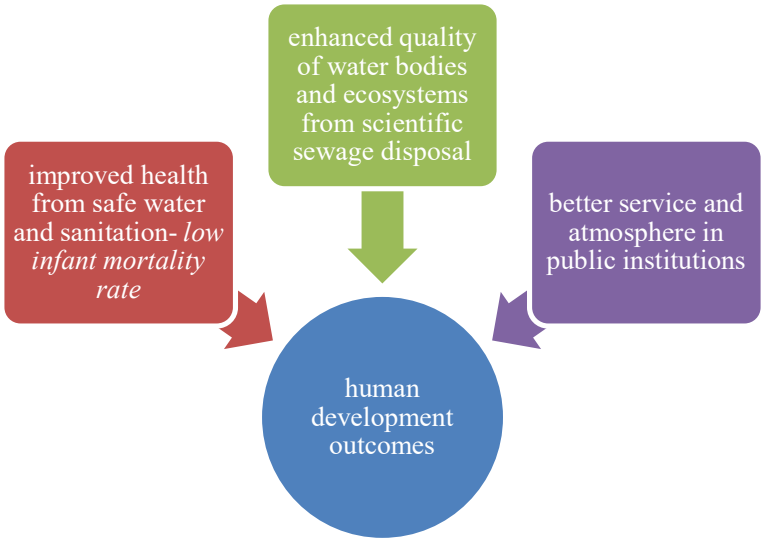


Fig. 1 Human development outcomes for sewerage investments

1.4 OVERVIEW OF SITUATION AND GOALS

Wastewater disposal and treatment was a major problem in cities in Kerala. The wastewater from toilets has been disposed through septic tanks and soak pits and grey form of wastewater from kitchen and bathrooms is directly discharged into the sludge drains without any treatment. As per Census 2011, 45.455 of the urban households have “no drainage”. There are 14.32% of the households connected to centralized sewerage system. Although centralized sewer system is of minor importance and disposal of sludge is a problem.

About 97.43% of the households in the urban areas of Kerala state have a toilet within their residential premises. Almost 56.69% of them are connected to septic tanks, 21.87% to pit latrines while households having connection to the centralized sewer system are about 14.32%. There are both technical and institutional dimensions to the problem of septic tanks in the state of Kerala. The septic tanks design does not comply with the national guidelines with reference to planning, design and construction. Local masons are unaware of the existing design and construction guidelines to construct and design the septic tanks. There are multiple agencies involved in operation and maintenance of water and sanitation services in Kerala. Septage management is viewed as private provision with limited role of urban local bodies.

The districts with highest percentage of households using septic tanks are Kozhikode (69.51), Wayanad (63.20), Malappuram (62.30), Kannur (60.24) and Thrissur (60.10). Together, these five districts account for 50.38 percent of the total households using septic tanks in the state of Kerala. About 50.78 percent of households in Census Towns use septic tanks for the purpose of faecal sludge management at the household level. Municipal Corporations and Municipalities have 29.40 and 19.82 percent respectively of the households having septic tanks. The Service Level Benchmark (SLB) is to ensure that all households have access to sewerage connection to ensure that the faecal sludge is safely disposed and treated at the Sewerage Treatment Plant (STP).

Another set of reasons cited for urgency in taking up septage management is the occupational hazards for emptying the septic tanks. The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 has expanded the definition of workers engaged in such sanitation works by including the practice of septic tank emptying and manual handling of such faecal sludge. The revised Manual Scavenging Act will require states to gear up the Municipal bodies in discharging their responsibilities effectively.

In the absence of efficient water treatment systems and solid waste management systems, untreated domestic and industrial wastes, and agriculture-runoff flow into the rivers polluting the rivers in Kerala. There has been widespread bacteriological contamination of faecal origin in ground and surface water which relate to proximity of increasing numbers of leach pit latrines, leakages from septic tanks, washing, bathing and other domestic activities.

Hence the goals for setting a sewerage strategy for a district will involve multi-faceted approach to cover every habitation and other institutions and establishments. This will render adequate results in both short term and long-term development plans. If a plan has been chalked out which can provide a systematic and flexible implementation mode, stage by stage implementation and better control over the system can be achieved. A district level plan document for sewerage will create a backbone for the subsequent formation of detailed engineering reports in this regard. Hence implementation of sewerage systems at the local body level will be more effective and systematic.

1.5 VISION OF SEWERAGE STRATEGY

As per the vision of Kerala State Sanitation Strategy, all cities and towns in Kerala become totally clean, sanitized, healthy, liveable, ensuring and sustaining good public health and environmental outcomes for all citizens, with a special focus on hygienic and affordable sanitation for the urban poor and women with specific focus on the diverse topography of the state and its implications. Hence the overall vision can be defined as the achievement of an urban Kerala ensuring environmentally safe disposal of solid and liquid waste. Similarly, to formulate a vision for sewage strategy for each habitation of the State it is imperative to develop a scientific, sustainable and effective sewage system covering directly or indirectly every human settlement. Improved Institutional governance and enhanced human resource capacities for planning and maintaining the sewerage is also coming under the goal. Capacity building for adoptability to modern technologies and applications for the service providers is also another goal.

1.6 SWACHH BHARAT MISSION - URBAN 2.0

The launch of Swachh Bharat Mission (SBM) on 2nd October 2014 by the Honb'le Prime Minister Shri Narendra Modi was a historic moment for India. Swachh Bharat Mission (Urban) (SBM-U) had three major objectives: (a) achieving 100% Open Defecation Free (ODF) status, (b) ensuring 100% scientific Solid Waste Management (SWM), and (c) behavior change through 'Jan Andolan', by 2nd October 2019, in all statutory towns. This Mission has achieved significant levels of success against the above objectives, with massive engagement of citizens across all categories of society.

SBM-U 2.0 will be implemented with a vision of achieving "Garbage Free" status for all cities. This will involve the following:

- all households and premises segregate their waste into "wet waste" (from kitchen and gardens) and "dry waste" (including paper, glass, plastic, and domestic hazardous waste and sanitary waste wrapped separately).
- 100% door to door collection of segregated waste from each household/ premise.
- 100% scientific management of all fractions of waste, including safe disposal in scientific landfills.
- all legacy dumpsites remediated and converted into green zones.
- all used water including fecal sludge, especially in smaller cities are safely contained, transported, processed and disposed so that no untreated fecal sludge and used water pollutes the ground or water bodies.

In order to achieve this vision, the following specific objectives are targeted to be achieved:

a) Sustainable Solid Waste Management
b) Sustainable Sanitation and treatment of used water
    a. holistic Sanitation, with end-to end solutions (from discharge, containment, evacuation, transportation to safe disposal of all effluents from toilets)
    b. treatment of used water before discharge into water bodies, and maximum reuse of treated used water
    c. eradication of hazardous entry into sewers and septic tanks, and sustaining elimination of manual scavenging, through mechanization of sewer and septic tank cleaning operations
c) Awareness creation along with large scale citizen outreach to create 'jan andolan', and institutionalize 'swachh' behavior.
d) Create institutional capacity to effectively implement programmatic interventions to achieve mission objectives

The Mission will be in force for five years, from 1st October 2021 to 1st October 2026. SBM–U 2.0 will be implemented by Ministry of Housing and Urban Affairs (MoHUA) through States/ UTs in all statutory towns (as per Census 201), in accordance with the guidelines. SBM-U 2.0 provides funds to address the issue of used water management including the safe containment, transportation and disposal of faecal sludge and septage from toilets, for cities with population of less than 1 lakh. Inclusion of used water management component under SBM-U 2.0 will help to achieve following two objectives:

- All used water is safely collected, treated and reused to feasible extent and no untreated used water is discharged into water bodies or the open environment.
- All faecal matter and septage is properly collected, treated and by-products reused.

To achieve the objective of treating used water before discharge into water body/ overland, the following will be the major areas of focus under SBM 2.0, and will be eligible for Central share of funding:

- Setting up of Sewage Treatment Plants (STPs)/ STP-cum-FSTP
- Laying Interception and Diversion (I&D) structures including provision of pumping stations and pumping main/gravity main upto STP
- Procuring adequate numbers of septic tank desludging equipments;
- Deploying Digital (IT enabled) tools for real time monitoring of efficiency parameters during the operational phase of STPs and allied equipments.

1.7 PROJECT COMPONENTS ELIGIBLE FOR FUNDING

1.7.1 Used Water Project Components eligible for central funding

The project components to be funded by GOI is given below

1. **Sewage Treatment Plant:** State/ULB will be free to adopt any proven technology, as brought out in the CPHEEO Manual/MoHUA Advisories from time to time. However, for smaller ULBs, nature-based technologies in suitable combinations may be adopted. Relevant components for integration of septage treatment at STP such as desludging ramp, screens, solid/ liquid separation chamber, pumping etc, will be admissible components for Central funding as part of STP.
2. **Interception and diversion drains/ outfall sewer/ trunk main sewer:** Interception and diversion drain component is eligible for funding for conveying municipal dry weather flow upto STP/ STP cum FSTP through an outfall sewer/ trunk sewer from existing/ upcoming sewer network leading to the Sewage treatment facility.
3. **Sewer & Septic tank cleaning machines** Desludging/ cleaning equipments will be eligible for funding provided that SLTC confirms that (a) the Private Sanitation Service Operators (PSSOs) are unlikely to be available to undertake this task at the particular ULB and (b) the State/ ULB will be engaging operators on contract to run them.

1.7.2 Used Water project components to be fully funded by States/ULBs

1 **Sewer Network-** The entire cost of sewer network being set up in the towns to be borne by the State/ UT & ULB including those of tied 15th Finance Commission (FC) Grants. The arrangements in terms of funds and timelines need to be delineated and explained to SLTC while sanctioning of projects and also communicated to the National Mission Directorate, at the time of claiming central share of funds for STPs/ STP cum FSTP and I&D infrastructure in any town. It is expected that each ULB will use 15th FC tied Grants/ SFC Grants and their own resources to suitably convey sewage from the households through

sewer networks to ensure robust and environmentally conscious sanitation approach. As an interim arrangement due to fund constraints or any other reasons existing and improved municipal pucca drains could be used as means of conveyance. Use of tied 15th FC grants towards development of sewage conveyance network would be monitored by Ministry in accordance with 15th FC guidelines. Further, to promote planned urbanization with requisite basic services, it is advised that in new green field developments in and around towns, provision of sewerage network along with decentralized sewage treatment facilities should be ensured. This will avoid construction of individual septic tanks and soak pits.

2 **Strengthening of Municipal Drains** As an interim arrangement, till sewers are laid in town, strengthening of drainage networks is to be taken up and intercepted into existing/ upcoming sewer network, wherever feasible, or brought to I &D point from where, sewage/ sullage can be conveyed to STP/ FSTP cum STP. As in the case of sewer network, the arrangements being contemplated in terms of funds including tied 15th FC Grants and timelines need to be delineated and explained to SLTC, while sanctioning of projects, and also communicated to the National Mission Directorate, at the time of submission of funds request towards STPs and I&D infrastructure. As explained above, in this case also funds mobilized out of 15th FC tied Grants/ SFC Grants and State/ULB's own resources would be monitored in adherence to 15th FC guidelines.

1.8 ORGANIZATION OF DETAILED ENGINEERING REPORT

The Detailed Engineering Report (DER) for the Sewage Treatment Plant, Interception and diversion drain components and Sewer Network for the Harbour zone of Ponnani Municipality in Malappuram District has been prepared by KWA and presented in 7 chapters, describing different project concepts and activities.

Chapter 1 deals with a general introduction to the subject. Vision and goals of the sewerage for entire project area and its social implications are described.

Chapter 2 consists of various aspects of the sewerage strategy for the project area. Plan for the sewerage treatment and the technology adopted are described.

Chapter 3 describes sewer network in details. Planning of sewer network in core areas and its design is illustrated in detail.

Chapter 4 deals with the unit operations and treatment process in details. Various components of the sewerage system and its design aspects are also described in detail.

In Chapter 5, detailed estimates for all components of the sewerage project are illustrated.

Chapter 6 deals with various aspects of operation and maintenance of the sewage treatment plant in detail. Since it is decided to impart optimum cost and functional aspects of operation, applications of modern technologies for control of the process are also dealt with.

In the concluding Chapter 7, observations gathered from the pre-feasibility studies for the planning, design and implementation of the sewerage system for the institution is presented. Action plan for the implementation of the project and recommendations for future additions are also dealt with.

CHAPTER 2

PLAN OF SEWAGE TREATMENT

2.1 GENERAL

In this Chapter general aspects of sewage collection, treatment and disposal for the Harbour zone in Ponnani Municipality is described. For Harbour and part of Puthuponnani zone of the Municipality, A core sanitation zone (CSZ) in the area is identified. This zone has a high population density area catering to around 50% of the population in approximately 30% of the area. sewer network consisting of pipeline network is planned to be laid underground to collect sewage load from various nodes in the system across the project area. The sewage network system also consisting of manholes at the interval of 30 m in normal cases and at every bends in vertical and horizontal planes. Whenever there is a variation in diameter, manholes are also provided. To reduce depth cutting, lifting manholes are provided with sewage lifting pumps of smaller capacities. Solar power and diesel generator backup power is also provided to get uninterrupted working of the system. IoT enabled monitoring of the sewerage system is envisaged with a control station inside the Sewage Treatment Plant (STP).

The rest or the areas of the zone can be called as Peri-urban Areas (PuAs) which can be further classified based on the population density, water consumption, topography etc. Households not connected to sewer networks have their grey water flowing through open/natural/artificial drains to low lying areas. An interception and diversion arrangement are set up at points on these drains from where the dry weather flow (wastewater not mixed with storm water) is collected and diverted to a treatment facility. In case the treatment facility is not nearby, then the wastewater is conveyed through truck sewers (using pumping stations) to the nearest treatment plant. While the core sanitation zone will have sewerage network, households in other zones will rely on onsite sanitation systems such as pits and septic tanks. The fecal sludge from the septic tanks needs to be emptied, transported and treated before being disposed or reuse. FS can be treated in the proposed STPs by enabling co-treatment along with sewage.

Sewage Treatment Plant is designed for primary treatment and subsequent bacteriological and chemical treatment process. Finally, sludge handling units are planned to be provided. The recycled water can be taken for agricultural and other commercial and industrial purposes and for recharging water bodies and to alleviate any pollution loads.

2.2 PROJECT AREA

Malappuram is situated in south-western India (11.03°N 76.05°E) and is one of the 14 districts in Kerala, with a coastline of 70 km. The city of Malappuram, the district headquarters, gives the district its name. The term, Malappuram, which means "over the hill" in Malayalam, is

derived from the geography of Malappuram, the administrative headquarters of the district. It is the most populous district of Kerala (41,12,920), which is home to around 12.3% of the total population of the state. In terms of population per sq.km, the district has recorded the 4th dense district (1157/Km^2) and 2nd urban dense district in the state as against state density (860/Km^2). It is the first e-literate district and the first cyber literate district in India. The district was formed on 16 June 1969. Malappuram district is bounded by Kozhikode district to the northwest, Wayanad district to the northeast, Nilgiri hills to the east, Palakkad district to the southeast, Thrissur district to the southwest, and Arabian Sea to the west, Malappuram has a total geographical area of 3,554 km^2, which ranks third in the state in terms of area. The district possesses 9.15% of the total area of the state. The district is located at 75°E - 77°E longitude and 10°N - 12°N latitude on the geographical map. Similar to other parts of Kerala, Malappuram also has a coastal area (lowland) bounded by Arabian Sea on the west, a midland at the centre, and a hilly area (highland), bounded by Western Ghats on the east. Unlike other districts of Kerala, hilly areas are widely seen in the midland area too.

The Ponnani municipality is located at the south west end of Malappuram district and fall completely on the southern bank of river Bharathapuzha. Ponnani municipality is situated about 50 kms south of the district headquarters, Malappuram, with an aerial extent of 24.82 Km^2. The area lies at 10.7677° N, 75.9259° E and has altitude ranging from 1.0 to 5.0 metres above sea level. It's the place where Kerala's second longest river, the Bharathapuzha, finally comes to an end of its long, winding journey through Malabar to join the Arabian sea. It is situated at the estuary of Bharathapuzha (River Ponnani), on its southern bank, and is bounded by the Arabian Sea on the west and a series of brackish lagoons in the south. The River Tirur joins River Ponnani at its mouth at Patinjarekkara Beach from the north bank, opposite to Ponnani. The Colonial-era Cannoly Canal ("the Ponnani Canal") bisects Ponnani town. National Highway 66, from to Panvel to Kanyakumari, passes through Ponnani Municipality. The nearest important rail head are Kuttipuram and Tirur on the Cochin-Mangalore broad gauge line which are 17 kms and 22 Kms away from Ponnani.

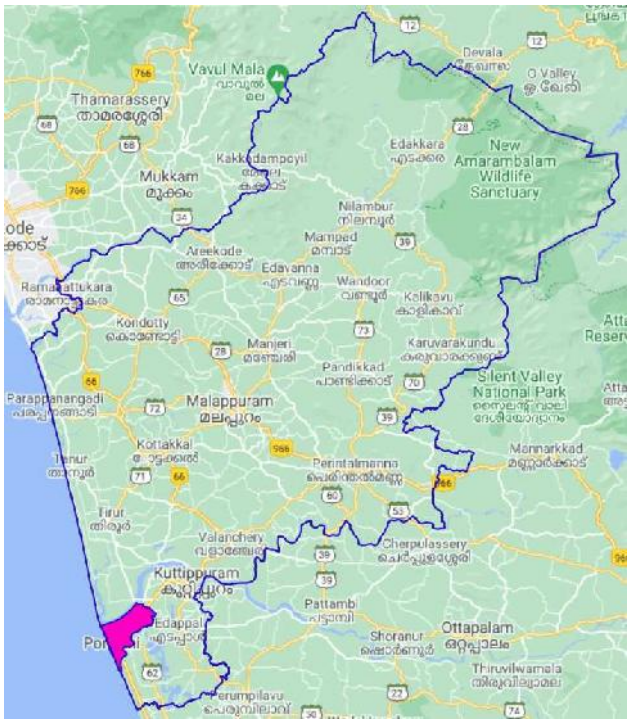


Fig. 2 Ponnani Municipality located in Malappuram District Map

Ponnani is one of the major fishing centres in the district and it is really awesome to observe during the month of February/March, thousands of migratory birds flock to this region. Ponnani being a major coastal town, the place has much historical significance too. Apart from being a favourite destination of the Arab traders some 2000 years ago, the place was also a captivating destination for many Muslim spiritual leaders who were introducing Islam here. This place was also traditionally famous for its religious importance and harmony. The Ponnani is known as small Mecca of Kerala. It is believed that Malik-ibn-Dinar, the first Islamic missionary to Kerala in the sixth century, visited to Kerala, visited Ponnani. The Juma Masjid here was constructed by his follower Zainuddin Ahammed in the 15th century. The Thrikkavu temple here is adjacent to the Juma Masjid, but there have been no untoward incidences in the area ever. There are many versions regarding the origin of the name Ponnani. It is said that the name was given by Arab traders, who exchanged gold coins they brought for goods at the port here. In Malayalam language, the word for gold is “pon nanyam” hence, the name Ponnani. Another version is that the Bharathapuzha River flowing through the region was known as “PonVahini” meaning carrier of gold, which later become Ponnani. Ponnani was a famous sea port in ancient times. It used to be under the control of Namboodiri feudal lords. Later, power shifted to the hands of the Zamorins of Kozhikkode. During early decades of 16th century, Ponnani witnessed terrible battle between Zamorin’s naval chief, Kunjali Marakkar and the Portuguese army. The place is also witnessed invasion by the Portuguese and later by Hyder Ali, a Carnatic emperor in 18th century. It was with the fall of Tipu Sultan s/o Hyderali that the Ponnani succumbed to the British during the last decade of the 18th century.

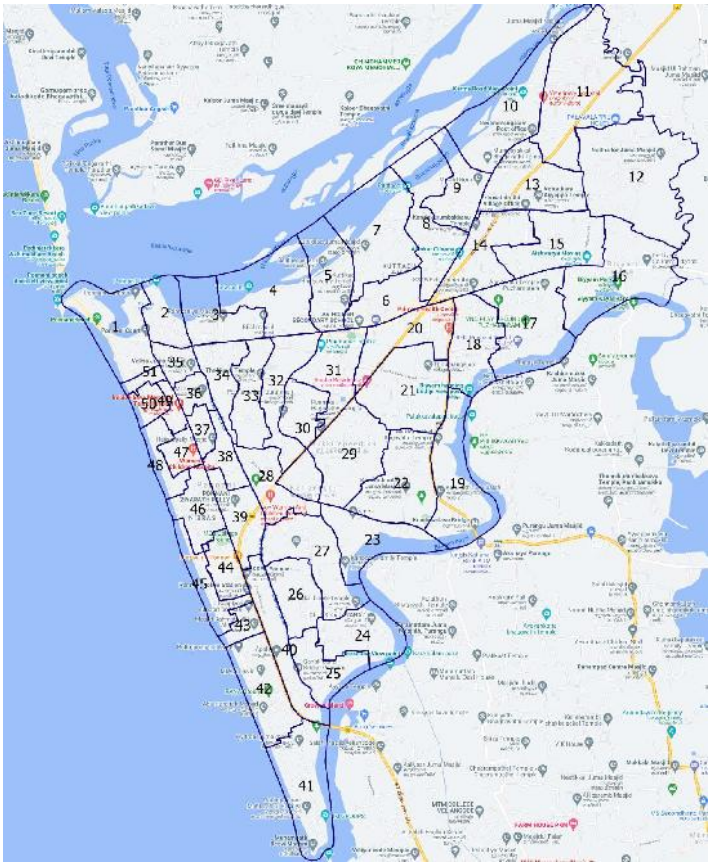


Fig. 3 Map of Ponnani Municipality and ward boundaries

Places of Interest

1. Ponnani Jum'ah Masjid

Fig. 4 Ponnani Jum'ah Masjid

2. Mausoleum of Jarattingal Tangal
3. Mausoleum of Makhdum Tangal
4. Trikkavu Temple

Fig. 5 Thrikkavu Temple

5. Kanda Kurumba Kavu
6. House of the Makhdums
7. Ponnani Beach

Fig. 6 Ponnani Beach

8. Patinjarekkara Beach

9. Ponnani Azhimukam
10. Ponnani Karma Road
11. Chamravattam Bridge

Fig. 7 Chamravattam Bridge

12. Biyyam Kayal

Fig. 8 Biyyam Kayal

13. Biyyam Hanging Bridge
14. Biyyam Park
15. Ponnani Harbour

Fig. 9 Ponnani Harbour

The Ponnani Municipality is composed of the following 51 wards

Table 1 Ward details in Ponnani Municipality

Ward No	Name of Ward
1	Azheekkal
2	Pallikadavu
3	Chana
4	Velleeri
5	Kuttikkad
6	Ezhuvathiruthi
7	Welfare
8	Thevarkshethram
9	Kottathara
10	Chmravattom
11	Eswaramangalam
12	Naithallur
13	Kotta
14	Erikkamanna
15	Puzhambram
16	Biyyam
17	Andithode
18	Boat jetty
19	Pulikkakadavu
20	Junction
21	Theyyangad
22	Karukathiruthy
23	Attupuram
24	Fisheries school
25	Kadavanad south
26	Kadavanad north
27	Ayyappankavu
28	Pallapram west
29	Uroob nagar
30	Pullonath athani
31	Chandapadi
32	Trikkav east
33	Thrikkav
34	Vandipetta

35	M .I. A
36	Puthamkulam
37	Thekkepuram
38	Parangivalappu
39	Municipal office
40	Cherupalli
41	Pudu ponnani south
42	Pudu ponnani north
43	Mylanchikkad
44	Nayadi colony
45	Murinjazhi
46	Mes college
47	Mukkadi
48	Aliyar palli
49	Govt. Hospital
50	Marakkadavu
51	Meentheruvu

Proposed project is designed to collect the sewage water from the houses and carry it to a suitable place for providing desired treatment before the waste water being finally disposed off to low-lying area or reused for the purposes like irrigation, gardening, firefighting, industrial & institutional supply or ground water recharge etc. Looking to the topography, construction scheduling and development trend, the total area of the Municipality is divided in 6 zones namely

1. Kottathara
2. Thrikkavu
3. Harbour
4. Puthuponnanni
5. Kadavanadu
6. Biyyam

This DER discusses the overall aspects of sewage collection, treatment and disposal for the harbour zone in Ponnani Municipality. The present proposal covers wards 1, 2, 35, 36, 38, 39, 44, 46, 47, 48, 49, 50 & 51fully.

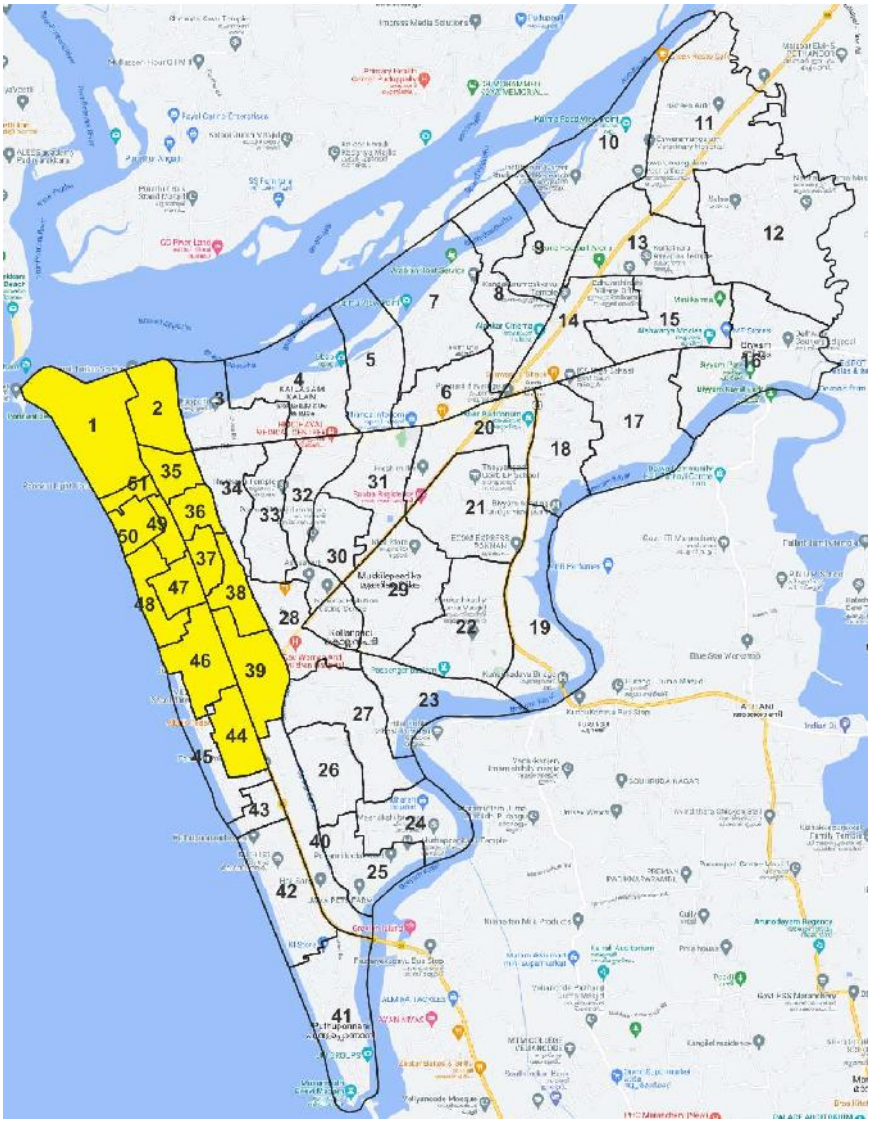


Fig. 10 Project area and ward map

2.3 PRESENT CONDITION OF SEWAGE COLLECTION AND DISPOSAL

As any part of Kerala, Ponnani is also thickly populated and occupied almost everywhere. The town is not a well-planned one and there is no comprehensive sewerage or drainage system in the town at the moment. The buildings, be it residential or commercial, have only individual arrangements in the form of septic tanks or leach pits for handling night soil located in their back yards. The other waste streams are simply disposed to the nearby drains or natural ditches. With the increasing population and needs, problem has become worse. The space limitations restrict individual waste disposal systems for buildings. Thus, a properly designed sewerage system is very essential to a rapidly growing municipality like Ponnani.

Fig. 11 Pollution stretches in Canoly canal

Fig. 12 Drainages at various locations

2.4 EXPECTED SEWER LOAD FROM PROJECT AREA

For computation of sewage load, population forecast has been performed in the geometrical progression method. For the local body, the decadal population variation (8.41%) has been taken as the mean value of the last decadal variation value for it and for the district. Form this value expected population in 2056 has been determined from the base year of 2011, since the latest Census data is available for the year 2011. For computing the sewage load, return ratio of 80% has been adopted. In addition to this, for the non-domestic and floating demand, a value of 20 percentage is taken and for unaccounted water and infiltration, another 10 percentage is taken. In addition, social survey was also conducted to determine the number of houses, shops etc. and other buildings in the project area. In addition to the above sewerage load the septage for the remaining area is also calculated. This calculation is based on the sludge accumulation

rates provided in table 9.2 of Manual on Sewerage and Sewage Treatment Systems – 2013 with successive desludging interval of 3 years.

Table 2 Population projection and Sewerage load calculation of Ponnani Municipality

			Population	Projected Population			
Sl No	**Name**	**Type**	**2011**	**2023**	**2026**	**2041**	**2056**
1	Ponnani	Municipality	90491	99624	101907	114763	127619

Table 3 Water demand and sewerage load calculation of Ponnani Municipality

Year	**2023**	**2026**	**2041**	**2056**
Water Demand (MLD)	14.94	15.29	17.21	19.14
Non-Domestic Water Demand (MLD) (20%)	2.99	3.06	3.44	3.83
Sewerage Flow (MLD) (80 % Return Ratio)	14.3	14.68	16.52	18.38

Table 4 Population projection and Sewerage load calculation of Ponnani Harbour Zone

			Projected Population			
Sl No	**Name**	**Type**	**2023**	**2026**	**2041**	**2056**
1	Ponnani Harbour Zone	Municipality	8976	10109	11385	12660

Table 5 Water demand and sewerage load calculation of Ponnani Harbour Zone

Year	**2023**	**2026**	**2041**	**2056**
Domestic Water Demand (MLD)	1.35	1.52	1.71	1.9
Non-Domestic Water Demand (MLD) (15 %)	0.20	0.23	0.26	0.29
Sewerage load (MLD) (80 % Return Ratio)	1.24	1.4	1.58	1.75
Ground water infiltration				0.15
TOTAL SEWAGE LOAD				1.90

Table 6 Present sewage load generation of the scheme area obtained from social survey

Sl No.	Item	Quantity	Water Supply (LPCD)	Sewerage load (LPS)
1	No of houses	1670	150	13.92

2	No of duty staffs in shops	190	45	0.08
3	No of seats in Hotel/Restaurants	40	70 per seat	0.03
4	No of beds in lodge	176	180 lpcs	0.29
5	No of apartments	41	150 lpcd	0.34
6	No of staffs in office	817	45 lpcd	0.34
7	Auditorium/Theatre seat	127	15 lpcd	0.02
8	No of students & staffs in Schools	4197	45 lpcd	1.75
9	Members in Hostels	307	135 lpcd	0.38
10	Visitors in Masjid	2265	15 lpcd	0.31
				17.46
TOTAL SEWAGE LOAD = 1.50 MLD				

Table 7 Septage load calculation

Sl No.		
1	Total population of the municipality at 5056	127619
2	Population considered for the sewerage network	12660
3	Population taken for septage	127619 – 12660 = 114959
4	Sludge deposit coefficient	67 litres/person/year
5	Desludging Interval	Once in 3 years
6	Sludge deposit	21.1 KLD

Table 8 STP capacity calculation

Sl No.	Item	Quantity
1	Average flow from network	1.9 MLD
2	Flow from drain interceptor	1 MLD
3	Flow from septage dilution tank	0.43 MLD
4	Capacity of STP	3.5 MLD

2.5 SEWERAGE TECHNOLOGY

Decentralized wastewater management system (DWMS) may be designed as the collection, treatment, and disposal/reuse of sewage from individual houses, cluster of houses, isolated communities, industries or institutional facilities as well as from portion of existing communities at or near the point of generation of sewage. Decentralized systems maintain both

the solids and liquid fraction, although the liquid portion and any residual solids can be transported to a centralized point for further treatment and reuse.

Recognizing the many applications and benefits of sewage reuse, some important points may be kept in view such as (i) review of the impact of the population growth rate (ii) review of potential water reuse applications and water quality requirements (iii) review of appropriate technologies for sewage treatment and reuse (iv) considering the type of management structure that will be required in the future and (v) identification of issues that must be solved to bring about water reuse for sustainable development on a broad scale. It has been emphasized that if the sewage from the urban and semi urban areas were reused for a variety of non-potable uses, the demand on the potable water supply would be reduced.

The choice of appropriate technology will also depend on several factors such as composition of sewage, availability of land, availability of funds and expertise. Different operation and maintenance options will have to be considered with respect to sustainable plant operation, the use of local resources, knowledge, and manpower.

2.6 STRATEGY FOR SEWERAGE SYSTEMS

For formulating a strategy for planning, designing and implementing sewerage systems for a project area it is imperative to closely examine the factors contributing to the generation of sewage load and its effective treatment, recycling and disposal arrangements. For this purpose, each location in the project area concerned has been analysed thoroughly using available data on the following parameters and features:

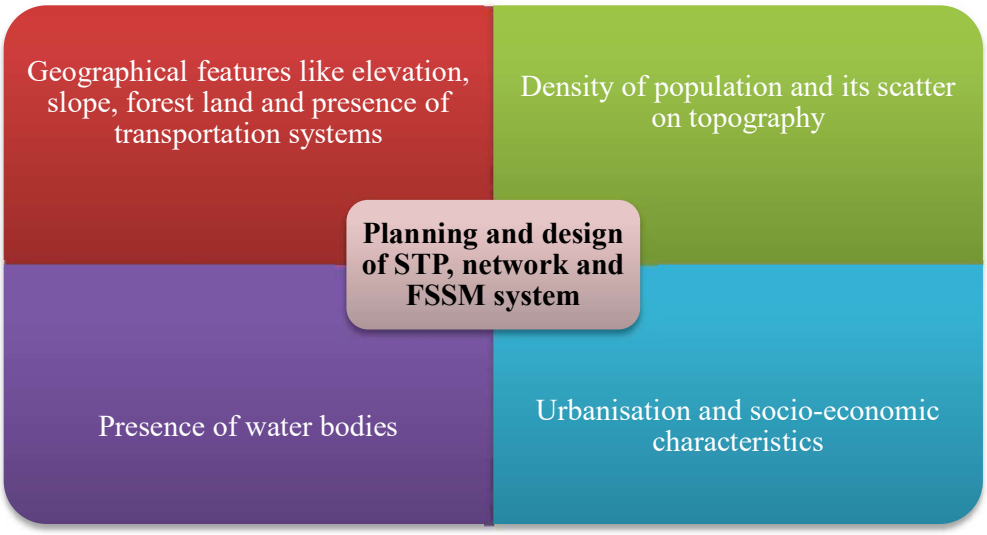


Fig. 13 Parameters for analysing LSGI's for sewerage/FSSM system

Since another important feature influencing the sewage load generation and its subsequent management task is the scatter of population density, an analysis was performed in this regard. Population forecast for the project area was carried out using geometrical progression method

with the increment percent as the mean value of last decade increment and the district average value.

2.7 PLAN FOR AREAS DIRECTLY CONNECTED TO POLLUTION OF WATER BODIES

The management of onsite sanitation systems such as septic tanks remains a neglected component of urban sanitation and wastewater management. Sullage, which is a fluid mixture of untreated and partially treated sewage solids, liquids and sludge of human or domestic origin, flows out of septic tanks and enters waterways or is generally disposed into nearest water body or nearest drain or low-lying areas. Solids accumulating in the septic tank that is defined as septage is periodically taken out and disposed of without treatment. This leads to serious health and environmental implications. In the absence of efficient water treatment systems and solid waste management systems, untreated domestic and industrial wastes, and agriculture-runoff flow into the rivers polluting the rivers in the locality. There has been widespread bacteriological contamination of faecal origin in ground and surface water which relate to proximity of increasing numbers of leach pit latrines, leakages from septic tanks, washing, bathing and other domestic activities. This scenario demands a planned sewerage system for the areas which are in proximity to the rivers.

2.8 PROGRAMME FOR ABATEMENT OF POLLUTION TO ENVIRONMENT

In the river rejuvenation programs several departments of Kerala State Government has been jointly chalked out short term and long-term plans for the abatement of pollution to the rivers. Local Self Government Institutions (LSGI's), Irrigation department, Kerala State Pollution Control Board, Ground Water Department and KWA etc. are among these participants. In the short term plans, identification of polluted stretches, surveillance to restrict dumping of wastes into river and its branches, cleaning and desilting of canals, closing of all unauthorized outlets leading to the river, boards to display slogans against littering waste in various places other activities like posters, notices and awareness classes, river water quality monitoring, inspection and effluent quality monitoring of the flats, industrial units, service stations, hospitals, hotels etc. are envisioned. In the long-term action plan, planning, design and operation of STPs and FSSM units are envisaged. These treatment facilities are to be so designed that safe disposal and recycling of the wastewater can be materialised. If decentralised units are planned, management of operation is observed to be optimised. Ground water recharging / rainwater harvesting etc. are also to be planned in the long-term action sequence. The strategy for abatement of pollution to environment can be summarised as follows:

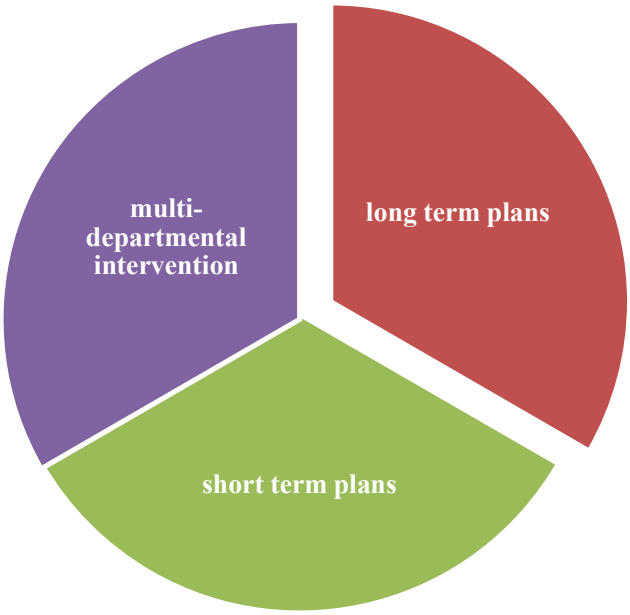


Fig. 14 The strategy for abatement of pollution to environment

2.9 OUTLINE OF SEWERAGE IMPLEMENTATION

In the implementation procedure for sewerage schemes, multi-faceted approach is essential to achieve its goals. Since the primary goal of sewerage system is providing hundred complete and scientific sanitation facilities for every household, grass route level planning is necessary. Every local body must be able to prepare a sanitation plan which can be implemented along with the development document for the LSGI.

Since the State is heading for a rapid expansion in drinking water production and distribution sector KWA, especially on materialising a 24 X 7 drinking water concept in urban areas, and to ensure the households have 100% access to piped water supply, mostly through individual connections, the sanitation facilities will generally improve. However, the production of sewage will also increase and hence this will demand sewerage facility for every household unit. Additionally recycling of grey water is also to be planned and implemented for non-drinking water usage.

For effective implementation of the sewerage there should also an Integrated Management Information System (IMIS) which is continuously updated.

2.10 PLAN FOR REUSE OF RECYCLED SEWAGE

In the planning and implementation of water reclamation and reuse, the reclaimed water application will usually govern the wastewater treatment needed to protect public health and

the environment, and the degree of reliability required for the treatment processes and operation (Metcalf and Eddy). The major wastewater re use categories are as follows:

a] agricultural irrigation, crop irrigation and commercial nurseries

b] landscape irrigation

c] industrial recycling and reuse

d] groundwater recharge, groundwater replenishment and saltwater intrusion control

e] recreational/environmental uses

f] non-potable urban uses

e] potable reuse

In the present project, the dewatered sludge can be used as a manure for cultivating vegetables and other plant life.

2.11 INTEGRATION WITH OTHER PROJECTS

Planning and design of sewerage schemes can be combined with other water resources projects also. This is since most of these projects are inter-related and environment sensitive. Hence the location of an STP, collection wells and coverage of sewage networks in an area depends upon the water supply system existing in that area, proximity of irrigation canals, water bodies and flood routing structures if any. The integration of different projects related to the water resources and conservation schemes greatly influence the successful establishment and operation of the sewerage schemes in an area. As shown below and integrated planning of the projects associated with water resources will contribute effectively for a successful sewerage system.

CHAPTER 3

PLANNING, DESIGNING AND LAYING OF SEWAGE NETWORK

3.1 GENERAL

The most common type of sewer construction practice involves the use of open trenches and prefabricated pipes. In the present project, open trenches are planned in most of the areas for laying of sewer load carrying pipe network upto a depth of 3 m and Horizontal Directional Drilling (HDD) method is used where depth is above 3 m. Sewer loads generated from individual households, commercial establishments, public institutions etc. in the Harbour zone is collected from the source nodes and carried through pipes and concrete chambers to the nearest manholes. From there it is transported through a network of pipes towards the Sewage Treatment Plant (STP). Care has been taken to limit the depth of cutting below 4.5 meters in most of the cases to avoid construction and operation difficulties. For septage management, de-sludging from sources are performed annually using special equipment and septage is carried to the STP for co-treatment after desirable dilution.

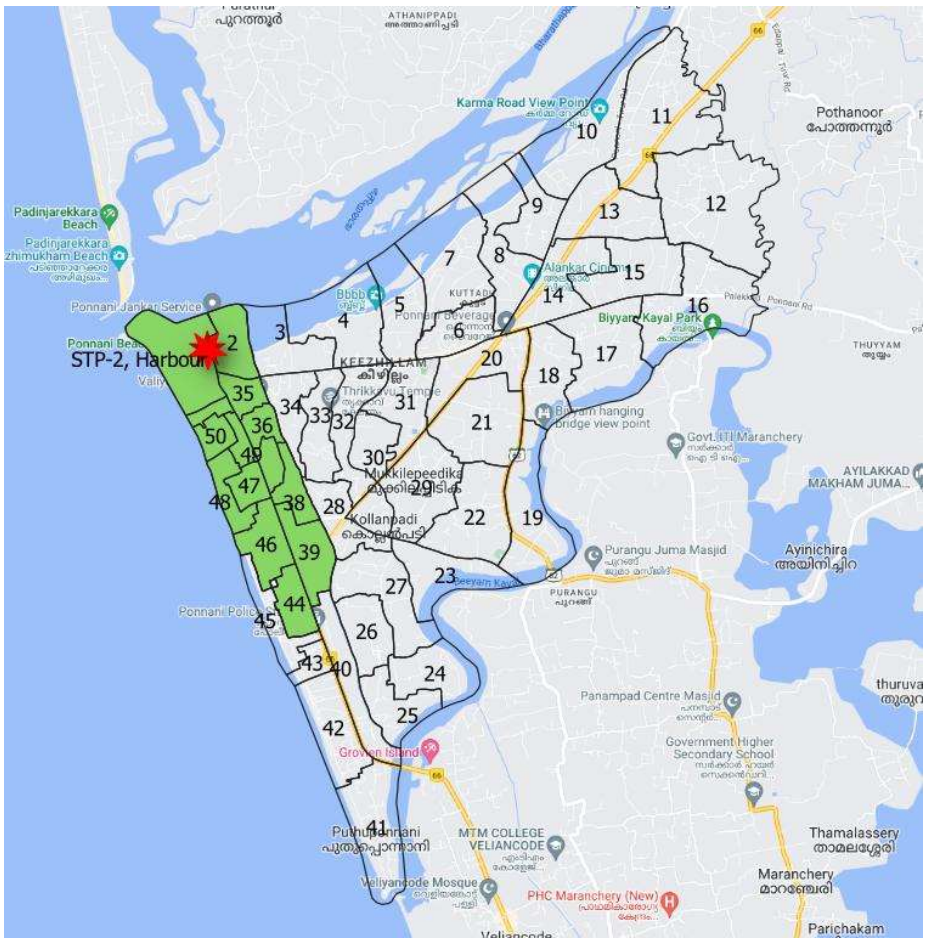


Fig. 15 Harbour zone and location of STP

Kearala Water Authority has already prepared two DPRs for the Kottathara zone and Harbour zone of Ponnani municipality and submitted it to government. As per the discussion done with municipal authorities it was decided to propose a sewage network system in the Kottathara zone first followed by Harbour zone and other areas too. It is decided to propose septage facility for the houses which are unable to connect to the sewerage network. Co-treatment facility is also provided here to treat the septage waste in the same STP. In the DPR prepared for Harbour zone which was submitted already, it was proposed to lay sewers for about 34.67 Kilometres with pipe size ranging from 225 mm to 630 mm outer diameter. The capacity of the STP was 7.12 MLD. Manholes are proposed at every 30 m interval and in every bends and road junctions. Since the project area is a water-logged area, 6 lifting stations and 3 well cum lifting stations (including well in STP) are proposed to avoid excessive depth as shown in Fig. 16. The land proposed for STP in this zone is owned by harbour department and the Municipality has initiated necessary steps to obtain a part of this land for the construction of Sewerage treatment facility.

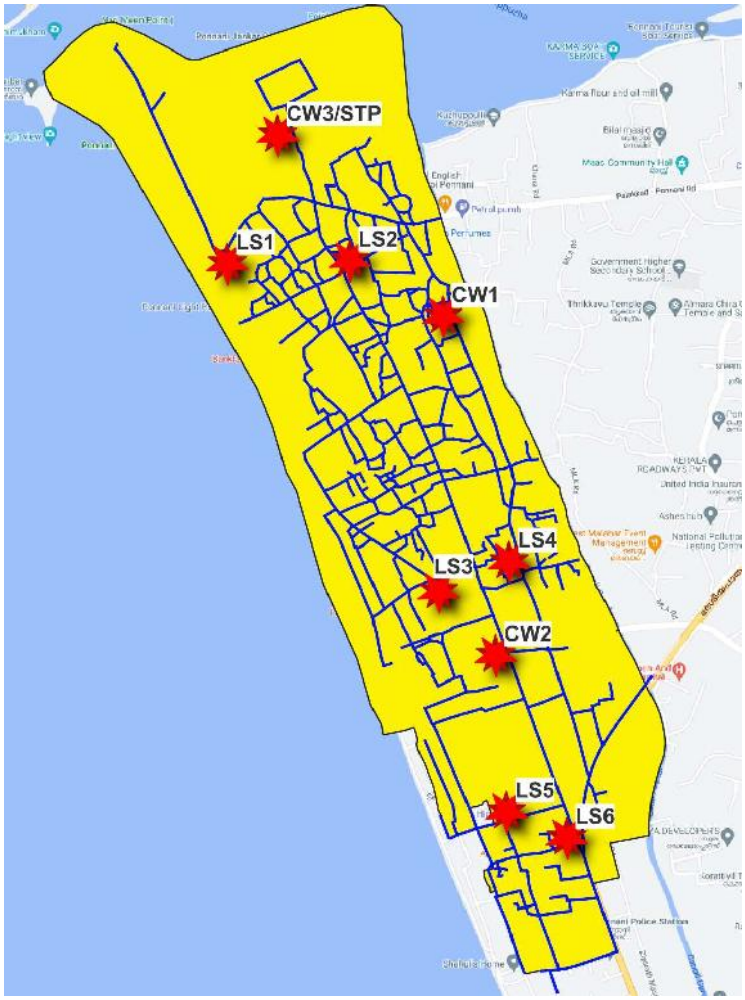


Fig. 16 Harbour zone with STP, Collection wells and lifting stations – Submitted proposal

In the present proposal, the already submitted DPR for the harbour zone is revised as per the SBM-2 guidelines. The total network length is reduced to 9.67 Km, by maintaining same pipe size as in the previous proposal. Thus, the ULB can extend this sewer network in future and ensure complete network coverage in the scheme area. In the present proposal Collection Wells (CW) - CW1, CW2, CW3 and Lifting Station (LS) - LS2, LS6 are only considered. There are four locations in the zone where wastewater from drains is intercepted. The interception and Diversion (I&D) arrangements are provided at four outfalls namely OF1, OF2, OF3 and OF 4. The existing drains in the zone will be intercepted and the wastewater flowing through them will be pumped to the nearest manholes. The GIS map of the existing drains and their outfalls is shown in Fig. 17.

Fig. 17 Drain and their outfalls

Fig. 18 Ponnani Harbour zone SBM 2 schematic representations

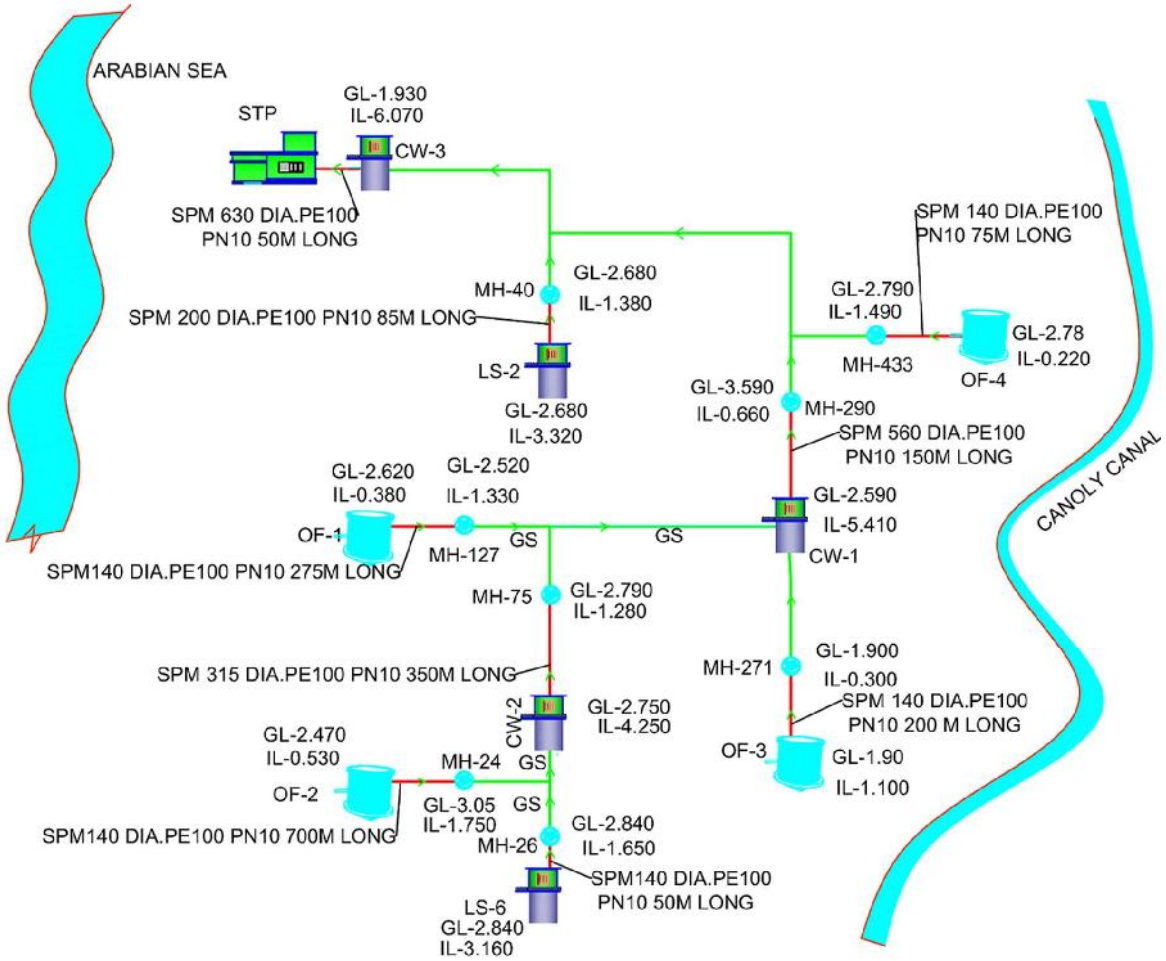


Fig. 19 Schematic diagram

3.2 COMPONENTS OF SEWAGE NETWORK

The components of the sewage collection and carriage network consists of the following elements:

Table 9 Components of sewage network

Sl. No.	Type of element	Material	Function
1	Chambers	Reinforced concrete	Collection of sewage from individual units for transferring to manholes
2	Sewer pipelines	Polyethylene (PE)	Transfer of sewage by gravity flow from one point to other
3	Manholes	Reinforced concrete	Sewage collection points and inspection areas for removing blocks and cleaning of lines
4	Lift manholes	Reinforced concrete	Sewage collection points and inspection areas for removing blocks and cleaning of lines and lifting of sewer load to the next manhole. Submersible pump sets are installed inside in such manholes.
5	Collection well	Reinforced concrete	Centralised collection point for sewer load from a sub-zone in the project area.
6	Pumping station	Reinforced concrete	Centralised collection point for sewer load from a sub-zone in the project area and pumping of sewage to the next well or STP.

3.3 DESIGN OF SEWAGE NETWORK

For the design of sewage network, hydraulic analysis was performed for the initially planned network and refined for a set of constraints and inflow values. The pipelines are designed for gravity flow conditions except for lifting and collection points. Minimum outer diameter of the pipeline was taken as 225 mm for main lines along the roads and for carriage from chambers to manholes, it is taken as 180 mm with material as HDPE. The slope was taken as a minimum value of 1 in 170 in general and care has been taken to provide sufficient slopes to generate self-cleansing velocities during peak flow conditions when the pipe is near to full in load. All stipulations given by the relevant Indian Standard Codes of practice and CPHEEO Manual has been adopted in design.

3.3.1. CREATING PRIMARY MODEL FROM GEOGRAPHIC INFORMATION SYSTEMS (GIS)

Using GIS data available, the project area was examined thoroughly, and a primary model of sewer flow was generated. This model was later refined using reduced elevations obtained from Differential Global Positioning System (DGPS) Real Time Kinematic Survey (RTK) values at the control points established in the primary model. The GIS provides information of

population density scatter, presence of water bodies, road network and topographical features as a quick reference for planning an optimum site for the STP as well as the routing of sewer load.

Fig. 20 Satellite imaginary of proposed STP location

3.3.2 TOPOGRAPHICAL SURVEY USING DGPS

For ascertaining accurate reduced levels of all control points in the primary model, Real Time Kinematic Survey (RTK) using DGPS was performed. DGPS is an improved autonomous Global Positioning which reduces the effect of correlated errors from two or more receivers only if they are all observing the same satellites. The DGPS data was retrieved in a computer system and subsequently used for hydraulic simulation of the network.

Fig. 21 Base station setting for DGPS survey at Ponnani Municipality

3.3.3 SOCIAL SURVEY

Social aspects of the sewage load generation have been examined in detail by performing social survey for the project area. Various teams comprising of people intended to gather information regarding presence of houses, commercial establishments and other public institutions were set up and extensive field survey was conducted. The variations of sewage flow and expected abnormalities were also studied and incorporated in the sewer network design.

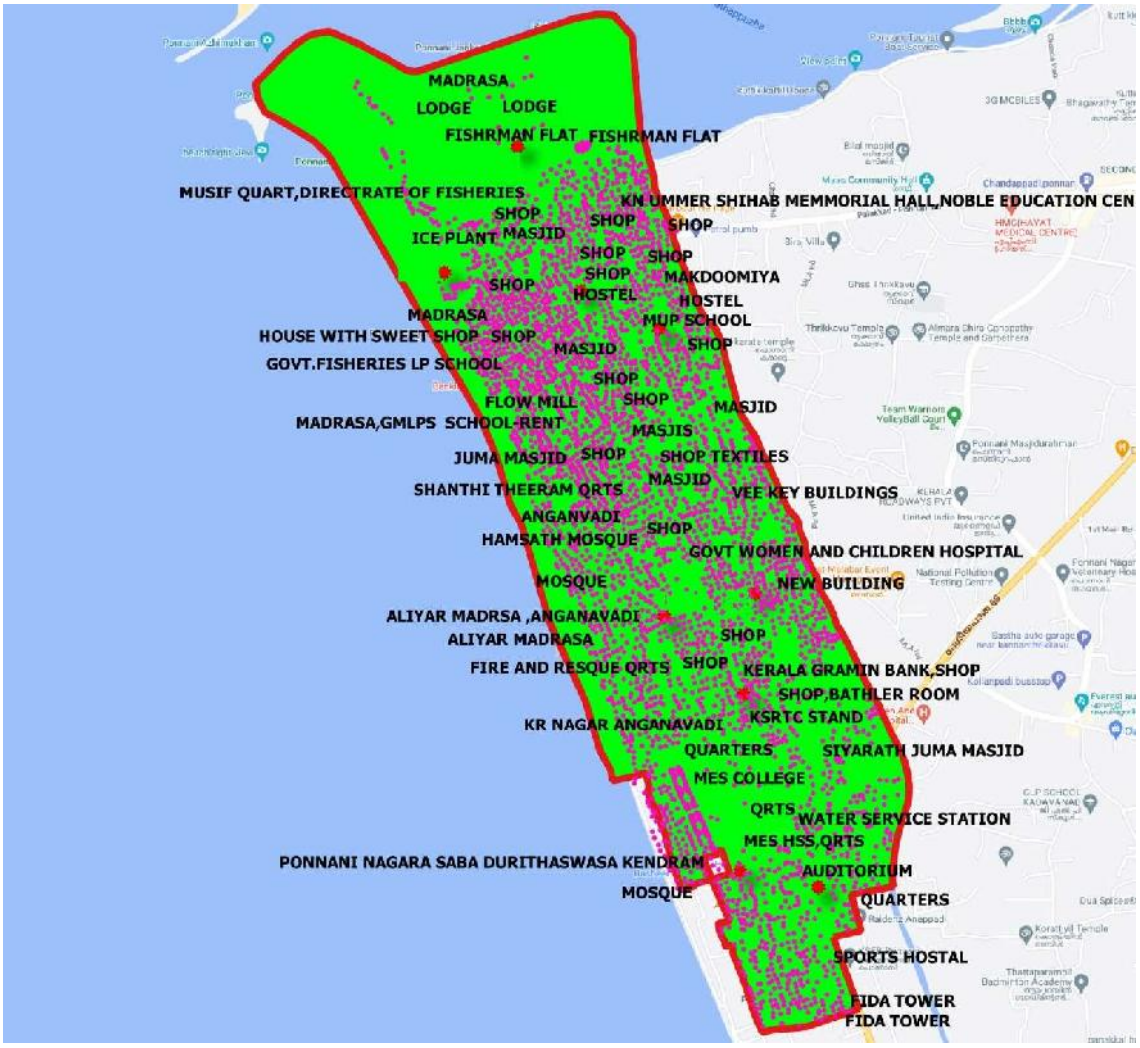


Fig. 22 Social survey details in GIS

3.3.4 HYDRAULIC SIMULATION OF SEWAGE NETWORK

Hydraulic simulation of sewage network was performed after collection of all basic input data like sewage inflow at all points, expected routing plan for easy carriage of sewer load towards a common collection point and location of STP. A suitable peak factor to accommodate sewage flow variations are provided in the hydraulic analysis. The sewer flow is expected to be carried out in gravity conditions through a network of pipelines, manholes and lifting stations. The maximum depth of cutting is limited below 4.60 m and hence sewage lifting stations are

provided making use of the manholes itself. For all pipelines minimum slopes to generate gravity flow is given as per the recommendations of CPHEEO Manual of Sewage Treatment Systems.

For hydraulic simulation of the sewage network comprising of pipelines, manholes and lifting stations, US Environmental Protection Agencies' Storm Water Management Model (SWMM) is adopted considering its versatility in hydraulic modelling using dynamic flow routing conditions. US EPA's Storm Water Management Model (SWMM) is used throughout the world for planning, analysis, and design related to stormwater runoff, combined and sanitary sewers, and other drainage systems.

Table 10 Details of social survey performed in the scheme area

Name of Manholes	No of houses	No of duty staffs in shops	No of seats in Hotel/Restaurants	No of beds in lodge	No of Apartments	No of staffs in office	Auditorium/Theatre seat	No of students & staffs in Schools	Members in hostels	Visitors in Masjid	Visitors in Hospital	No of beds in hospital	Sewage load	Sewage load/manhole considering future growth and peak factor
MH 24	5												0.042	0.133
MH 25	5												0.042	0.133
MH 26	1												0.008	0.028
MH 32	9												0.075	0.24
MH 33	1												0.008	0.028
MH 34	2												0.017	0.053
MH 35	7							100					0.1	0.32
MH 41	1												0.008	0.028
MH 47	1												0.008	0.028
MH 52	1												0.008	0.028
MH 69	2												0.017	0.053
MH 70	4												0.033	0.108
MH 71	2												0.017	0.053
MH 72	1												0.008	0.028
MH 73	1	6											0.011	0.035
MH 74	1												0.008	0.028
MH 75	4	1											0.034	0.108
MH 125	4	1											0.034	0.108
MH 126	4												0.033	0.108
MH 127	8												0.067	0.213
MH 128	10			10									0.1	0.32
MH 129	12							110					0.146	0.465
MH 130	15	1											0.125	0.4
MH 131	23	1											0.192	0.613
MH 132	7	1								250			0.093	0.298
MH 133	6	1						250					0.155	0.493
MH 134	10	2											0.084	0.268

MH 135	10												0.083	0.265
MH 136	5							100					0.083	0.265
MH 137	5	2											0.043	0.135
MH 138	5												0.042	0.133
MH 139	6												0.05	0.16
MH 140	7	2											0.059	0.188
MH 141	1												0.008	0.028
MH 142	1	1											0.009	0.028
MH 143	6	10											0.054	0.173
MH 144	4	10											0.038	0.12
MH 145	6												0.05	0.16
MH 146	6	1											0.05	0.16
MH 147	10	5											0.085	0.273
MH 148	7												0.058	0.185
MH 149	3												0.025	0.08
MH 150	3												0.025	0.08
MH 151	1												0.008	0.028
MH 152	1	4											0.01	0.033
MH 153	7												0.058	0.185
MH 154	7												0.058	0.185
MH 155	17												0.142	0.453
MH 156	8												0.067	0.213
MH 157	5												0.042	0.133
MH 158	8												0.067	0.213
MH 159	8												0.067	0.213
MH 160	11												0.092	0.293
MH 161	8												0.067	0.213
MH 162	3									10			0.026	0.085
MH 175	4							305					0.16	0.513
MH 176	3								60				0.1	0.32
MH 180	3												0.025	0.08
MH 181	2								2				0.019	0.06
MH 182	6									150			0.071	0.225
MH 183	4												0.033	0.108
MH 184	3												0.025	0.08
MH 185	4												0.033	0.108
MH 186	4												0.033	0.108
MH 187	7												0.058	0.185
MH 188	4					10					150		0.058	0.185
MH 189	7												0.058	0.185
MH 200	8												0.067	0.213
MH 215	6									50			0.057	0.183
MH 216	2												0.017	0.053
MH 220	15												0.125	0.398
MH 221	10												0.083	0.265
MH 222	9								5				0.081	0.26
MH 223	5												0.042	0.133
MH 224	4												0.033	0.108
MH 225	1												0.008	0.028
MH 226	5												0.042	0.133

MH 227	5												0.042	0.133
MH 228	7												0.058	0.185
MH 229	3	5						2					0.028	0.09
MH 230	3									100			0.039	0.125
MH 231	10												0.083	0.265
MH 232	3	2											0.026	0.083
MH 233	3												0.025	0.08
MH 234	6	3											0.051	0.163
MH 235	3	10											0.029	0.093
MH 236	2												0.017	0.053
MH 237	1	3						272		90			0.135	0.433
MH 242	2												0.017	0.053
MH 243	2												0.017	0.053
MH 244	3												0.025	0.08
MH 245	2												0.017	0.053
MH 246	6												0.05	0.16
MH 247	2												0.017	0.053
MH 265	2												0.017	0.053
MH 266	6												0.05	0.16
MH 267	6												0.05	0.16
MH 268	4												0.033	0.108
MH 269	3												0.025	0.08
MH 270	4												0.033	0.108
MH 271	4												0.033	0.108
MH 272	2												0.017	0.053
MH 273	3												0.025	0.08
MH 274	3												0.025	0.08
MH 275	4												0.033	0.108
MH 276	2												0.017	0.053
MH 277	4												0.033	0.108
MH 282	30	4											0.252	0.803
MH 283	12												0.1	0.32
MH 284	4												0.033	0.108
MH 285	4												0.033	0.108
MH 286	4												0.033	0.108
MH 287	3	2											0.026	0.083
MH 288	3	5											0.027	0.088
MH 289	5												0.042	0.133
MH 290	8												0.067	0.213
MH 291	8												0.067	0.213
MH 292	7	5											0.06	0.193
MH 293	5												0.042	0.133
MH 294	6												0.05	0.16
MH 295	7												0.058	0.185
MH 296	7	15											0.065	0.205
MH 297	1	7											0.011	0.035
MH 298	5												0.042	0.133
MH 299	2												0.017	0.053
MH 300	5												0.042	0.133
MH 301	7												0.058	0.185

MH 302	2												0.017	0.053
MH 303	6												0.05	0.16
MH 304	2												0.017	0.053
MH 305	1										150	135	0.592	1.885
MH 306	2												0.017	0.053
MH 307	2												0.017	0.053
MH 308	1												0.008	0.028
MH 309	2												0.017	0.053
MH 310	8	1											0.067	0.215
MH 311	1												0.008	0.028
MH 312	6												0.05	0.16
MH 313	5												0.042	0.133
MH 314	6			2		10							0.058	0.183
MH 315	14		20										0.13	0.413
MH 316	6												0.05	0.16
MH 317	3												0.025	0.08
MH 318	3												0.025	0.08
MH 319	4												0.033	0.108
MH 320	4												0.033	0.108
MH 321	3												0.025	0.08
MH 322	4												0.033	0.108
MH 323	9												0.075	0.24
MH 324	11									50			0.099	0.315
MH 325	13												0.108	0.345
MH 326	5												0.042	0.133
MH 327	12												0.1	0.32
MH 328	12												0.1	0.32
MH 329	7												0.058	0.185
MH 330	12							50					0.121	0.385
MH 331	8					10							0.071	0.225
MH 332	13									75			0.119	0.378
MH 333	11									100			0.106	0.338
MH 334	15												0.125	0.398
MH 335	3												0.025	0.08
MH 336	1												0.008	0.028
MH 337	1												0.008	0.028
MH 338	10					10							0.088	0.28
MH 339	12												0.1	0.32
MH 340	20												0.167	0.533
MH 341	1	1											0.009	0.028
MH 342	2												0.017	0.053
MH 353	3									75			0.035	0.113
MH 354	10												0.083	0.265
MH 355	14												0.117	0.373
MH 369	15	2											0.126	0.4
MH 370	12												0.1	0.32
MH 371	7												0.058	0.185
MH 372	7												0.058	0.185
MH 373	4												0.033	0.108
MH 374	2												0.017	0.053

MH 376	19	1				6							0.161	0.515
MH 377	14												0.117	0.373
MH 378	12												0.1	0.32
MH 379	16												0.133	0.425
MH 380	15							479					0.325	1.035
MH 381	12												0.1	0.32
MH 382	10												0	0
MH 383	7	1											0.059	0.188
MH 384	8												0.067	0.213
MH 385	7												0.058	0.185
MH 386	1			8									0.022	0.07
MH 390	10												0.083	0.265
MH 391	10												0.083	0.265
MH 392	10												0.083	0.265
MH 393	6	1											0.05	0.16
MH 409	2												0.017	0.053
MH 410	4												0.033	0.108
MH 420	2							1750					0.746	2.378
MH 421	2									75			0.027	0.088
MH 422	1			13									0.03	0.095
MH 426	10												0.083	0.265
MH 427	9					6							0.078	0.248
MH 428	1												0.008	0.028
MH 430	5												0.042	0.133
MH 431	4												0.033	0.108
MH 432	6												0.05	0.16
MH 433	11												0.092	0.293
MH 434	14												0.117	0.373
MH 435	1			18	12								0.138	0.44
MH 443	5					73	100	350		250			0.267	0.85
MH 444	6												0.05	0.16
MH 445	3									100			0.039	0.125
MH 446	1												0.008	0.028
MH 447	3												0.025	0.08
MH 458	1	1											0.009	0.028
MH 459	1												0.008	0.028
MH 460	1												0.008	0.028
MH 461	2												0.017	0.053
MH 462	2												0.017	0.053
MH 463	4												0.033	0.108
MH 464	2												0.017	0.053
MH 465	3												0.025	0.08
MH 466	3										1420		0.222	0.708
MH 467	1												0.008	0.028
MH 468	1												0.008	0.028
MH 469	1												0.008	0.028
MH 470	1	2											0.009	0.03
MH 471	1												0.008	0.028
MH 472	3												0.025	0.08

MH 473	2	1			16								0.15	0.48
MH 474	4			120									0.233	0.745
MH 475	10					39							0.1	0.318
MH 476	4												0.033	0.108
MH 477	6		5										0.053	0.17
MH 478	2					35							0.031	0.1
MH 479	4												0.033	0.108
MH 480	5												0.042	0.133
MH 481	2												0.017	0.053
MH 482	2												0.017	0.053
MH 483	1	5											0.01	0.033
MH 484	2	9											0.02	0.065
MH 485	2			2									0.02	0.065
MH 486	3	2											0.026	0.083
MH 508	7												0.058	0.185
MH 512			5										0.003	0.01
MH 513	3												0.025	0.08
MH 514	2									50			0.024	0.075
MH 515	2												0.017	0.053
MH 516	2				5								0.058	0.185
MH 517	1												0.008	0.028
MH 518	2												0.017	0.053
MH 519	1									10			0.01	0.03
MH 520	1									10			0.01	0.03
MH 521	1												0.008	0.028
MH 522	1			3			27						0.017	0.055
MH 523	1									150			0.029	0.093
MH 524	1												0.008	0.028
MH 525	3												0.025	0.08
MH 526	1												0.008	0.028
MH 527	1									40			0.014	0.045
MH 528	1					10							0.013	0.04
MH 529	1												0.008	0.028
MH 530	1												0.008	0.028
MH 531	2												0.017	0.053
MH 532	1												0.008	0.028
MH 533	1					39							0.025	0.078
MH 534	2												0.017	0.053
MH 535	1					59							0.033	0.105
MH 536	1					10				30			0.017	0.053
MH 537	1												0.008	0.028
MH 538	1												0.008	0.028
MH 539	4												0.033	0.108
MH 540	1												0.008	0.028
MH 541	1					500							0.217	0.69
MH 542	1												0.008	0.028
MH 573	8												0.067	0.213
MH 574	5	1								100			0.056	0.178
MH 575	1												0.008	0.028
MH 576	2												0.017	0.053

MH 577	8												0.067	0.213
MH 578													0	0
MH 652	6									50			0.057	0.183
MH 653	10												0.083	0.265
MH 951	13												0.108	0.345
MH 1008													0	0
MH 1009													0	0
MH 1010													0	0
MH 1011													0	0
MH 1012													0	0
MH 1076	12								230	300			0.429	1.368
MH 1077	12							45					0.119	0.378
MH 1078	8	6											0.069	0.22
MH 1079	4	12	10										0.045	0.143
MH 1080	9	8											0.078	0.25
MH 1081	3	17											0.032	0.103
MH 1082	6	7											0.053	0.168
MH 1083	8							50					0.088	0.28
MH 1084	13												0.108	0.345
MH 1085	6												0.05	0.16
MH 1086	8												0.067	0.213
MH 1087	10												0	0
MH 1088	10												0.083	0.265
MH 1089	7												0.058	0.185
MH 1090	8												0.067	0.213
MH 1091	1												0.008	0.028
MH 1092	3												0.025	0.08
MH 1093	3												0.025	0.08
MH 1094	2												0.017	0.053
MH 1095	1												0.008	0.028
MH 1096	1							200		25			0.095	0.303
MH 1097	1												0.008	0.028
MH 1098	2												0.017	0.053
MH 1099	1												0.008	0.028
MH 1100	2	2									10		0.019	0.06
MH 1101	1												0.008	0.028
MH 1390	2												0.017	0.053
MH 1391	3								10				0.038	0.12
MH 1392	2												0.017	0.053
MH 1393	2												0.017	0.053
MH 1394	2												0.017	0.053
MH 1395	2												0.017	0.053
MH 1396	2												0.017	0.053
MH 1397	1												0.008	0.028
MH 1423	2												0.017	0.053
MH 1433	5												0.042	0.133
MH 1434	2									75			0.027	0.088
MH 1435	4												0.033	0.108
MH 1436	4												0.033	0.108
MH 1437	1												0.008	0.028

MH 1438	3											0.025	0.08
MH 1439	2				8			134				0.139	0.443
MH 1440	9									50		0.082	0.26
MH 1441	1											0.008	0.028
MH 1442	3											0.025	0.08
MH 1443	1											0.008	0.028
MH 1444	1											0.008	0.028
MH 1456	5											0.042	0.133
MH 1457	1											0.008	0.028
MH 1458	2											0.017	0.053
MH 1467	5											0.042	0.133
MH 1468	3											0.025	0.08
MH 1469	2											0.017	0.053
MH 1469	0											0	0
MH 1470	8											0.067	0.213
MH 1481	1											0.008	0.028
MH 1482	2											0.017	0.053
MH 1483	4											0.033	0.108
MH 1484	3											0.025	0.08
												18.095	57.843

Fig. 23 SWMM model of full network with flow routing in gradation towards outfalls

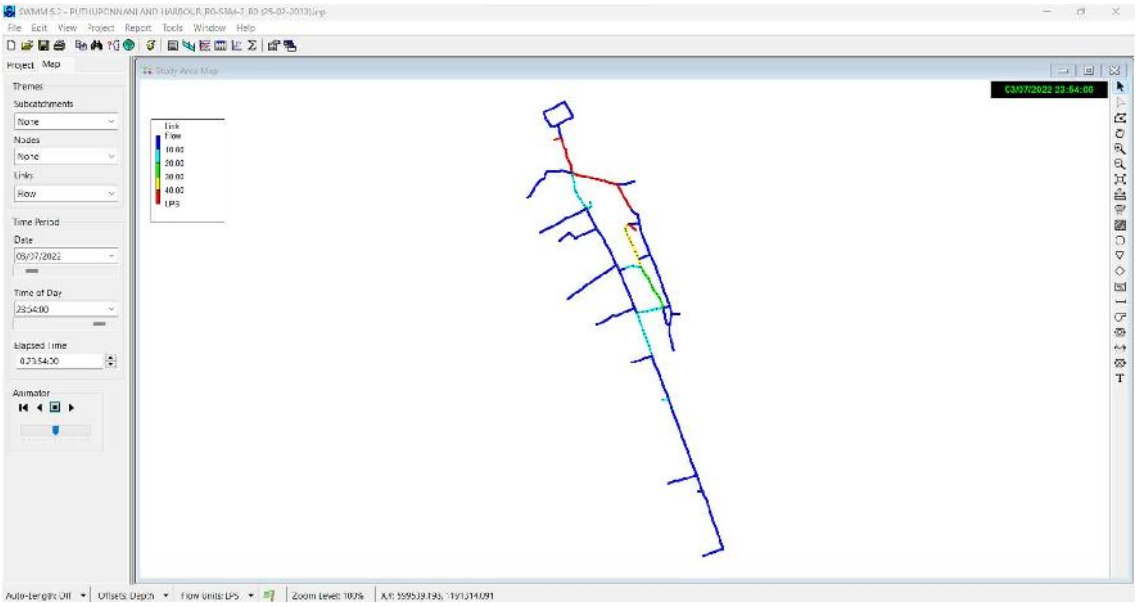


Fig. 24 SWMM model of SBM-2 network with flow routing in gradation towards outfalls

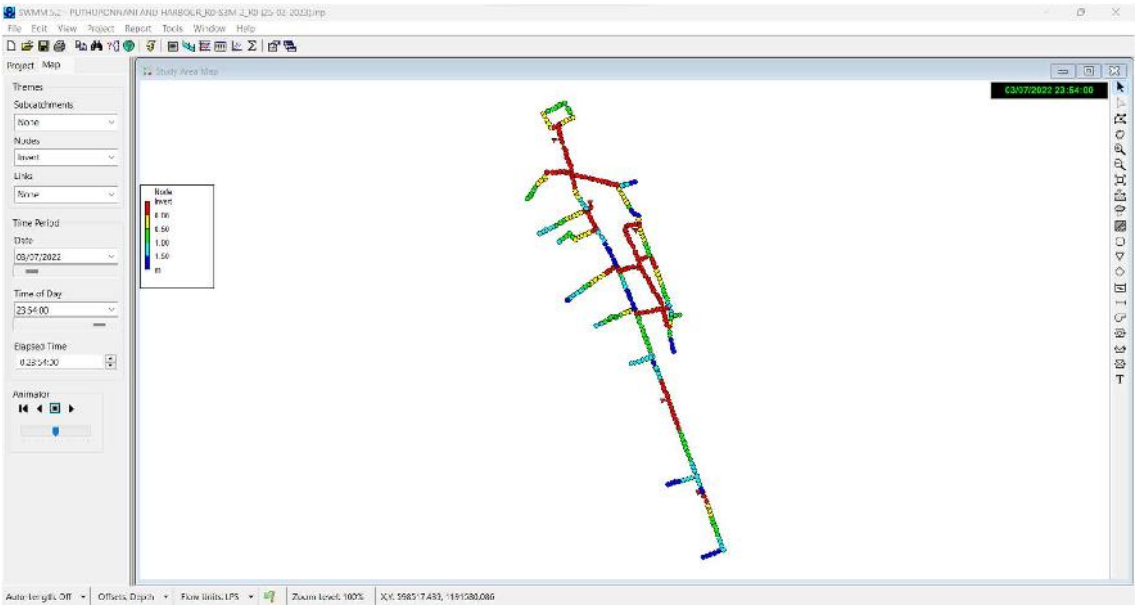


Fig. 25 Map area in SWMM model with invert levels of nodes in gradation

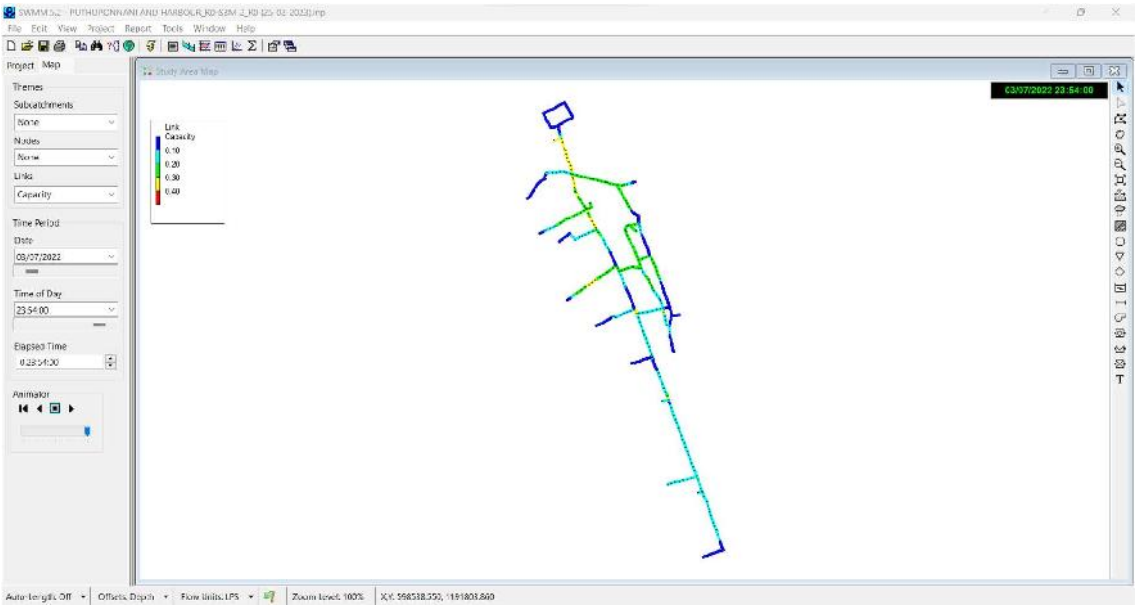


Fig. 26 Map area in SWMM with capacities of pipelines during peak flow in gradation

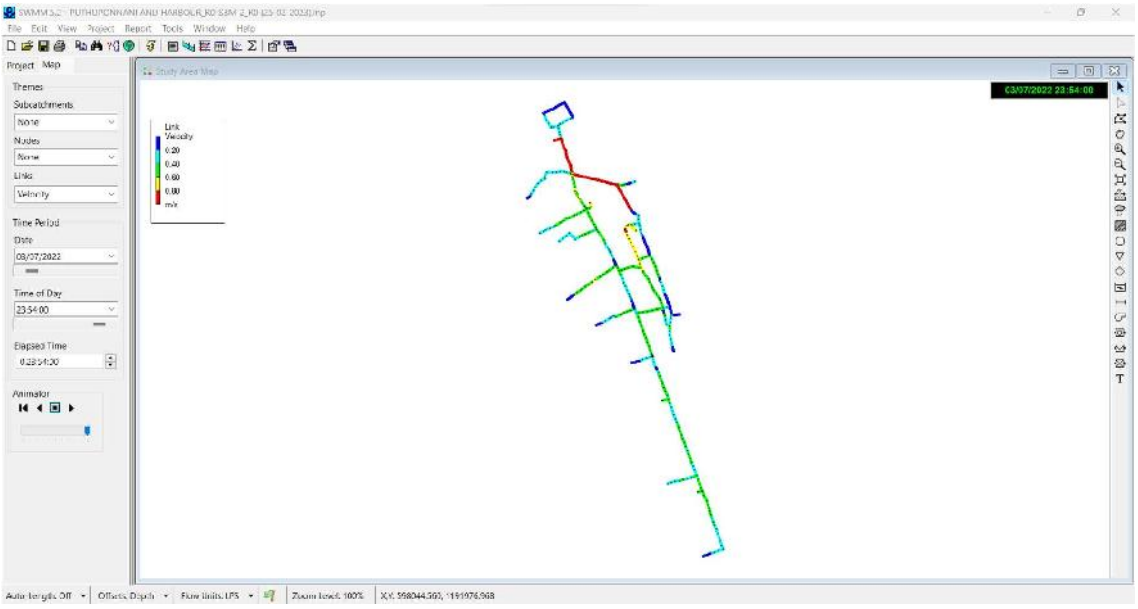


Fig. 27 Map area in SWMM model with velocity profile in gradation

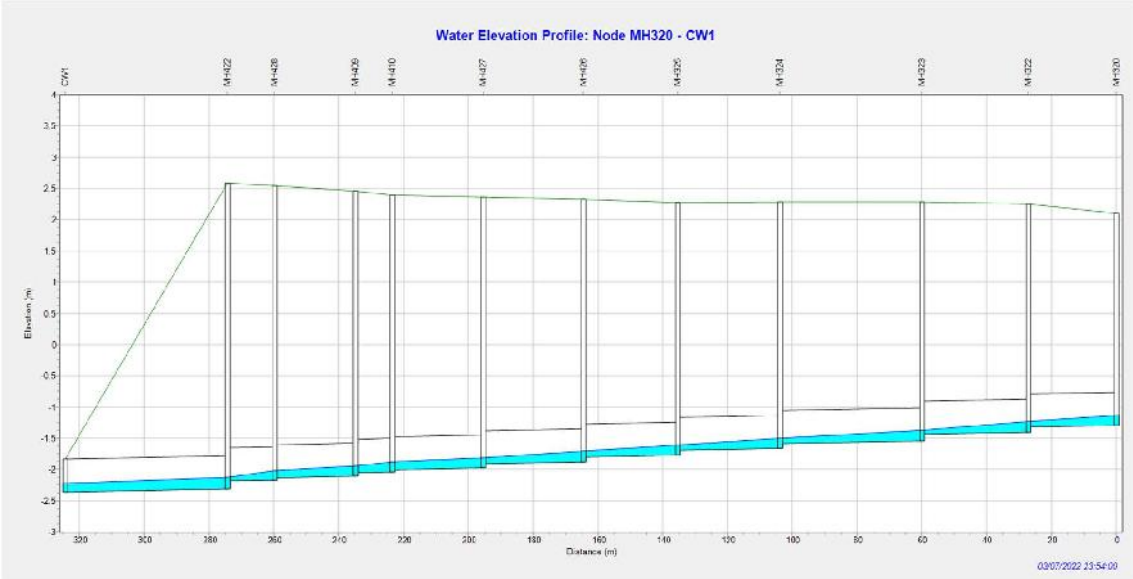


Fig. 28 Water elevation profile plotted in SWMM model of sewage network

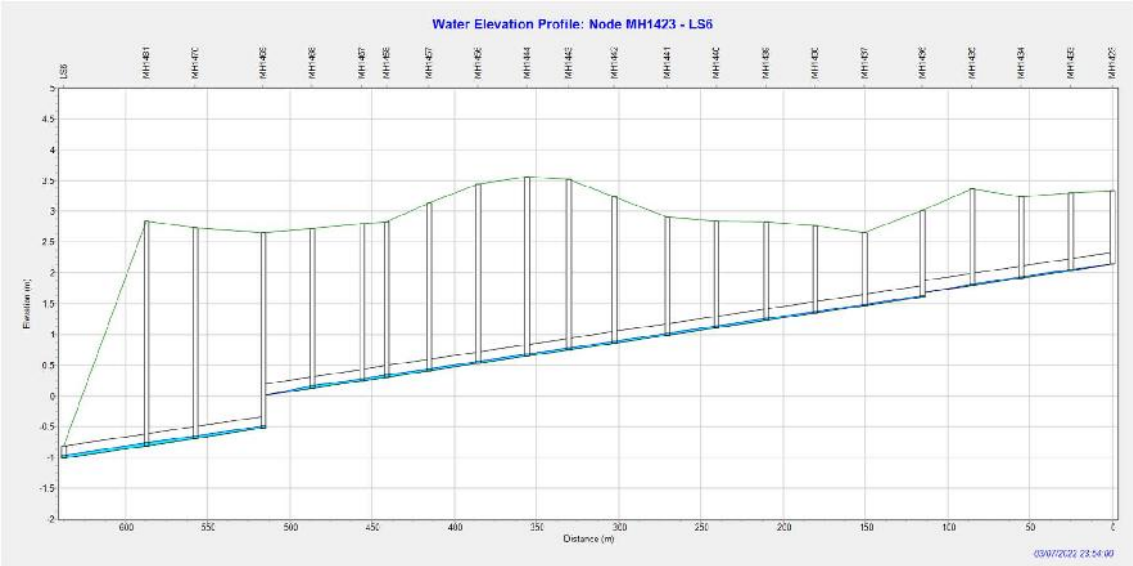


Fig. 29 Water elevation profile plotted in SWMM model of sewage network

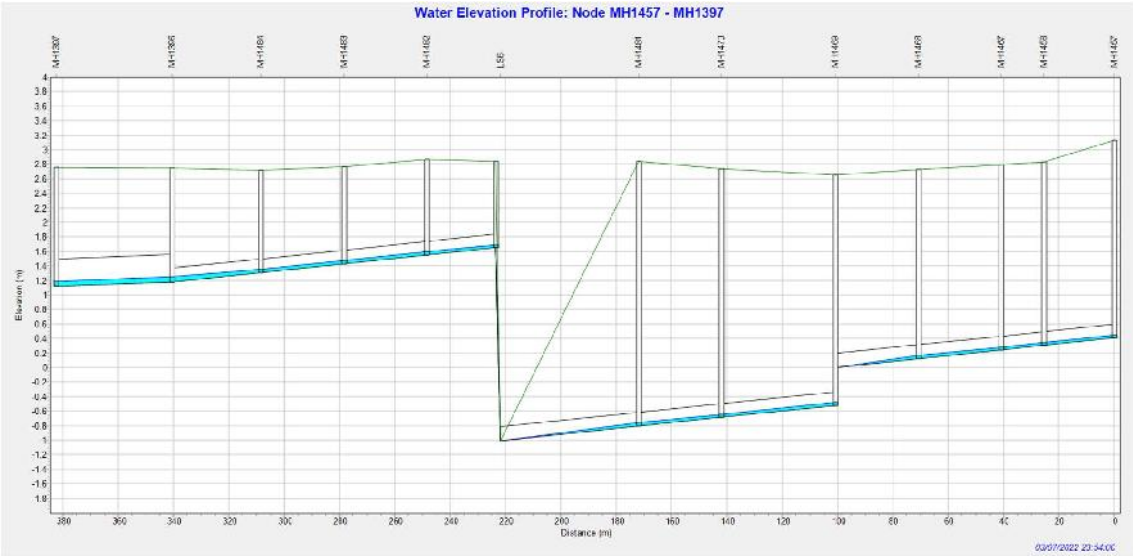


Fig. 30 Water elevation profile plotted in SWMM model of sewage network with lifting in between

Table 11 Hydraulic network flow route - Pumping

Sl No	From	To	Details	Road category
1	LS-2	MH-40	Dia 200 mm PE100 PN 10 Length - 85 m	Municipality BT
2	LS-6	MH-26	Dia 140 mm PE100 PN 10 Length - 50 m	NH BMBC
3	OF-1	MH-127	Dia 140 mm PE100 PN 10 Length - 275 m	Municipality BT -200 m, PWD BT – 75 m
4	OF-2	MH-24	Dia 140 mm PE100 PN 10 Length - 700 m	Municipality BT
5	OF-3	MH-271	Dia 140 mm PE100 PN 10 Length - 200 m	Municipality BT
6	OF-4	MH-433	Dia 140 mm PE100 PN 10 Length - 75 m	NH BMBC
7	CW-1	MH-290	Dia 560 mm PE100 PN 10 Length - 150 m	Municipality BT
8	CW-2	MH-75	Dia 315 mm PE100 PN 10 Length - 350 m	NH BMBC
9	CW-3	STP	Dia 630 mm PE100 PN 10 Length - 50 m	

Table 12 Pipes proposed for sewage network-pressurised flow

Sl. No.	Type of pipe	Internal diameter (mm)	Outer diameter (mm)	Pressure rating	Total length (m)
1	PE 100 PN 10	112.9	140	PN 10	1375
2		161.5	200	PN 10	85
3		254.5	315	PN 10	350
4		450.1	560	PN 10	150
5		506.6	630	PN 10	50
TOTAL					2010

Table 13 Pipes proposed for sewage network-interception chamber to manholes

Sl. No.	Type of pipe	Internal diameter (mm)	Outer diameter (mm)	Pressure rating	Total length (m)	Road category
1	PE 100 PN 8	151.6	180	PN 8	2776	Harbour Dept Road – 256 m Municipality BT – 1328 m PWD BT – 176 m NH BMBC – 1016 m
TOTAL					2776 m	2776 m

Table 14 Pipes proposed for sewage network-gravity flow

Sl. No.	Type of pipe	Internal diameter (mm)	Outer diameter (mm)	Pressure rating	Total length (m)	Open cut length (m)	HDD length (m)
1	PE 100 PN 8	189.7	225	PN 8	5612.7	4963.4	649.3
2		236.1	280	PN 8	279	69	210
3		299.5	355	PN 8	1048.6	740.5	308.1
4		377.9	450	PN 8	405.3	371.9	33.4
5		470.5	560	PN 8	558.1	331.6	226.5
6		529.3	630	PN 8	1766.6	128.9	1637.7
TOTAL					9670.3	6605.3	3065

Table 15 Sewage Network-Road category

Sl. No.	Road category	Total length (m)	Open cut length (m)	HDD length (m)
1	Harbour Dept. Road	990.9	670.9	320
2	Municipality BT	4655.2	3120.4	1534.8
3	PWD BT	586.7	506.3	80.4
4	NH BMBC	3437.5	2307.7	1129.8
TOTAL		9670.3	6605.3	3065

3.4 DESIGN OF MANHOLES

A manhole is an opening by which a man may enter a sewer for inspection, cleaning and other maintenance and fitted with a removable cover to withstand traffic loads in sewers. Having designed the sewer system, the manholes are first constructed in identified reaches before the sewers are laid. The diameters of circular manholes for stated depths of sewers are in Table as shown below:

Table 16 Details of manholes

Sl. No.	Range of depths, in m	Internal diameter in m	Total number	Percentage of total number
1	Above 1 m and up to 1.5 m	1.2	91	26.22%
2	Above 1.5 m and up to 2.50 m	1.2	112	32.28%
3	Above 2.50 m and up to 3.5 m	1.5	93	26.8%
4	Above 3.50 m and up to 4.5 m	1.5	48	13.83%
5	Above 4.50 m and up to 5.5 m	1.8	3	0.86%
TOTAL			347	

Manholes are primarily designed as reinforced cement concrete manholes with special treatment to resist corrosive and adverse environments. Manholes should be built to cause minimum head loss and interference with the hydraulics of the sewer line. One way to maintain a relatively smooth flow transition through the manhole, when a small sewer joins one of a larger diameter, is to match the pipe crown elevations at the manhole. Precast rings for shaft can be done to manage inlet and out portions and house sewer connections through chambers. The structural design of the manholes is performed to withstand traffic loads also with controlled cracking under severe exposure conditions.

3.5 DESIGN OF LIFTING STATIONS AND COLLECTION WELLS

Situations restricting depth of cutting can be easily got over by restricting the depth of sewers to a practicable limit and diverting the flow into a pavement submersible pump station with a lockable control panel there itself like the pillar boxes of the electricity board and the delivery main can lift the flow to the downstream manhole at the conventional 0.9 m depth to invert. There are called lifting manholes and during the analysis stage itself the number of such manholes are designed to be minimum. These submersible pump stations of lifting manholes can be operated by mercury float switches and powered by dedicated feeder lines from the local electrical authority like the lines given to the hospitals, etc. These pump sets can also be connected to solar panels. The pump pit can be covered with pedestrian grade walkway slabs which are of reinforced cement concrete and with adequate lifting arrangements to permit the lowering and lifting the submersible pump sets. With the advancement in technology, the IoT enabled sensors can be installed in these lift manholes and connected to a remote-control station using cloud data transfer. If sufficient land is obtained at the specific locations of lifting manholes, these lifting manholes may be replaced with a lifting station. Thus, there will be sufficient storage in the well of the lifting station which enhances the flexibility. There are

three collection wells, including the collection well located in the STP compound, as per the design for the project area. Each collection well is designed to have adequate storage during peak hours of flow. Two to three submersible centrifugal pumps are provided to work in parallel during peak hours flow or whenever the situation demands for it. The detailed design of the collection wells is presented below:

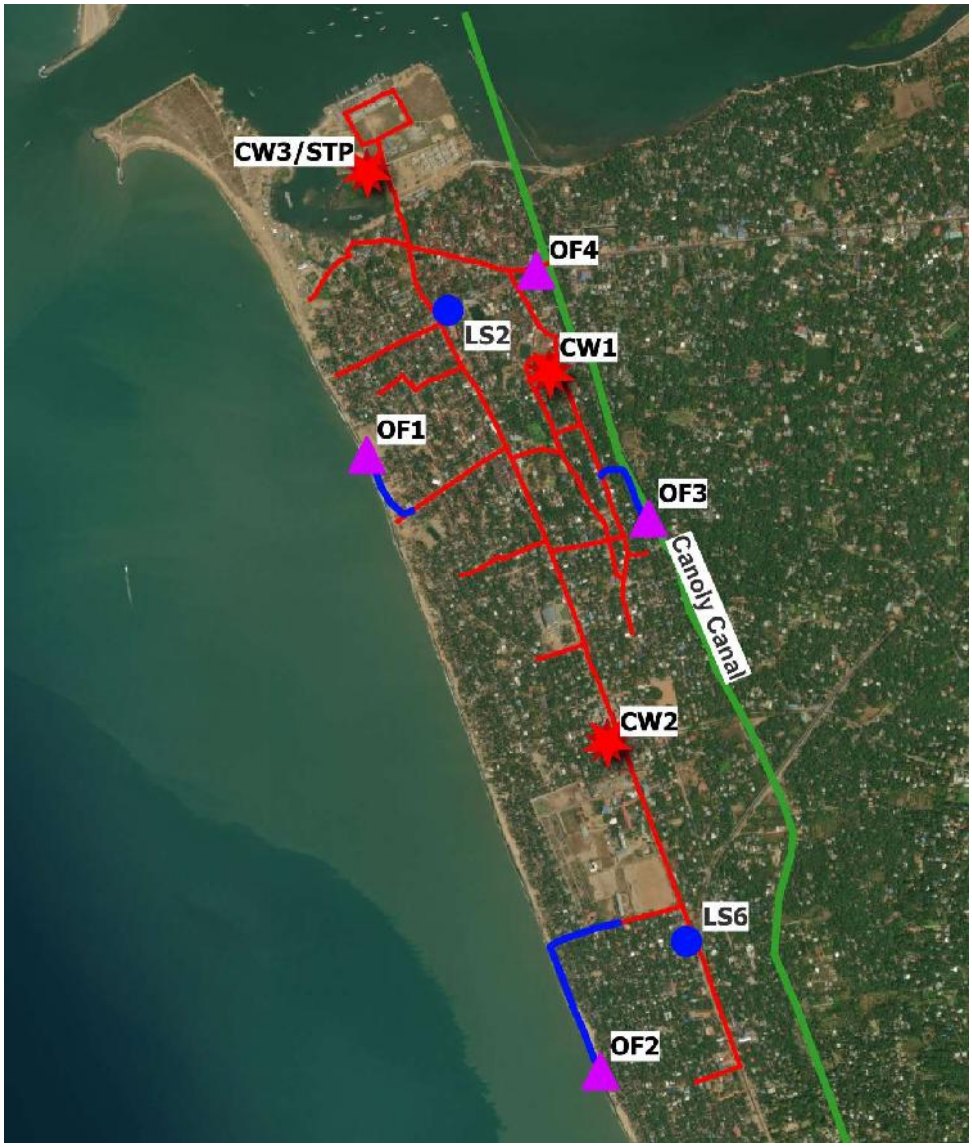


Fig. 31 Sewerage zones with lifting station, collection wells and proposed STP

Table 11 Design of collection wells

DESIGN OF COLLECTION WELL-CW 1				
Average inflow into well from network	17.69	LPS		
Peak inflow into well from network	44.22	LPS	PF	2.50
Average flow into well from other well	0	LPS		
Peak flow into well from other well	0	LPS		
Total average inflow into well from network+other well	17.69	LPS		
Total peak inflow into well from network+other well	44.22	LPS		

Peak hours	3			
Number of pumps operated in peak hours	3			
Rated outflow during peak hours/pump in parallel	17.69	LPS		
Total rated outflow in peak hours	53.06	LPS		
Inflow converted into storage during peak hours	-8.84	LPS		
Volume of sewage to be stored in well	-95.52	m^3		
Diameter of collection well-inner	3	m		
Depth of well	8	m		
Depth of collection well for storage	3	m		
Volume of sewage actually stored in well	21.21	m^3	ok	
Wall thickness of collection well	0.45	m		
Base slab thickness	0.45	m		
Offset to base slab	0.60	m		
Outer dia of collection well	3.9	m		
Freeboard of collection well	0.5	m		
Distance of travel in pumping to next station	150	m		
Velocity of travel adopted for peak discharge	0.9	m/sec		
Diameter of pumping line required	250.12	mm	fix OD	560
Actual inside diameter of pumping line in mm	450.1	pressure rating		PN 10
Total head for the pump set from EPANET analysis	15	m		
Discharge for the single pump set	17.69	LPS	efficiency	0.45
Power required for pump set/number	7.86	HP	fix HP	10
DESIGN OF COLLECTION WELL-CW 2				
Average inflow into well from network	4.47	LPS		
Peak inflow into well from network	11.18	LPS	PF	2.50
Average flow into well from other well	0	LPS		
Peak flow into well from other well	0	LPS		
Total average inflow into well from network+other well	4.47	LPS		
Total peak inflow into well from network+other well	11.18	LPS		
Peak hours	3			
Number of pumps operated in peak hours	3			
Rated outflow during peak hours/pump in parallel	4.47	LPS		
Total rated outflow in peak hours	13.41	LPS		
Inflow converted into storage during peak hours	-2.23	LPS		
Volume of sewage to be stored in well	-24.07	m^3		
Diameter of collection well-inner	3	m		
Depth of well	7	m		
Depth of collection well for storage	3	m		
Volume of sewage actually stored in well	21.21	m^3	ok	
Wall thickness of collection well	0.45	m		
Base slab thickness	0.45	m		
Offset to base slab	0.60	m		
Outer dia of collection well	3.9	m		
Freeboard of collection well	0.5	m		
Distance of travel in pumping to next station	350	m		

Velocity of travel adopted for peak discharge	0.9	m/sec		
Diameter of pumping line required	125.77	mm	fix OD	315
Actual inside diameter of pumping line in mm	254.5	pressure rating		PN 10
Total head for the pump set from EPANET analysis	10	m		
Discharge for the single pump set	4.47	LPS	efficiency	0.45
Power required for pump set/number	1.32	HP	fix HP	2
DESIGN OF COLLECTION WELL-CW 3 @ STP				
Average inflow into well from network	27.71	LPS		
Peak inflow into well from network	69.28	LPS	PF	2.50
Average flow into well from other well	0	LPS		
Peak flow into well from other well	0	LPS		
Total average inflow into well from network+other well	27.71	LPS		
Total peak inflow into well from network+other well	69.28	LPS		
Peak hours	3			
Number of pumps operated in peak hours	3			
Rated outflow during peak hours/pump in parallel	27.71	LPS		
Total rated outflow in peak hours	83.14	LPS		
Inflow converted into storage during peak hours	-13.86	LPS		
Volume of sewage to be stored in well	-149.65	m^3		
Diameter of collection well-inner	4	m		
Depth of well	8	m		
Depth of collection well for storage	3	m		
Volume of sewage actually stored in well	37.70	m^3	ok	
Wall thickness of collection well	0.45	m		
Base slab thickness	0.45	m		
Offset to base slab	0.60	m		
Outer dia of collection well	4.9	m		
Freeboard of collection well	0.5	m		
Distance of travel in pumping to next station	50	m		
Velocity of travel adopted for peak discharge	0.9	m/sec		
Diameter of pumping line required	313.08	mm	fix OD	630
Actual inside diameter of pumping line in mm	506.6	pressure rating		PN 10
Total head for the pump set from EPANET analysis	15	m		
Discharge for the single pump set	27.71	LPS	efficiency	0.45
Power required for pump set/number	12.32	HP	fix HP	15
DESIGN OF LIFTING STATION LS 2				
Average inflow into well from network	4.46	LPS		
Peak inflow into well from network	11.15	LPS	PF	2.50
Average flow into well from other well	0	LPS		
Peak flow into well from other well	0	LPS		

Total average inflow into well from network+other well	4.46	LPS		
Total peak inflow into well from network+other well	11.15	LPS		
Peak hours	3			
Number of pumps operated in peak hours	3			
Rated outflow during peak hours/pump in parallel	4.46	LPS		
Total rated outflow in peak hours	13.38	LPS		
Inflow converted into storage during peak hours	-2.23	LPS		
Volume of sewage to be stored in well	-24.08	m^3		
Diameter of collection well-inner	2	m		
Depth of well	6	m		
Depth of collection well for storage	2	m		
Volume of sewage actually stored in well	6.28	m^3	ok	
Wall thickness of collection well	0.4	m		
Base slab thickness	0.4	m		
Offset to base slab	0.60	m		
Outer dia of collection well	2.8	m		
Freeboard of collection well	0.5	m		
Distance of travel in pumping to next station	85	m		
Velocity of travel adopted for peak discharge	0.9	m/sec		
Diameter of pumping line required	125.59	mm	fix OD	200
Actual inside diameter of pumping line in mm	161.5	pressure rating		PN 10
Total head for the pump set from EPANET analysis	10	m		
Discharge for the single pump set	4.46	LPS	efficiency	0.45
Power required for pump set/number	1.32	HP	fix HP	1.5
DESIGN OF LIFTING STATION LS 6				
Average inflow into well from network	0.88	LPS		
Peak inflow into well from network	2.21	LPS	PF	2.50
Average flow into well from other well	0	LPS		
Peak flow into well from other well	0	LPS		
Total average inflow into well from network+other well	0.88	LPS		
Total peak inflow into well from network+other well	2.21	LPS		
Peak hours	3			
Number of pumps operated in peak hours	2			
Rated outflow during peak hours/pump in parallel	0.88	LPS		
Total rated outflow in peak hours	1.77	LPS		
Inflow converted into storage during peak hours	0.44	LPS		
Volume of sewage to be stored in well	4.77	m^3		
Diameter of collection well-inner	2	m		
Depth of well	6	m		
Depth of collection well for storage	2	m		
Volume of sewage actually stored in well	6.28	m^3	ok	
Wall thickness of collection well	0.4	m		
Base slab thickness	0.4	m		
Offset to base slab	0.60	m		

Outer dia of collection well	2.8	m		
Freeboard of collection well	0.5	m		
Distance of travel in pumping to next station	50	m		
Velocity of travel adopted for peak discharge	0.9	m/sec		
Diameter of pumping line required	55.92	mm	fix OD	140
Actual inside diameter of pumping line in mm	112.9	pressure rating		PN 10
Total head for the pump set from EPANET analysis	10	m		
Discharge for the single pump set	0.88	LPS	efficiency	0.45
Power required for pump set/number	0.26	HP	fix HP	0.5
DESIGN OF OUTFALL WELL - OF 1				
Average inflow into well from network	2.90	LPS		
Peak inflow into well from network	2.90	LPS	PF	1.00
Average flow into well from other well	0	LPS		
Peak flow into well from other well	0	LPS		
Total average inflow into well from network+other well	2.90	LPS		
Total peak inflow into well from network+other well	2.90	LPS		
Peak hours	3			
Number of pumps operated in peak hours	1			
Rated outflow during peak hours/pump in parallel	2.90	LPS		
Total rated outflow in peak hours	2.90	LPS		
Inflow converted into storage during peak hours	0.00	LPS		
Volume of sewage to be stored in well	0.00	m^3		
Diameter of collection well-inner	2	m		
Depth of well	3	m		
Depth of collection well for storage	2	m		
Volume of sewage actually stored in well	6.28	m^3	ok	
Wall thickness of collection well	0.30	m		
Base slab thickness	0.30	m		
Offset to base slab	0.30	m		
Outer dia of collection well	2.6	m		
Freeboard of collection well	0.5	m		
Distance of travel in pumping to next station	275	m		
Velocity of travel adopted for peak discharge	0.9	m/sec		
Diameter of pumping line required	64.05	mm	fix OD	140
Actual inside diameter of pumping line in mm	112.9	pressure rating		PN 10
Total head for the pump set from EPANET analysis	7.5	m		
Discharge for the single pump set	2.90	LPS	efficiency	0.45
Power required for pump set/number	0.64	HP	fix HP	1
DESIGN OF OUTFALL WELL - OF 2				
Average inflow into well from network	2.90	LPS		
Peak inflow into well from network	2.90	LPS	PF	1.00
Average flow into well from other well	0	LPS		
Peak flow into well from other well	0	LPS		

Total average inflow into well from network+other well	2.90	LPS		
Total peak inflow into well from network+other well	2.90	LPS		
Peak hours	3			
Number of pumps operated in peak hours	1			
Rated outflow during peak hours/pump in parallel	2.90	LPS		
Total rated outflow in peak hours	2.90	LPS		
Inflow converted into storage during peak hours	0.00	LPS		
Volume of sewage to be stored in well	0.00	m^3		
Diameter of collection well-inner	2	m		
Depth of well	3	m		
Depth of collection well for storage	2	m		
Volume of sewage actually stored in well	6.28	m^3	ok	
Wall thickness of collection well	0.30	m		
Base slab thickness	0.30	m		
Offset to base slab	0.30	m		
Outer dia of collection well	2.6	m		
Freeboard of collection well	0.5	m		
Distance of travel in pumping to next station	700	m		
Velocity of travel adopted for peak discharge	0.9	m/sec		
Diameter of pumping line required	64.05	mm	fix OD	140
Actual inside diameter of pumping line in mm	112.9	pressure rating		PN 10
Total head for the pump set from EPANET analysis	8.5	m		
Discharge for the single pump set	2.90	LPS	efficiency	0.45
Power required for pump set/number	0.73	HP	fix HP	1
DESIGN OF OUTFALL WELL - OF 3				
Average inflow into well from network	2.90	LPS		
Peak inflow into well from network	2.90	LPS	PF	1.00
Average flow into well from other well	0	LPS		
Peak flow into well from other well	0	LPS		
Total average inflow into well from network+other well	2.90	LPS		
Total peak inflow into well from network+other well	2.90	LPS		
Peak hours	3			
Number of pumps operated in peak hours	1			
Rated outflow during peak hours/pump in parallel	2.90	LPS		
Total rated outflow in peak hours	2.90	LPS		
Inflow converted into storage during peak hours	0.00	LPS		
Volume of sewage to be stored in well	0.00	m^3		
Diameter of collection well-inner	2	m		
Depth of well	3	m		
Depth of collection well for storage	2	m		
Volume of sewage actually stored in well	6.28	m^3	ok	
Wall thickness of collection well	0.30	m		
Base slab thickness	0.30	m		
Offset to base slab	0.30	m		
Outer dia of collection well	2.6	m		

Freeboard of collection well	0.5	m		
Distance of travel in pumping to next station	275	m		
Velocity of travel adopted for peak discharge	0.9	m/sec		
Diameter of pumping line required	64.05	mm	fix OD	140
Actual inside diameter of pumping line in mm	112.9	pressure rating		PN 10
Total head for the pump set from EPANET analysis	7.5	m		
Discharge for the single pump set	2.90	LPS	efficiency	0.45
Power required for pump set/number	0.64	HP	fix HP	1
DESIGN OF OUTFALL WELL - OF 4				
Average inflow into well from network	2.90	LPS		
Peak inflow into well from network	2.90	LPS	PF	1.00
Average flow into well from other well	0	LPS		
Peak flow into well from other well	0	LPS		
Total average inflow into well from network+other well	2.90	LPS		
Total peak inflow into well from network+other well	2.90	LPS		
Peak hours	3			
Number of pumps operated in peak hours	1			
Rated outflow during peak hours/pump in parallel	2.90	LPS		
Total rated outflow in peak hours	2.90	LPS		
Inflow converted into storage during peak hours	0.00	LPS		
Volume of sewage to be stored in well	0.00	m^3		
Diameter of collection well-inner	2	m		
Depth of well	3	m		
Depth of collection well for storage	2	m		
Volume of sewage actually stored in well	6.28	m^3	ok	
Wall thickness of collection well	0.30	m		
Base slab thickness	0.30	m		
Offset to base slab	0.30	m		
Outer dia of collection well	2.6	m		
Freeboard of collection well	0.5	m		
Distance of travel in pumping to next station	75	m		
Velocity of travel adopted for peak discharge	0.9	m/sec		
Diameter of pumping line required	64.05	mm	fix OD	140
Actual inside diameter of pumping line in mm	112.9	pressure rating		PN 10
Total head for the pump set from EPANET analysis	7.5	m		
Discharge for the single pump set	2.90	LPS	efficiency	0.45
Power required for pump set/number	0.64	HP	fix HP	1

3.6 LAYING OF SEWER NETWORK

In the following sections, important matters in connection with the laying of sewer network and making the system efficient is illustrated in detail.

3.6.1 EXCAVATION AND LAYING

1. On all excavation work, safety precautions for the protection of life and property are essential; and measures to avoid too great inconveniences to the public are desirable. Such measures and precautions include the erection and maintenance of signs (to forewarn public), barricades, bridges and detours; placing and maintenance of lights both for illumination and as danger signals; provision of watchmen to exclude unauthorized persons, particularly children from trespassing on the work.
2. Computation of the safe load carrying capacity of the pipe when installed and bedded in the manner to be specified using a suitable factor of safety and making certain the design supporting strength thus obtained is greater than the maximum load to be applied.
3. Sewers may be laid in trenches or under embankment in areas which may be temporarily or permanently submerged in water. The fill load in such cases will be reduced and will correspond to the buoyant weight of the fill material. However, effect of submergence could be ignored which provides an additional factor of safety, but it may be necessary to check whether a pipe is subject to flotation. Under submergence, the minimum height of the fill material that will be required to prevent flotation ignoring the frictional forces in the fill can be determined. Wherever sufficient height of fill material is not available, anti-flotation blocks should be provided.
4. All rigid pipes may be tested for strength in the laboratory by the three-edge bearing test (ultimate load).
5. Width of the trench specified for a particular job should be minimum in consonance with the requirements of adequate working space to allow access to all parts and joints of pipe.
6. The Field Engineer should keep in touch with the Design Engineer throughout the duration of the Project and any deviation from the design assumptions due to the exigencies of work, should be immediately investigated and corrective measures taken in time.
7. All pipes used on the work should be tested as per the IS specifications and test certificates of the manufacturers should be furnished for every consignment brought to the site.
8. Whenever shoring is used, the pulling out of planks on completion of work, should be carried out in stages and this should be properly supervised to ensure that the space occupied by the planks is properly backfilled.
9. Proper backfilling methods both as regards to selection of materials, methods of placing and proper compaction should be in general agreement with the design assumptions.

10. In quicksand conditions, it is necessary to anchor the sewer to the ground and hold it at the grade as laid in the face of soil sinkage.
11. The type of bedding (granular, concrete cradle, full concrete encasement etc.) would depend on the soil strata and depth at which sewer is laid.
12. It is understood that the line (horizontal alignment) and grade layout of a sewer line as per design must be carried out meticulously. The horizontal layout determines the location as well as direction of the sewer line, while slope (grade) of the line provides the necessary hydraulic carrying capacity of the sewerage system.
13. The location of the trench is generally laid out first as an offset line running parallel to the proposed sewer centre line. This offset line is demarcated by wooden stakes driven into the ground surface at intervals of, say, 15 m. The offset line, as is clear, is quite away from the sewer centre line with a view not to allow it being disturbed during construction; however, it must be proximate enough so that the transfer of measurements to the actual trench can readily be done.
14. Two procedures are available to lay pipe sections in the open trench, namely, by batter boards, and by laser beams. Better boards are placed across the trench at uniform intervals. The tops of these boards can be set at some even height above the designed sewer invert elevation. The centre line of the sewer is traced on the boards by extending a line of sight with a transit level or a theodolite and a string is stretched from board to board along this very line. Later on this Line is transferred onto the trench bed by means of a plumb bob. Invert levels and action line is transferred onto the trench bed by means of a plumb bob. Invert levels and characteristics indicated by vertical rods are marked off in even increments -the lower end of each rod is placed on the pipe invert, and the string over the batter boards helps to check if it matches with the proper elevation mark on the rod, by appropriate adjustment of the pipe placement centreline transferred. In the laser method, advantage is taken of an intense, narrow beam of light that is projected by the laser instrument, over a long distance. This beam is aligned through a sewer pipe to strike a target held at the other end of the pipe. A transit that is placed above a manhole helps establish the alignment of the sewer with reference to field survey points and transfer it down to the laser instrument that is mounted inside the manhole. Lasers can achieve an accuracy of 0.01 per cent over up to 300 m
15. Cross drainage works arise when a sewer must cross another service like electricity, water line, gas piping, telecommunication cable, river courses, nalas, etc.
16. Regarding power cables, the sewer shall be above and apart from the power cable by at least 30 cm as per IS: 1255. Regarding water lines, the sewer shall always travel below the water line. Regarding gas lines, the sewer must travel above the gas line so that

sewer gases if they escape need not accidentally set off an ignition of the gas line. Regarding telecommunication cables, lateral separation of at least 30 cm shall be followed. In cases of river crossings and nala crossings each situation shall be decided on its site conditions and gravity sewers may be converted to pumped sewer lines by a low lift dedicated pumping station before the crossing discharging into the gravity section after crossing the water course and this will help in always keeping the pumped sewer visible or close to the ground.

17. A cross connection between water main and sewer main seldom occurs because of the sizes of these mains. However, where the location is complicated, the water mains shall be either blue coloured pipes or painted with blue florescent coloured paint.
18. A minimum offset of equal to half the width of the manhole plus 30 cm shall be the lateral offset between water mains and sewer lines. It is advisable to encase the sewer than the water main.
19. Gravity sewers shall not be laid closer to water retaining structures and the effort should be to detour as far as possible. In case of leakages in sewer joints, the leakage may gain access to the sidewalls of the water retaining structures.
20. The width of trench at and below the top of a sewer should be the minimum necessary for its proper installation with the due consideration to its bedding. The width of a sewer trench depends on the type of shoring (single stage or two stage), working space required in the lower part of the trench and the type of ground below the surface.
21. Excavation for sewer trenches for laying sewers shall be in straight lines and to the correct depths and gradients required for the pipes as specified in the drawings. The material excavated from the trench shall not be deposited very close to the trench to prevent the weight of the materials from causing the sides of the trench to slip or fail. The sides of the trench shall, however, be supported by shoring where necessary to ensure proper and speedy excavation. In case, the width of the road or lane where the work of excavation is to be carried out is so narrow as to warrant the stacking of materials near the trench, the same shall be taken away to a place to be decided by the Engineer-in-Charge. This excavated material shall be brought back to the site of work for filling the trench.
22. In case the presence of water is likely to create unstable soil conditions, a well point system shall be employed to drain the immediate area of the sewer trench prior to excavation operation. A well point system consists of a series of perforated pipes driven or jetted into the water bearing strata on either side of a sewer trench and connected with a header pipe leading to a pump, In the event of excavation being made deeper than necessary, the same shall be filled and stabilized.

23. The shoring shall be adequate to prevent caving in of the trench walls of subsidence of areas adjacent to the trench. In narrow trenches of limited depth, a simple form of shoring shall consist of a pair of 40 to 50 mm thick, and 30 cm wide planks set vertically at intervals and firmly strutted. For wider and deeper trenches, a system of wall plates (Wales) and struts of heavy timber section is commonly used. Continuous sheeting shall be provided outside the wall plates to maintain the stability of the trench walls. The number and the size of the wall plates shall be fixed considering the depth of trench and type of soil.
24. In non-cohesive soils combined with considerable ground water, it may be necessary to use continuous interlocking steel sheet piling to prevent excessive soil movements due to ground water percolation. Such sheet piling shall extend at least 1.5 m below the bottom of the trench unless the lower part of the trench is in fine material. In case of deep trenches, if conditions demand, excavation and shoring may be done in stages.
25. All pipes, ducts, cables, mains and other services exposed due to the excavation shall be effectively supported.
26. Trenches for sewer construction shall be dewatered for the placement of concrete and laying of pipe sewer or construction of concrete or brick sewer and kept dewatered until the concrete foundations, pipe joints or brick work or concrete have cured.
27. Where a sewer must be laid in a soft underground stratum or in a reclaimed land, the trench shall be excavated deeper than what is ordinarily required. The trench bottom shall be stabilized by the addition of coarse gravel or rock. In case of very bad soil the trench bottom shall be filled in with cement concrete of appropriate grade.
28. In the areas subject to subsidence, the pipe sewer should be laid on suitable supports or concrete cradle supported on piles.

3.6.2 SEWER CARRIAGE SYSTEM WITH PIPELINES AND CONNECTIONS TO HOUSES/OTHER UNITS

1. Unlike in the case of CI, DI, UPVC pipe sewers, the HDPE sewers are normally butt welded and pre-assembled on ground and then only laid inside the trench spanning manhole to manhole. The butt welding shall follow the manufacturer's recommendations. Where flanged joints are needed for attaching or inserting fittings and specials like valves, the free end of the HDPE pipe shall be butt welded with a standard flange and thereafter the flanged jointing can be made. However, in the case of such pipes, the uplift during high groundwater conditions above the pipe level is a problem specifically in high ground water and coastal areas.
2. Other than the metallic and concrete pipe sewers, the uplift during high groundwater conditions above the pipe level is a problem specifically in high ground water locations,

waterlogged locations and coastal areas. The concrete surrounds or venteak piles shall be used to hold these in place in such conditions, where ground water can rise above the sewer.

3. Each section of sewer shall be tested for water tightness preferably between manholes. To prevent change in alignment and disturbance after the pipes have been laid, it is desirable to backfill the pipes up to the top keeping at least 90 cm length of the pipe open at the joints. However, this may not be feasible in the case of pipes of shorter length, such as stoneware and RCC pipes. With concrete encasement or concrete grade, partial covering of the pipe is not necessary.
4. As soon as a stretch of sewer is laid and tested, a double disc or solid or closed cylinder, 75 mm less in dimension than the internal dimension of the sewer shall be run through the stretch of the sewer to ensure that it is free from any obstruction.
5. Backfilling of the sewer trench is a very important consideration in sewer construction. The method of backfilling to be used varies with the width of the trench, the character of the material excavated, the method of excavation and the degree of compaction required.
6. No trench shall be filled in unless the sewer stretches have been tested and approved for water tightness of joints. However, partial filling may be done keeping the joints open to avoid disturbance.
7. In the design of sewer systems, consideration should be given to the desirability of maintaining velocities sufficient to avoid sulphide build up and of minimizing pressure lines and points of high turbulence. The designer should take into consideration topography, grades of sewers, ventilation, materials of construction, sewage temperature and strength, etc.
8. Any protective coating used should possess the following qualities: (i) it should be resistant to acid attack, (ii) it should bond securely to the concrete, (iii) it should be economical and durable, (iv) it should be resistant to abrasive action by flow of sewage, and (v) when applied, it should be thin enough to fill all pores and irregularities in the surface. The coating should be continuous with no pin holes or other breaks.
9. The house service sewer connections shall be effected only in manholes. In case of old sewers, a new manhole shall be inserted for this purpose. The material of the House Service Sewer shall be either UPVC or HDPE rigid straight pipes of 6 kg/cm^2 pressure class in manufacture and as per IS: 15328 and IS: 4984 respectively.
10. The minimum earth cover above the crown shall be 90 cm and where this becomes impossible, the property owner shall be directed to depress his terminal chamber to comply with the above especially as the public sewer manhole shall start at its crown

at 90 cm below ground level. Where such sewers cross the electricity power cables, the specifications of IS: 1255 of 1983 reaffirmed in 2001 in clauses 6.3.3 and 6.3.3.1 shall be followed without any exception that all such house service sewers shall be only above the power cable and the minimum clearance shall be 30 cm over the cable which itself shall be covered all around by 15 cm riddled soil and further protected on top by tiles, bricks or slabs.

11. The house owner shall be mandated to possess a “kraite” a type of non-corroding sufficiently flexible but rigid type of less than 10 mm diameter rod, which he/she shall use to rod the house service sewer freely up to the manhole and the labour of the local body shall not be deployed for any removal of obstructions in the house service sewer. Typically, it is possible to effect six service connections to a manhole.
12. It is also recommended to install collection chambers outside a group of houses and collect sewer load through pipes and connect chamber with manholes using pipes.
13. Sewer network system can be made efficient in operation using huge volume data obtained from individual sensors installed in the manholes and lifting points. This historical data will provide backbone for emergency routing plans for failure of a link or obstructions.
14. Sewer network system must be carefully examined using digital data for potential nodes of weakness or redundancies and specially addressed periodically.
15. There must be continuous coordination between the designer of the sewer network and the engineer in charge of the operation and maintenance of sewer system for addressing issues during repair, expansion of network and diagnostics of blocks.
16. A computer simulation model of the sewer network system must be constantly upgraded with data obtained from sensors for real time monitoring and future predictions of the versatility of the sewer carriage system. Similarly, all lifting manholes must also be continuously monitored in digital platform for performance appraisal and future modifications.

CHAPTER 4

DESIGN OF UNIT OPERATIONS AND SEWAGE TREATMENT PROCESS

4.1 GENERAL

The constituents of concern found in wastewater are removed by physical, chemical, and biological methods. The individual methods usually are classified as physical unit operations, chemical unit processes, and biological unit processes. Treatment methods in which the application of physical forces predominate are known as physical unit operations. Examples of physical unit operations include screening, mixing, sedimentation, gas transfer, filtration and adsorption. Treatment methods in which the removal or conversion of constituents is brought about by the addition of chemicals or other chemical reactions are known as chemical unit processes. Examples of chemical unit processes include disinfection, oxidation and precipitation. Treatment methods in which the removal of constituents is brought about by biological activity are known as biological unit processes. Biological treatment is used primarily to remove the biodegradable organic constituents and nutrients in wastewater (Metcalf& Eddy, Inc).

From practical observations, the rates at which physical, chemical and biological reactions and conversions occur are important, as they will affect the size of the treatment facilities that must be provided. The rate at which reactions and conversions occur, and the degree of their completion, is generally a function of the constituents involved, the temperature, and the type of reactor. The fundamental basis for the analysis of the physical, chemical and biological unit operations and processes used for wastewater treatment is the material mass balance principle in which an accounting of the mass is made before and after reactions and conversions have taken place (Metcalf & Eddy).

In the following sections, the design of unit operations and chemical and biological unit processes are described. The sizes of the units and control parameters are determined.

4.2 COMPONENTS OF SEWAGE TREATMENT SYSTEM

The components of the sewerage treatment system are described in the process flow chart separately attached. The components are listed as follows:

Table 17 Components of sewage treatment system

Sl. No.	Description unit	Nature of treatment
1	Receiving chambers	Receive sewage and septage separately
2	Oil and grease trap	Removes oil and scum from sewage and diluted septage

3	Coarse screen channel	Removes impurities of size greater than 20 mm by physical separation using screens
4	Fine screen channel	Removes impurities of size greater than 6 mm by physical separation using screens
5	Grit separator	Removes impurities of size greater than 0.15 mm by gravity settling
6	Flow channels	Gravity sewage flow open channels
7	Equalisation tank	Normalises flow by storing during peak hours and releasing during off peak hours
8	MBBR-1	Biological reactor with suspended and attached growth process for BOD removal from sewage
9	MBBR-2	Biological reactor for nitrification process
10	MBBR-3	Biological reactor for de-nitrification process in post anoxic condition
11	MBBR-4	Biological reactor for final stage of BOD removal after de-nitrification
12	Secondary clarifier with plate settler	Clarification of biologically treated water using sludge blanket and plate settler.
13	Chlorine contact tank	Disinfection of clarified water
14	Filter feed tank	This is used for holding clarified and disinfected water before pumping to filter units
15	Pressure sand filter	Filtration of clarified water using sand and anthracite coal dual media for better results
16	Activated carbon filter	Filtration of clarified water using activated carbon filter
17	Treated water tank	This unit is used for holding filtered clear water
18	Sludge sump	Sludge from clarified is collected and transferred to sludge thickener
19	Sludge thickener	Sludge is thickened in gravity separation and supernatant is directed to equalisation tank
20	Centrifuge	Thickened sludge is further solidified by centrifugal action in a mechanical equipment

4.3 INITIAL COMPONENTS OF TREATMENT

In the following sections, pre-treatment of the raw sewage before entering equalisation tank is illustrated. The characteristics of the raw sewage and treated sewage are taken from the observation of similar environment adopting conservative values. This is due to the absence of reliable data from the test results of laboratory analysis of samples. The characteristics of the raw sewage and expected treated water is also described below for the design of the STP with Moving Bed Bio Film Reactor (MBBR).

In the following section, the design of pre-treatment units is described in detail. There is a co-treatment unit separately provided to receive septage load collected from various points after desludging activities. The septage is diluted in a water tank with specified dilution ratio to obtain desirable values of COD, BOD and TSS. There are receiving chambers for both septage and sewage loads. Oil and grease trap unit is used to remove oil and grease generated from kitchen and wash water flows. Manual coarse and fine screen channel is used to remove

physical impurities of size greater than 20 mm and 6 mm respectively. A grit separator is given to remove fine particles of size 0.15 mm and above. There are odour control units also, especially for the co-treatment units.

4.3.1 UNIT OPERATIONS

DESIGN OF STP WITH MOVING BED BIOFILM-REACTOR (MBBR)						
Average flow from network	2.9	MLD				
Working hours	23					
Flow from septage dilution tank	18.08	m^3/hour	0.43	MLD		
Design flow	3.46					
Fix design flow	3.50	MLD	3500000	LPD	3500	m^3/day
			3500	KLD	145.83	m^3/hour
Assumed peak factor	2.5					
Peak design flow	8.75	MLD	8750000	LPD	8750	m^3/day
					364.58	m^3/hour
Raw Sewage Characteristics						
Average sewage flow entering the STP	145.83	m^3/hour				
Peak flow entering the STP	364.58	m^3/hour				
COD	500	mg/l				
Primary ST/ET effluent BOD	250	mg/l				
Thickener overflow return as fraction of plant flow	0.15					
Thickener overflow return	0.525	MLD				
Thickener overflow return BOD	350	mg/l				
Centrate from sludge dewatering as fraction of plant flow	0.006					
Centrate from sludge dewatering return	0.02100	MLD				
Centrate from sludge dewatering return BOD	280	mg/l				
Influent BOD to aeration tank	263.1	mg/l				
TSS	400	mg/l				
Total Nitrogen (As N)	40	mg/l				
Total Phosphorous (As P)	7	mg/l				
Faecal Coliform	30000000	mpn/100 ml				
E Coliform	40000000	mpn/100 ml				
Chlorides as Cl	125	mg/l				
pH	6					
Treated Sewage Characteristics (after filtration)						
COD	50	mg/l				
BOD	10	mg/l				
TSS	20	mg/l				
Total Nitrogen (As N)	10	mg/l				
Total Phosphorous (As P)	1	mg/l				
E Coliform	100	mpn/100 ml				

pH	7					
Receiving Chamber						
Average quantity of flow	145.83	m^3/hour				
Peak flow	364.58	m^3/hour				
	0.10	m^3/sec				
Average Retention Time for peak flow	600	sec	offset to wall	0.3	m	
Volume of the inlet chember	60.76	m^3	free board	0.55	m	
Assumed depth of flow	2.45	m	total height	3	m	
Area required for inlet chamber	24.80	m^2	wall thickness	0.3	m	
Length of the tank	5	m	slab thickness	0.45	m	
Breadth of the tank	4.96	fix	5	m	area in m^2	38.44
Oil and Grease Trap						
Average quantity of flow	145.83	m^3/hour				
Peak flow	364.58	m^3/hour				
	0.10	m^3/sec				
Average Retention Time for peak flow	300	sec	offset to wall	0.15	m	
Volume of the inlet chamber	30.38	m^3	free board	0.75	m	
Assumed depth of flow	2.5	m	total height	3.25	m	
Area required for chamber	12.15	m^2	wall thickness	0.3	m	
Length of the tank	3.5	m	slab thickness	0.35	m	
Breadth of the tank	3.47	fix	3.5	m		
Breadth of baffle wall inside	3.5	m			area in m^2	19.36
Manual Coarse Screen Channel						
Peak design flow	0.10	m^3/sec				
Number of channels	1					
Peak flow rate per screen	0.10	m^3/sec				
Velocity at peak flow	0.6	m/sec	assumed			
Velocity through clean bar screen	0.85	m/sec				
Length of channel U/S	2	m	wall thickness	0.25	m	
Width of channel provided	1	m	offset to wall	0.25	m	
Depth of flow	0.17	m	slab thickness	0.30	m	
Area required for screen	0.17	m^2				
Headloss through bar screen	0.03	m	*assuming head loss coefficient = 0.7*			
Assumed depth of flow after inserting bar screen	0.2	m	0.20	(control value)		
Width of channel required	0.84	m	fix	1	m	
Clear bar spacing	20	mm	*(20 to 50 mm)*			

Bar thickness	10	mm	*(5 to 15 mm)*			
Number of bars	32					
Clear bar spacing obtained	21	mm	OK			
Inside width of screen (openings)	0.68	m				
Full height of channel	1.5	m	fb	0.5		
Angle of inclination	45	degree	0.79	rad		
Actual velocity at peak flow	0.76	*(between 0.60 m/sec and 0.90 m/sec)*				
Length of channel required D/S	1.50	m	fix	2.5	m	
					area in m^2	9
Manual Fine Screen Channel						
Peak design flow	0.10	m^3/sec				
Number of channels	1					
Peak flow rate per screen	0.10	m^3/sec				
Velocity at peak flow	0.6	m/sec	assumed			
Velocity through clean bar screen	1.00	m/sec				
Length of channel U/S	2	m	wall thickness	0.25	m	
Width of channel provided	1	m	offset to wall	0.25	m	
Depth of flow	0.17	m	slab thickness	0.30	m	
Area required for screen	0.17	m^2				
Headloss through bar screen	0.05	m	*assuming head loss coefficient = 0.7*			
Assumed depth of flow after inserting bar screen	0.22	m	0.22	(control value)		
Width of channel required	0.77	m	fix	1	m	
Clear bar spacing	6	mm	*upto 6 mm*			
Bar thickness	10	mm	*(5 to 15 mm)*			
Number of bars	62					
Clear bar spacing obtained	6.0	mm	OK			
Inside width of screen (openings)	0.38	m				
Full height of channel	1.5	m	fb	0.5		
Angle of inclination	45	degree	0.79	rad		
Actual velocity at peak flow	1.24	*(between 0.60 m/sec and 0.90 m/sec)*				
Length of channel required D/S	1.50	m	fix	2.5	m	
					area in m^2	9
Mechanical Coarse Screen Channel						
Peak design flow	0.10	m^3/sec				
Number of channels	1					
Peak flow rate per screen	0.10	m^3/sec				

Velocity at peak flow	0.6	m/sec	assumed			
Velocity through clean bar screen	0.85	m/sec				
Length of channel U/S	2	m	wall thickness	0.25	m	
Width of channel provided	1	m	offset to wall	0.25	m	
Depth of flow	0.17	m	slab thickness	0.30	m	
Area required for screen	0.17	m^2				
Headloss through bar screen	0.03	m	*assuming head loss coefficient = 0.7*			
Assumed depth of flow after inserting bar screen	0.2	m	0.20	(control value)		
Width of channel required	0.84	m	fix	1	m	
Clear bar spacing	20	mm	*(20 to 50 mm)*			
Bar thickness	10	mm	*(5 to 15 mm)*			
Number of bars	32					
Clear bar spacing obtained	21	mm	OK			
Inside width of screen (openings)	0.68	m				
Full height of channel	1.5	m	fb	0.5		
Angle of inclination	70	degree	1.22	rad		
Actual velocity at peak flow	0.76	*(between 0.60 m/sec and 0.90 m/sec)*				
Length of channel required D/S	0.55	m	fix	2	m	
					area in m^2	8
Mechanical Fine Screen Channel						
Number of screen	1					
Peak design flow	0.1013	m^3/sec				
Peak flow rate per screen	0.1013	m^3/sec				
Velocity at peak flow	0.6	m/sec	assumed			
Velocity through clean bar screen	1.18	m/sec				
Length of channel U/S	2	m	wall thickness	0.25	m	
Width of channel provided	1	m	offset to wall	0.25	m	
Depth of flow	0.17	m	slab thickness	0.30	m	
Area required for screen	0.17	m^2				
Headloss through bar screen	0.08	m	*assuming head loss coefficient = 0.7*			
Assumed depth of flow after inserting bar screen	0.24	m	0.24	(control value)		
Width of channel required	0.70	m	fix	1	m	
Clear bar spacing	6	mm	*upto 6 mm*			
Bar thickness	10	mm	*(5 to 15 mm)*			

Number of bars	62					
Clear bar spacing obtained	6.2	mm	OK			
Inside width of screen (openings)	0.38	m				
Full height of channel	1.5	m	fb	0.5		
Angle of inclination	70	degree	1.22	rad		
Actual velocity at peak flow	1.09	*(between 0.60 m/sec and 0.90 m/sec)*				
Length of channel required D/S	0.55	m	fix	2	m	
					area in m^2	8
Daily screening quantity						
Daily sewage quantity	3500.00	m^3/day				
Rate of screening quantity	0.015	m^3/1000 m^3				
Daily screening quantity	0.0525	m^3/day				
Grit Separator						
Number of grit units	1	SB	1			
Peak flow	0.101	m^3/sec				
Flow in one unit	0.101	m^3/sec				
Grit particle size	0.15	mm				
HRT	60	sec	*(45 to 90 sec, typical 60)*			
Volume of grit chamber	6.08	m^3				
SOR	900	m^3/m^2/day	*(empirical, from observations)*			
	0.010	m^3/m^2/sec				
Area required	9.72	m^2	wall thickness	0.30	m	
SWD	2.75	m	slab thickness	0.35	m	
Side of square channel	3.12	m	offset to wall	0.3	m	
Fix length	3.15	m	freeboard	0.8	m	
Fix width	3.15	m	area given	9.9225	m^2	OK
Shape factor	0.85		volume given	27.29	m^3	OK
Specific gravity of liquid	2.65					
Kinematic viscosity	000010030	m^2/sec				
V_p in m/sec	0.020	*let Nr < 1, apply Stoke's law to get terminal velocity vp*				
N_r	3	*apply Newton's equation*				

assumed velocity in m/sec	0.0143					
Nr	2					
drag coefficient Cd	15.77					
vp in m/sec	0.014					
Critical displacement velocity, Vc	0.0143	m/sec		R_t	1.15	
Horizontal velocity of flow, Vh	0.0117	m/sec	OK	R_v	1.23	
					area in m^2	18.92

4.4 DESIGN OF CO-TREATMENT UNITS FOR SEPTAGE

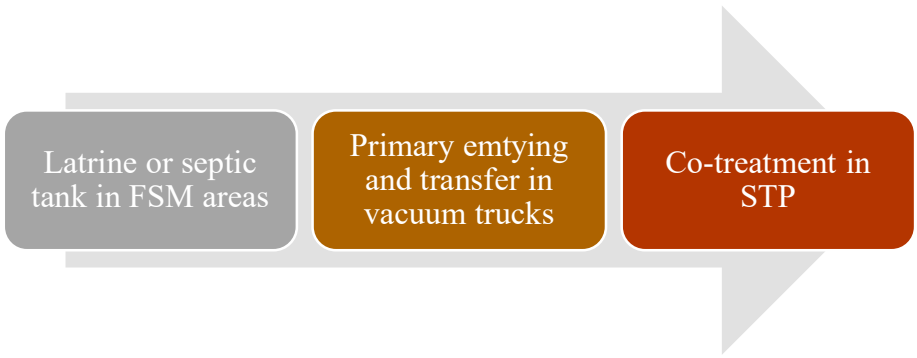


Fig. 32 Septage Management, Containment, Emptying, Transportation, Treatment, End Use / Disposal

For the areas considered as septage zones, the households, institutions, commercial entities etc., shall undertake de-sludging of the septic tanks and pit once in every three years or when get filled up whichever is earlier as per the NBC code and CPHEEO guidelines. The most satisfactory method of sludge removal is by vacuum tankers. Though de-sludging frequencies vary, it is generally recommended to de-sludge tanks once every two to three years, or when the tank becomes one third full. Periodical de-sludging also helps to reduce the pollution levels in the liquid effluent, which normally enters waterways untreated. However, a small amount of sludge should be left in the tank to ensure that a minimum level of the necessary microorganisms responsible for anaerobic digestion remain in the tank. The gas generated due to anaerobic digestion might escape when tank is open for de-sludging. Hence, it is highly advisable to avoid using fire (or any incendiary material) in these cases. Regular de-sludging activities require well-organized community and public/private service providers. Because of the delicate nature of septic systems housing microbial processes, care should also be taken not to scrub the septic clean or use chemicals such as detergents etc. to avoid the complete destruction of favorable microbes in the tank.

4.4.1 UNIT OPERATIONS

The septage collected and transported to the STP is diluted in the tank by adding recycled water. The normalized values of BOD and TSS are calculated based on test results on samples performed. The detailed design is presented below:

DESIGN OF CO-TREATMENT UNIT FOR SEPTAGE WITH MOVING BED BIOFILM-REACTOR (MBBR)						
Design population	57480	Designed for 2 streams of septage treatment for 114960population				
Sludge deposit coefficient	67	litres/person/year		(interval once in 3 years)		
Sludge deposit	10.55	KLD				
Average septage flow	11	KLD				
Working hours	24					
Design flow	11.00	KLD	11000	LPD	11.0	m^3/day
Maximum peak factor expected	2		11	KLD	0.46	m^3/hour
Peak design flow	22.00	KLD	22000	LPD	22	m^3/day
					0.92	m^3/hour
Number of trips/day	8				0.00025	cum/sec
Quantity of septage obtained in single trip with peak factor	2.75	m^3				
Raw Septage Characteristics						
COD	25000	mg/l				
BOD	5000	mg/l				
TSS	5000	mg/l				
Treated Sewage Characteristics (after filtration)						
COD	50	mg/l				
BOD	10	mg/l				
TSS	20	mg/l				
Receiving Chamber						
Average quantity of flow	0.46	m^3/hour				
Peak flow	0.92	m^3/hour				
	0.00025	m^3/sec				
Average Retention Time for peak flow	600	sec	offset to wall	0.3	m	
Volume of the inlet chember	0.1528	m^3	free board	0.8	m	
Assumed depth of flow	0.5	m	total height	1.3	m	
Area required for inlet chamber	0.31	m^2	wall thickness	0.25	m	
Length of the tank	0.75	m	slab thickness	0.3	m	
Breadth of the tank	0.41	fix	0.5	m	area in m^2	2.96
Design of Dilution Chamber from Mass-balance Principle						
Target outflow BOD (actual incoming BOD to STP)	265	mg/l	offset to wall	0.45	m	
Target outflow TSS (actual incoming TSS to STP)	400	mg/l	free board	0.50	m	
Volume of recycled water used for dilution	51500	litres	total height	3.00	m	
Quantity of septage obtained as above	2.75	m^3	No.of Tank	2		
BOD of diluted septage	262.95	mg/l	ok			

TSS of diluted septage	272.44	mg/l	ok			
Total volume of dilution tank	54.25	m^3				
Liquid depth adopted inside dilution tank	2.50	m	wall thickness	0.25	m	
side of square tank	4.66	m	slab thickness	0.35	m	
Length of dilution tank adopted	4.70	m				
Breadth of dilution tank adopted	4.70	m	ratio of dilution		18.73	
Average outflow from dilution tank	9.04	m^3/hour	volume	55.23	m^3	ok
-do-	0.22	mld			area in m^2	37.21
Design of pile foundation for one -dilution tank						
Number of pile grid	2	ext piles no	0	int piles no	0	
Toatal maximum length of inner side	4.70	m				
Total length of grid in plan	5.15	m	single span	5.15	m	
Breadth of raft beam	0.45	m	drop	0.75	m	
Side water depth	2.50	m	freeboard	0.50	m	
Floor slab thickness	0.35	m	offset to wall	0.45	m	
Sidewall thickness	0.25	m				
Value of load computaion constants for piles	A	5.19	B	0.42	C	1.88
Load on piles computation for the grid in Tonnes	corner	38.53	exterior	65.25	interior	106.89
Set pile number per load point	corner	1	exterior	0	interior	0
Load on single pile in Tonne	corner	38.53	exterior	0.00	interior	0.00
Diameter of pile from design	0.45	m	Length	18.00	m	
Diameter of pile from design	0.60	m	Length	18.00	m	
Number of 45cm dia piles	4	4.00		0.00		0.00
Number of 60cm dia piles	0	0.00		0.00		0.00
Total length of 45cm dia piles	72	m				
Total length of 60cm dia piles	0	m				
Oil and Grease Trap						
Average quantity of flow	9.04	m^3/hour	No.of Tank	2		
Peak flow	18.08	m^3/hour				
	0.00502	m^3/sec				
Average Retention Time for peak flow	300	sec	offset to wall	0.15	m	
Volume of the inlet chamber	1.51	m^3	free board	0.75	m	
Assumed depth of flow	1.6	m	total height	2.35	m	
Area required for inlet chamber	0.94	m^2	wall thickness	0.25	m	

Length of the tank	1	m	slab thickness	0.3	m	
Breadth of the tank	0.94	fix	1	m	area in m^2	3.24
Breadth of baffle wall inside	1	m				
Manual Coarse Screen Channel						
Peak design flow	0.00502	m^3/sec				
Number of screen	1					
Peak flow rate per screen	0.0050	m^3/sec				
Velocity at peak flow	0.5	m/sec	assumed			
Velocity through clean bar screen	0.60	m/sec				
Length of channel U/S	1	m	wall thickness	0.25	m	
Width of channel provided	0.6	m	offset to wall	0.25	m	
Depth of flow	0.02	m	slab thickness	0.30	m	
Area required for screen	0.01	sqm				
Headloss through bar screen	0.01	m	*assuming head loss coefficient = 0.7*			
Assumed depth of flow after inserting bar screen	0.02	m	0.02	(control value)		
Width of channel required	0.50	m	fix	0.7	m	
Clear bar spacing	20	mm	*(20 to 50 mm)*			
Bar thickness	10	mm	*(5 to 15 mm)*			
Number of bars	22					
Clear bar spacing obtained	21	mm	OK			
Inside width of screen (openings)	0.48	m			area in m^2	4.25
Full height of channel	1	m	fb	0.3		
Angle of inclination	45	degree	0.79	rad		
Actual velocity at peak flow	0.42	*(between 0.60 m/sec and 0.90 m/sec)*				
Length of channel required D/S	1.00	m	fix	1.5	m	
Sewage pump- for pumping to receiving chamber/equalisation tank of STP						
Number of pumps	1	SB	1			
Type of pump set	submersible centrifugal sewage transfer- non clog					
Average flow	9.04	m^3/hour				
Peak design flow	18.08	m^3/hour				

Working hours	23					
Flow capacity of each pump	18.87	m^3/hour				
Peak factor	1.25					
Discharge	6.55	LPS	0.0066	m^3/sec		
Head required	10	m				
Efficiency	50%					
Power required	1.75	HP	fix	2	HP	
Energy	29.98	kwh				
Recycled water pump- for pumping to dilution tank						
Number of pumps	1	SB	1			
Type of pump set	submersible centrifugal sewage transfer- non clog					
Average flow	8.58	m^3/hour				
Peak design flow	17.17	m^3/hour				
Working hours	23					
Flow capacity of each pump	17.91	m^3/hour				
Peak factor	1.25					
Discharge	6.22	LPS	0.0062	m^3/sec		
Head required	20	m				
Efficiency	50%					
Power required	3.32	HP	fix	3.5	HP	
Energy	56.92	kwh				
Design of mechanical mixer for dilution tank						
Capacity of dilution tank provided	54.25	m^3				
Hydraulic Retension Time	6	hours				
Mixing rate	0.5	m^3/hour				
Capacity of mixer	18.08	m^3/hour				
Power transferred in mixing	5	Watts/m^3				
Power required for mixer	0.12	HP	fix	0.5	HP	
Energy	8.95	kwh				

4.5 DESIGN OF EQUALISATION TANK

Equalisation tank is used to normalise the flow towards chemical and biological processing units. This unit has been designed in accordance with the observation of flow for 24 hours in similar cases. A peak factor is obtained from the observed data for both BOD loading and discharge. The equalisation tank will store liquid during excess flow periods and release quantity during off-peak flow periods. The volume of equalisation tank is scientifically designed based on this concept. Hence there will be a normalised value for influent BOD also.

4.5.1 UNIT OPERATIONS

Equalization Tank						
Number of units	1					
Average design flow to one unit	145.83	m^3/hour				
Volume of tank required	909.33	m^3	*from detailed analysis*			
HRT	6.24	hours				
SWD	4.2	m				
Area required for equalization tank	216.51	m^2	free board	0.75	m	
			offset to wall	0.45	m	
Area required for each tank	216.51	m^2	wall thickness	0.3	m	
Diameter of circular tank	16.60	m	fix	16.75	m	
Side if square tank	14.71	m	fix length	14.75	m	
Thickness of foundation slab	0.45	m	fix breadth	14.75	m	
Actual capacity provided	925.5	m^3	circular	OK		
	913.8	m^3	rectangular	OK	area in m^2	264.06
Design of pile foundation						
Number of pile grid	5	ext piles no	12	int piles no	9	
Toatal maximum length of inner side	14.75	m				
Total length of grid in plan	15.20	m	single span	3.80	m	
Breadth of raft beam	0.45	m	drop	0.75	m	
Side water depth	4.2	m	freeboard	0.75	m	
Floor slab thickness	0.45	m	offset to wall	0.45	m	
Sidewall thickness	0.30	m				
Value of load computaion constants for piles	A	5.90	B	0.54	C	3.71
Load on piles computation for the grid in Tonnes	corner	38.58	exterior	61.01	interior	89.72
Set pile number per load point	corner	1	exterior	1	interior	2
Load on single pile in Tonne	corner	38.58	exterior	61.01	interior	44.86
Diameter of pile from design	0.45	m	Length	18.00	m	
Diameter of pile from design	0.60	m	Length	18.00	m	
Number of 45cm dia piles	22	4.00		0.00		18.00
Number of 60cm dia piles	12	0.00		12.00		0.00
Total length of 45cm dia piles	396	m				
Total length of 60cm dia piles	216	m				

4.6 DESIGN OF MBBR UNITS

Biochemical oxygen demand (BOD) is an indirect measure of the concentration of biodegradable organic matter in water or wastewater. Organic matter (as measured by BOD) is one of the major constituents removed from wastewater in domestic wastewater treatment plants. The reason for being concerned about organic matter in water is its effect on dissolved

oxygen in the receiving stream. Dissolved oxygen in water is essential for much of aquatic life, so organic contaminants that affect dissolved oxygen level in water are of concern.

The two major reactions that take place in the organic carbon cycle are biological oxidation of waste organic matter and photosynthesis, which is the process by which green plants produce organic matter from carbon dioxide and water in reactions that are catalysed by sunlight and the chlorophyll in the green plants. Through the biological oxidation process, aerobic microorganisms utilize oxygen in breaking down organic matter to carbon dioxide and water together with small amounts of other end products.

The photosynthesis and biological oxidation processes can be represented by the following two equations:

Photosynthesis:

CO_2 + H_2O + sunlight → organic plant matter (primarily C, H, & O) + oxygen (this reaction is catalysed by the chlorophyll in green plants)

Biological Oxidation:

waste organic matter (primarily C, H & O) + O_2 → CO_2 + H_2O + energy

The process takes place as aerobic microorganisms utilize the waste organic matter as their food (energy) source. The process uses oxygen, so if it is taking place in a water body, dissolved oxygen is consumed. A large quantity of organic matter in the water will result in multiplication of microorganisms and rapid removal of dissolved oxygen, leading to oxygen depletion below the level needed by aquatic life. This is also the process that takes place in biological oxidation processes in wastewater treatment plants for removal of organic matter from the incoming wastewater.

The MBBR process for wastewater treatment was invented and initially developed by Professor Hallvard Ødegaard in the late 1980s at the Norwegian University of Science and Technology. Use of this wastewater treatment process has spread rapidly.

The MBBR process is an attached growth biological wastewater treatment process. That is, the microorganisms that carry out the treatment are attached to a solid medium, as in trickling filter or RBC systems. By contrast, in a suspended growth biological wastewater treatment process, like the activated sludge process, the microorganisms that carry out the treatment are kept suspended in the mixed liquor in the aeration tank. In the conventional attached growth biological treatment processes, like trickling filter or RBC systems the microorganisms are attached to a medium that is fixed in place and the wastewater being treated flows past the surfaces of the medium with their attached biological growth. which are described in more

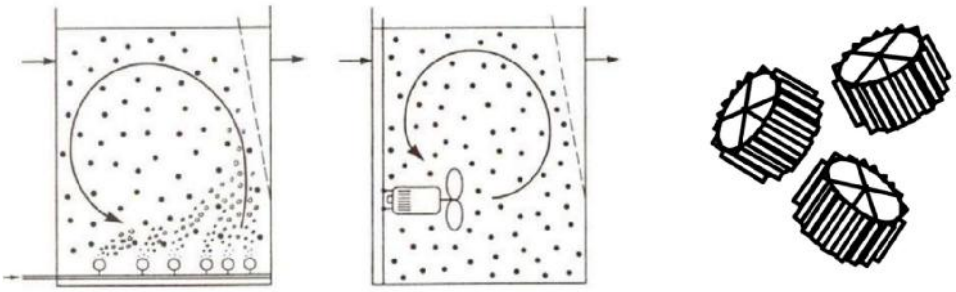
detail in the next section. The MBBR treatment processes typically take place in a tank like an activated sludge aeration tank. In contrast, an MBBR process utilizes small plastic carrier media, which are kept suspended by a diffused air aeration system for an aerobic process or by a mechanical mixing system for an anoxic or anaerobic process. A sieve is typically used at the tank exit to keep the carrier media in the tank.

MBBR processes use plastic media support carriers like those shown in Figure 11. As shown in Figure, the carrier is typically designed to have a high surface area per unit volume, so that there is a lot of surface area on which the microorganisms attach and grow. Two properties of the carrier are needed for the process design calculations are the specific surface area in m^2/m^3 and the void ratio. The specific surface area of MBBR carriers is typically in the range from 350 to 1200 m^2/m^3 and the void ratio typically ranges from 60% to 90%. Design values for these carrier properties should be obtained from the carrier manufacturer or vendor (Harlan H. Bengtson).

The MBBR wastewater treatment process is quite flexible and can be used in several different ways:

1. Single stage BOD removal 2. Two stage BOD removal 3. Two stage BOD removal and Nitrification 4. Single stage tertiary Nitrification 5. Pre-Anoxic Denitrification 6. Post-Anoxic Denitrification (Harlan H. Bengtson).

The idea behind the development of the moving bed biofilm process was to adopt the best from both the activated sludge process and the biofilter processes without including the worst. Contrary to most biofilm reactors, the moving bed biofilm reactor utilises the whole tank volume for biomass growth, as does also the activated sludge reactor. Contrary to the activated sludge reactor, it does not need any sludge recycle, as also the case in other biofilm reactors. This is achieved by having the biomass grow on carriers that move freely in the water volume of the reactor, kept within the reactor by a sieve arrangement at the reactor outlet. Since no sludge recirculation takes place, only the surplus biomass must be separated – a considerable advantage over activated sludge process. The reactor may be used for both aerobic, anoxic or anaerobic processes (H. Ødegaard).



a. Aerobic reactor b. Anoxic and anaerobic reactor c. The biofilm carrier (K1)

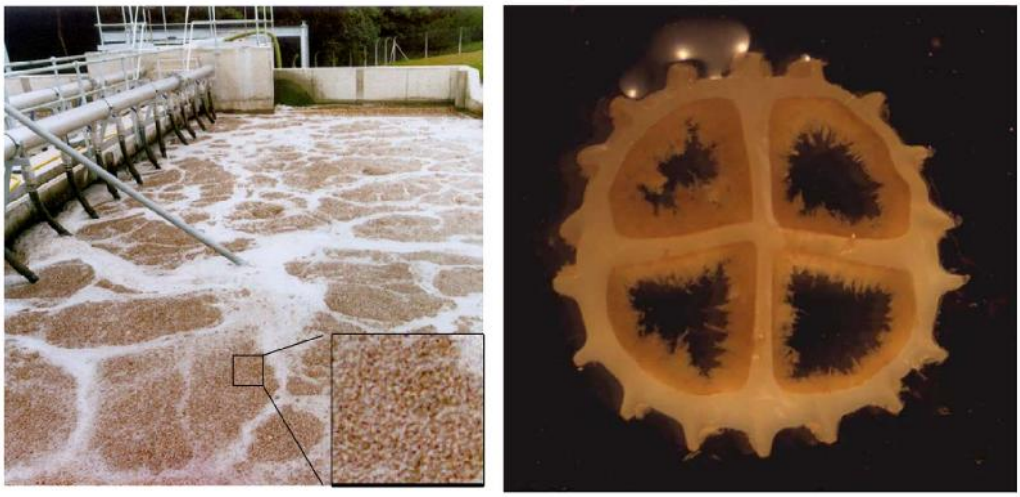


Fig. 33 MBBR Carrier media in a MBBR tank

The key design parameter for sizing the MBBR tank is the surface area loading rate (SALR), typically with units of g/m^2 /day, that is g/day of BOD coming into the MBBR tank per m^2 of carrier surface area. Using design values for wastewater flow rate and BOD concentration entering the MBBR tank, the loading rate in g BOD/day can be calculated. Then dividing BOD loading rate in g/day by the SALR in g/m^2 /day gives the required carrier surface area in m^2. The carrier fill %, carrier specific surface area, and carrier % void space can then be used to calculate the required carrier volume, tank volume and the volume of liquid in the reactor (Harlan H. Bengtson).

To carry out denitrification of a wastewater flow (removal of the nitrogen from the wastewater), it is necessary to first nitrify the wastewater, that is, convert the ammonia nitrogen typically present in the influent wastewater to nitrate. Nitrification will only take place at a reasonable rate if the BOD level is quite low. Thus, an MBBR denitrification process will need a reactor for BOD removal, one for nitrification, and one for denitrification. The nitrification reactor will always follow the BOD removal reactor, because of the need for a low BOD level in the nitrification reactor. The denitrification reactor may be either before the BOD removal reactor (called pre-anoxic denitrification) or after the nitrification reactor (called post-anoxic denitrification).

The denitrification reactions, which convert nitrate ion to nitrogen gas, and hence remove it from the wastewater flow, will take place only in the absence of oxygen, that is, in an anoxic reactor. Also, the denitrification reactions require a carbon source. In a pre-anoxic denitrification process, the BOD in the primary effluent wastewater is used as the carbon source for denitrification. In this process, however the primary effluent entering the pre-anoxic reactor still has ammonia nitrogen present rather than the nitrate nitrogen needed for denitrification.

In a post-anoxic denitrification process, the influent to the denitrification reactor comes from the nitrification reactor, so the wastewater influent ammonia nitrogen has been converted to nitrate as required for denitrification. The BOD has also been removed prior to the post anoxic denitrification reactor, however, so an external carbon source is required for the denitrification reactions.

The pre-anoxic denitrification process has the advantage of not requiring an external carbon source and it reduces the BOD load to the BOD removal part of the process because BOD is used in the denitrification reactions. However, the pre-anoxic process requires an influent C/N ratio greater than 4, where C/N is taken to be BOD/TKN, and the post-anoxic process can achieve a more complete nitrogen removal. In the present project, post-anoxic de-nitrification process is adopted to address the issues expected during the occurrence of higher values of total nitrogen in the incoming sewage load.

At each operation in reactor, the influent and effluent characteristics are monitored and if possible after de-nitrification the effluent can be directly taken for clarification. Also, there are provisions for bypassing de-nitrification reactor also. However, all these decisions largely depends upon the operational efficiency and continuous monitoring of the parameters in effluent at each stage.

4.6.1 PROCESS ANALYSIS AND DESIGN

Sewage pump- for pumping to MBBR Tank						
Number of pumps	2	SB	1			
Type of pump set	submersible centrifugal sewage transfer- non clog					
Average flow	3500.00	m^3/day				
Peak design flow	8750.00	m^3/day				
Working hours	23					
Flow capacity of each pump	76.09	m^3/hour				
Peak factor	1.20					
Discharge	25.36	LPS	0.0254	m^3/sec		

Head required	20	m				
Efficiency	55%					
Power required	12.30	HP	fix	15	HP	
Energy	421.98	kwh				
Moving Bed Biofilm-Reactor (MBBR 1)-Single Stage						
Number of tanks	1					
Average design flow to one unit	3500.0	m^3/day				
BOD of incoming sewage	263.13	mg/l				
TSS of incoming sewage	400	mg/l				
BOD expected after treatment	10	mg/l				
BOD to be removed	253.13	mg/l				
BOD removal % expected	96.20					
BOD loading rate/volume	4	$kg/m^3/day$	*4-7 $kg/m^3/day$ as per M&E*			
Actual BOD loading rate	920.96	kg/day				
Quantity of BOD to be removed per day	885.96	kg/day				
Volume of reactor required	230.24	m^3				
Surface area loading rate (SALR) for BOD removal	7.50	$g/m^2/day$				
Required carrier surface area	122794.69	m^2				
Specific surface area of carrier	600.00	m^2/m^3				
Required carrier volume	204.66	m^3	freeboard	0.5	m	
Volume of media required	40%		depth of base	0	m	
	92.10	m^3	depth of masonry	0	m	
Volume of tank required-BOD loading rate/volume method	322.34	m^3	slab thickness	0.35	m	
Volume of tank required-SALR method	511.64	m^3	offset to wall	0.60	m	
Volume of each tank	511.64	m^3	total height	5.00	m	
SWD	4.5	m	wall thickness	0.30	m	
Area of each tank	113.70	m^2	fix dia	12.2	m	
Diameter of circular tank	12.03	m	length	10.9	m	
Side of square tank	10.66	m	breadth	10.9	m	
Actual capacity provided-circular	526.05	m^3	OK			
Actual capacity provided-rectangular	534.65	m^3	OK			
Fix capacity	534.65	m^3				
Actual volume of media obtained	213.86	m^3				
Actual carrier surface area	128314.80	m^2				

Volume of liquid in the tank	449.10	m^3				
Hydraulic Retension Time at design average flow	3.08	hours	184.8	minutes		
Hydraulic Retension Time at peak flow	1.23	hours	73.9	minutes		
SARR for the given SALR	6.94	$g/m^2/day$				
Estimated BOD removal rate	890.18	kg/day				
Actual BOD removal rate %	96.66	BOD of effluent		8.79	mg/l	ok
					area in m^2	161.29
Design of pile foundation						
Number of pile grid	4	ext piles no	8	int piles no	4	
Toatal maximum length of inner side	10.9	m				
Total length of grid in plan	11.35	m	single span	3.78	m	
Breadth of raft beam	0.45	m	drop	0.75	m	
Side water depth	4.5	m	freeboard	0.50	m	
Floor slab thickness	0.35	m	offset to wall	0.60	m	
Sidewall thickness	0.30	m				
Value of load computaion constants for piles	A	5.93	B	0.56	C	3.75
Load on piles computation for the grid in Tonnes	corner	38.72	exterior	61.15	interior	89.70
Set pile number per load point	corner	1	exterior	1	interior	2
Load on single pile in Tonne	corner	38.72	exterior	61.15	interior	44.85
Diameter of pile from design	0.45	m	Length	18.00	m	
Diameter of pile from design	0.60	m	Length	18.00	m	
Number of 45cm dia piles	12	4.00		0.00		8.00
Number of 60cm dia piles	8	0.00		8.00		0.00
Total length of 45cm dia piles	216	m				
Total length of 60cm dia piles	144	m				
Moving Bed Biofilm-Reactor (MBBR 2)-Single Stage Nitrification						
Number of tanks	1					
Average design flow to one unit	3500.0	m^3/day				
BOD of incoming sewage	20.00	mg/l				
NH_4-N of incoming sewage	40.00	mg/l				
Alkalinity as $CaCO_3$	140.00	mg/l				
Target effluent NH_3-N	3.30	mg/l	% removal	91.75		
DL level to be maintained in tank	2.00	mg/l				

Design minimum waste water temperature	20.00	° C				
$SARR_{max}$	0.61		SARR temp coefft. Θ		1.058	
Minimum NH_3-N at $SARR_{max}$	0.50		$SARR_T$	0.81	$g/m^2/day$	
Design value of SALR	0.88	$g/m^2/day$				
NH_3-N loading rate	140.00	kg/day				
Required carrier surface area	158845.87	m^2/day	freeboard	0.50	m	
Specific surface area of carrier	600.00	m^2/m^3	depth of base		m	
Required carrier volume	264.74	m^3/day	depth of masonry	0	m	
Volume of media required	40%		slab thickness	0.45	m	
Volume of tank required-SALR method	661.86	m^3	offset to wall	0.60	m	
Volume of each tank	661.86	m^3	total height	5.00	m	
SWD	4.5	m	wall thickness	0.30	m	
Area of each tank	147.08	m^2	fix dia	13.7	m	
Diameter of circular tank	13.68	m	length	12.15	m	
Side of square tank	12.13	m	breadth	12.15	m	
Actual capacity provided-circular	663.35	m^3	OK			
Actual capacity provided-rectangular	664.30	m^2	OK			
Fix capacity	664.30	m^3				
Actual volume of media obtained	265.72	m^3				
Actual carrier surface area	159432.30	m^2				
Volume of liquid in the tank	558.01	m^3				
Hydraulic Retension Time at design average flow	3.83	hours	229.58	minutes		
Hydraulic Retension Time at peak flow	1.53	hours	91.83	minutes		
BOD SALR	0.44	$g/m^2/day$	*should be < 0.5 to achieve good nitrification*			
Using the equivalent weight of $CaCO_3$ as 50, the equivalent weight of $NaHCO_3$ as 84, the alkalinity use for nitrification as 7.14 g $CaCO_3$/g NH_3-N and the target effluent alkalinity as 80 mg/L as $CaCO_3$, give the calculated alkalinity requirement as 118.5 mg/L as $CaCO_3$.						
Influent alkalinity	140.00	mg/l				
Target effluent alkalinity	80.00	mg/l				
Alkalinity used for Nitrification	7.14	g $CaCO_3$/g NH_3-N				
Alkalinity to be added	202.04	mg/l				

Rate of alkalinity addition needed as $CaCO_3$	707.13	kg/day				
Equiv wt. of $CaCO_3$	50.00	g/equivalent				
Equiv wt. of $NaHCO_3$	84.00	g/equivalent				
Daily $NaHCO_3$ requirement	1187.98	kg/day $NaHCO_3$				
					area in m^2	194.60
Design of pile foundation						
Number of pile grid	4	ext piles no	8	int piles no	4	
Toatal maximum length of inner side	12.15	m				
Total length of grid in plan	12.60	m	single span	4.20	m	
Breadth of raft beam	0.45	m	drop	0.75	m	
Side water depth	4.5	m	freeboard	0.50	m	
Floor slab thickness	0.45	m	offset to wall	0.60	m	
Sidewall thickness	0.30	m				
Value of load computaion constants for piles	A	6.75	B	0.72	C	3.75
Load on piles computation for the grid in Tonnes	corner	47.11	exterior	75.46	interior	113.40
Set pile number per load point	corner	1	exterior	2	interior	2
Load on single pile in Tonne	corner	47.11	exterior	37.73	interior	56.70
Diameter of pile from design	0.45	m	Length	18.00	m	
Diameter of pile from design	0.60	m	Length	18.00	m	
Number of 45cm dia piles	20	4.00		16.00		0.00
Number of 60cm dia piles	8	0.00		0.00		8.00
Total length of 45cm dia piles	360	m				
Total length of 60cm dia piles	144	m				
Moving Bed Biofilm Reactor (MBBR 3)-post-anoxic denitrification						
Number of tanks	1					
Carbon:Nitrogen ratio (C/N)	6.58					
Average design flow to one unit	3500	m^3/day				
Target effluent NO_3-N concentration	4.00	mg/l				
SALR for post-anoxic stage	2.00	g NO_3 N /m^2/day				
Estimate of SARR/SALR ratio	0.886	mg/l				
Target % N removal	91.75					
Specific surface area of carrier	600.00	m^2/m^3				
NO_3-N daily loading rate	128.45	kg/day	freeboard	0.75	m	

Required carrier surface area	64225	m^2	depth of base		m	
Required carrier volume	107.04	m^3	depth of masonry		m	
Volume of media required	40%		slab thickness	0.35	m	
Volume of tank required-SALR method	267.60	m^3	offset to wall	0.60	m	
Volume of each tank	267.6	m^3	total height	5.25	m	
SWD	4.5	m	wall thickness	0.30	m	
Area of each tank	59.47	m^2	fix	8.8	m	
Diameter of circular tank	8.70	m	length	7.75	m	
Side of square tank	7.71	m	breadth	7.75	m	
Actual capacity provided-circular	273.70	m^3	OK			
Actual capacity provided-rectangular	270.28	m^3	OK			
Fix capacity	270.28	m^3				
Actual volume of media obtained	108.11	m^3				
Actual carrier surface area	64867.50	m^2				
Volume of liquid in the tank	227.04	m^3				
Hydraulic Retension Time at design average flow	1.56	hours	93.41	hours		
Hydraulic Retension Time at peak flow	0.62	hours	37.36	hours		
SARR	1.77	$g/m^2/day$				
Estimated NO_3-N removal rate	114.96	kg/day				
NO_3-N of effluent	3.85	mg/l	OK			
Alkalinity produced by denitrification	3.57	g $CaCO_3$/g NO_3-N removed				
Actual alkalinity to be added	84.78	mg/l				
Rate of alkalinity addition needed as $CaCO_3$	296.73	kg/day				
Equiv wt. of $CaCO_3$	50.00	g/equivalent				
Equiv wt. of $NaHCO_3$	84.00	g/equivalent				
Daily $NaHCO_3$ requirement	498.50	kg/day $NaHCO_3$				
4.6 lb COD/lb NO_3-N removed and 1.5 lb COD/lb Methanol. The required methanol dosage is then calculated as: 4.6/1.5 = 3.1 lb methanol /lb NO_3-N removed. The methanol requirement in lb/day is then equal to 3.1 times the previously calculated NO_3-N removal rate						
Methanol requirement in kg/day	398.20	kg/day				
Considering toxicity, economy and safety considerations it is better to adopt retrun activated sludge feed into anoxic tank for carbon source. Alkaline fermentation can be adopted for better results.						

					area in m^2	91.20
Design of pile foundation						
Number of pile grid	3	ext piles no	4	int piles no	1	
Toatal maximum length of inner side	7.75	m				
Total length of grid in plan	8.20	m	single span	4.10	m	
Breadth of raft beam	0.45	m	drop	0.75	m	
Side water depth	4.5	m	freeboard	0.75	m	
Floor slab thickness	0.35	m	offset to wall	0.60	m	
Sidewall thickness	0.30	m				
Value of load computaion constants for piles	A	6.35	B	0.56	C	3.94
Load from steel trussed roof slab	0.25	T/m^2				
Value of load computaion constants for roof slab	D	0.513				
Load on piles computation for the grid in Tonnes	corner	46.57	exterior	72.62	interior	104.19
Set pile number per load point	corner	1	exterior	1	interior	2
Load on single pile in Tonne	corner	46.57	exterior	72.62	interior	52.10
Diameter of pile from design	0.45	m	Length	18.00	m	
Diameter of pile from design	0.60	m	Length	18.00	m	
Number of 45cm dia piles	6	4.00		0.00		2.00
Number of 60cm dia piles	4	0.00		4.00		0.00
Total length of 45cm dia piles	108	m				
Total length of 60cm dia piles	72	m				
Design of mechanical mixer for denitrification tank						
Capacity of de-nitrification tank provided	270.28	m^3				
Hydraulic Retension Time	1.56	hours				
Mixing rate	0.5	m^3/hour				
Capacity of mixer	347.22	m^3/hour				
Power transferred in mixing	5	Watts/m^3				
Power required for mixer	2.33	HP	fix	3	HP	
Energy	39.93	kwh				
Moving Bed Biofilm Reactor (MBBR 4) chamber after de-nitrification						
Number of tanks	1					
Average design flow to one unit	3500	m^3/day				
BOD of incoming sewage (including return activated sludge as carbon source)	86.83	mg/l				

TSS of incoming sewage	50	mg/l				
BOD expected after treatment	7	mg/l				
BOD to be removed	79.83	mg/l				
BOD removal % expected	91.94					
BOD loading rate/volume	4	kg/m^3/day	*4-7 kg/m^3/day as per M&E*			
Actual BOD loading rate	303.92	kg/day				
Quantity of BOD to be removed per day	279.42	kg/day				
Volume of reactor required	75.98	m^3				
Surface area loading rate (SALR) for BOD removal	15.00	g/m^2/day				
Required carrier surface area	20261.12	m^2				
Specific surface area of carrier	600.00	m^2/m^3	freeboard	0.5	m	
Required carrier volume	33.77	m^3	depth of base		m	
Volume of media required	35%		depth of masonry		m	
	26.59	m^3	depth of masonry		m	
Volume of tank required-BOD loading rate/volume method	102.57	m^3	slab thickness	0.35	m	
Volume of tank required-SALR method	96.48	m^3	offset to wall	0.45	m	
Volume of each tank	102.57	m^3	total height	5.00	m	
SWD	4.5	m	wall thickness	0.30	m	
Area of each tank	22.79	m^2	fix dia	5.5	m	
Diameter of circular tank	5.39	m	length	4.8	m	
Side of square tank	4.77	m	breadth	4.8	m	
Actual capacity provided-circular	106.91	m^3	OK			
Actual capacity provided-rectangular	103.68	m^3	OK			
Fix capacity	103.68	m^3				
Actual volume of media obtained	36.29	m^3				
Actual carrier surface area	21772.80	m^2				
Volume of liquid in the tank	89.16	m^3				
Hydraulic Retension Time at design average flow	0.61	hours	36.7	minutes		
Hydraulic Retension Time at peak flow	0.24	hours	14.7	minutes		
SARR for the given SALR	13.13	g/m^2/day				
Estimated BOD removal rate	285.77	kg/day				

Actual BOD removal rate %	94.03	BOD of effluent		5.19	mg/l	ok
					area in m^2	39.69
Design of pile foundation						
Number of pile grid	2	ext piles no	0	int piles no	0	
Toatal maximum length of inner side	4.8	m				
Total length of grid in plan	5.25	m	single span	5.25	m	
Breadth of raft beam	0.45	m	drop	0.75	m	
Side water depth	4.5	m	freeboard	0.50	m	
Floor slab thickness	0.35	m	offset to wall	0.45	m	
Sidewall thickness	0.30	m				
Value of load computaion constants for piles	A	7.90	B	0.42	C	3.75
Load on piles computation for the grid in Tonnes	corner	63.35	exterior	104.81	interior	165.87
Set pile number per load point	corner	1	exterior	2	interior	3
Load on single pile in Tonne	corner	63.35	exterior	52.41	interior	55.29
Diameter of pile from design	0.45	m	Length	18.00	m	
Diameter of pile from design	0.60	m	Length	18.00	m	
Number of 45cm dia piles	0	0.00		0.00		0.00
Number of 60cm dia piles	4	4.00		0.00		0.00
Total length of 45cm dia piles	0	m				
Total length of 60cm dia piles	72	m				
Blower air requirement						
BOD loading	1224.88	kg/day				
NH_3-N loading rate	140.00	kg/day				
Oxygen uptake ratio-BOD	1.50	kg of O_2/kg of BOD				
Oxygen uptake ratio-NH_3-N	4.50	kg of O_2/kg of NH_3-N				
Oxygen required for BOD loading	1837.32	kg/day				
Oxygen required for NH_3-N loading	630.00	kg/day				
Percentage of O_2 in air	21.00					
Weight of air required-BOD loading	8749.12	kg/day				
Weight of air required-NH_3-N loading	3000.00	kg/day				
Density of air	1.225	kg/m^3				
Volume of air-BOD loading	7142.14	m^3/day				

Volume of air-NH_3-N loading	2448.98	m^3/day				
Air transfer efficiency of diffuser	0.075					
Quantity of air required-BOD loading	95228.54	m^3/day				
Quantity of air required-NH_3-N loading	32653.06	m^3/day				
Factor of saftey	1.20					
Volume of air required-BOD loading	4761.43	m^3/hour				
Volume of air required-NH_3-N loading	1632.65	m^3/hour				
Volume of equalisation tank	909.33	m^3				
Normal inflow	0.041	m^3/sec				
Air requirement for equalisation tank	1.25	m^3/m^3/hour				
Air requirement for sludge tank	3.00	m^3/m^3/hour				
Volume of ET	909.33	m^3				
Volume of air required for ET	1136.66	m^3/hour				
Volume of air required for ST	27.29	m^3/hour				
Total air required	7558.03	m^3/hour				
Capacity of blower	7558.00	m^3/hour				
Number of blowers working	4.00	SB	1			
Air required per blower	1889.50	m^3/hour				
Pressure given	0.60	kg/cm^2	5.89	m		
Volumetric efficiency	70%					
Power required for blower motor	59.26	HP	44.20	kw		
Fix power of blower motor	60.00	HP				
Energy	4066.83	kwh				

4.7 DESIGN OF CLARIFIER

In the following sections, flocculation and clarification processes are described for the effluent from MBBR tanks. To achieve high degree of clarification, up flow hopper bottom type clarifier is used. The upper portion of the clarifier consists of the rectangular vessel in which tube settlers/plate settlers are installed for particle removal. Alum and Lime dosing is used for formation of aggregates or flocs from finely divided particles and from chemically destabilised particles. The settling of discrete, non-flocculating particles can be analysed by means of the classic laws of sedimentation formed by Newton and Stokes. The clarified is designed based on the various aspects of theory of sedimentation.

4.7.1 UNIT OPERATIONS

Alum solution tank						
number of units	1	SB	1			
dosage of alum	25	ppm				
requirement for 8 hours	29.170	kg				
volume of solution at 10% strength/unit	0.26	m^3				
length of tank	1	m				
breadth of tank	1	m				
liquid depth	0.26	m				
total depth	1	m				
solution flow rate	0.0325	m^3/hour			area in m^2	4.41
Lime solution tank						
number of units	1	SB	1			
dosage of lime	15	ppm				
requirement for 8 hours	17.5	kg				
volume of solution at 10% strength/unit	0.16	m3				
length of tank	1	m				
breadth of tank	1	m				
liquid depth	0.16	m				
total depth	1	m				
solution flow rate	0.020	m^3/hour			area in m^2	4.41
Chemical store						
alum required for 3 months	7875.9	kg				
density of alum	1065	kg/m3				
volume required	7.4	m3				
area required at a stacking height of 2 m	3.7	m2				
assuming 50% circulation space total area	5.55	m2				
lime required for 3 months	4725	kg				
density of lime	1113	kg/m3				
volume required	4.25	m3				
area required at a stacking height of 2 m	2.125	m2				
assuming 50% circulation space total area	3.19	m2				
total area required	8.74	m2				
length	3.5	m				
breadth	2.50	m	fix	3	area in m^2	24.44
Secondary Clarifier with Plate/Tube Settler						
Average output required from tube settler in MLD	3.50	145.83	m^3/hour	40.51	LPS	
Number of batteries	1					
Average design flow as input in MLD/unit	3.50	145.83	m^3/hour	40.51	LPS	
Width of plates in mm	1200	space between plates		75	mm	91.59
Length of plates adopted in m	1.8					

Angle of inclination of tubes adopted in deg.	55	0.96	rad			
Relative length of settler (dimensionless) Lr = L/d	24.0		wall thickness	0.3	m	
Relative length is changed by L' = 0.058 x [Vo x d/v]			column size	0.45	m	
Where Vo is velocity of flow along tube settler			offset to wall	0.6	m	
v is kinematic viscosity of water			depth of raft	0.75	m	
Effective relative length of tube, L = Lr- [0.058 x Vo x d/v]			slab thickness	0.45	m	
Kinematic viscosity of water in m/day	0.087264		r-beam depth	0.75	m	
Effective relative length of tube/plate , L	24.0	(-)	0.050	Vo		
	10.74		top channel-t	0.20	m	
desirable value of relative length =	*around 20 but below 40*		top channel-w	0.6	m	
for one unit:			top channel-d	0.85	m	
Vertical water height in chamber in m	2.3		freeboard	0.5	m	
Height of chamber in hopper portion in m	2.3		t-beam width	0.45	m	
Side of large square in m	6.5		t-beam depth	0.6	m	
Side of small square in m	3.3		r-beam width	0.45	m	
h_3 in m (height of the truncated cone)	2.37		inlet pipe dia	0.30	m	
Angle of inclination of hopper side to vertical	0.608	34.84	degree	55.16	*deg. with hor.*	
Larger inclined length L_i of slanting slab in m	5.69	area in m^2	18.50			
Smaller inclined length l_i of slanting slab in m	2.89	area in m^2	4.77			
Contact area in m^2	54.91					
SOR in m^3/m^2/day for upflow clarifier	63.73	<	75	(due to dual clarification)		
SOR in m^3/m^2/hour for upflow clarifier	2.66	<	5			
Trial volume in m^3 of one unit	153.79		volume of hopper in m^3		56.61	
Detention time in hours	1.05	in square	0.67	in hopper	0.39	hours
Fix volume	195	m^3				
Performance parameter of tube settler S = Vs/Vo x [sinθ + L x cosθ]						

For laminar flow regime, critical performance parameter value for complete removal of particle,						
Critical value of performance parameter, Sc =	1.333	circular				
	1.375	square				
	1	parallel plates				
Particle size in mm	0.025					
Settling velocity of particle in m/sec, V_s (laminar)	0.0006	m/sec	48.08	m/d		
Reynolds number, Nr	0.014					
Trial value of flow along plate settler V_o in m/day	266					
Shape of cross section of tubes	plates	(square, circular, or plates)				
Critical of performance parameter obtained, Sc	[(Vs/Vo) x (sinθ+Lcosθ)					
	1.26					
Plate entrance area/one unit	12.61	m^2				
Number of modules of plates	2					
Number of plates required/module	70.05					
Fix number of plates required/module	50					
Length/module of tray holding plates	6500	mm				
Thickness of plate	2	mm				
Number of plates configured in one module	70.45	OK				
Height of plate module for 1m length of tubes inclined:	0.82					
Hence height of tube module	1.47	m				
Fix length of plate module	1.8	m				
Fix height of plate module	1.2	m				
Fix number of plates required per module	70					
Angle of inclination	55	degree to horizontal				
Contact area	302.4	m^2				
SOR in m^3/m^2/day for plate settler	11.09	<	40			
Total plate entrance area	12.600	m^2				
Actual velocity of flow in m/day	266.20	*now correct velocity*			area in m^2	68.89
Design of pile foundation						
Number of pile grid-outer	3	single span	3.48	m		
Number of pile grid-inner	3	single span	1.875	m		

Outer piles	8					
Inner piles	8					
Pile cap side	1.1	m	depth	0.9	m	
	outer pile	inner pile				
Load from channels with water in Tonne	4.38	0				
Load from vertical wall in Tonne	7.30	0				
Load from hopper wall in Tonne	2.57	2.57				
Load from top beam in Tonne	2.35	1.27				
Load from column in Tonne	2.96	0.38				
Load from vertical water column in Tonne	5.92	12.18				
Load from grade beam in Tonne	2.93	1.58				
Load from grade tie-beam in Tonne	0.00	1.35				
Load from pile cap in Tonne	2.72	2.72				
Number of piles per load point	1.00	1.00				
Total load on pile in Tonne	31.14	22.06				
Diameter of pile from design	0.45	m	Length	18.00	m	
Diameter of pile from design	0.60	m	Length	18.00	m	
Number of 45cm dia piles	16		8		8	
Number of 60cm dia piles	0		0		0	
Total length of 45cm dia piles	288	m				
Total length of 60cm dia piles	0	m				

4.8 DESIGN OF FILTER FEED, CHLORINE CONTACT UNITS AND PRESSURE FILTERS

Pressure filters are used for treatment of the clarified water in the next stage. Pressure Sand Filter is used for removal of suspended solids and turbidity from the effluent from clarifier. Clarified water is passed through the pressure sand filter, the filter media (Fine quartz sand) is supported on gravel and pebbles bed of progressively larger sizes. During the filtration cycle, the filter bed retains the dirt and suspended particles from the water and accumulates within the filter bed. Clear water can be collected from the outlet of filter. Frequent backwashing of the media is also required.

Activated carbon filter process basically absorbs unwanted contaminants from wastewater. Activated carbon is initially treated with oxygen. This helps the charcoal open millions of tiny pores. Activated carbon is highly effective when it comes to absorption of contaminants from water. Filtration process includes activated carbon to remove the residual contaminants from sewage. Carbon absorbs micropollutants such as chlorine, methane, organic compounds, and even the taste and odour from water. Activated carbon filter removes chlorine from wastewater.

It has a large surface area which makes it highly effective to absorb contaminants from wastewater. Chlorine removal process fills the wide pores of the carbon. Hence, impurities are removed. Activated carbon needs replacement as its capacity to work reduces gradually. This process involves a low operating cost. Carbon in the activated carbon filter process also absorbs organic compounds. The capacity of this process will depend on the physical properties of the surface area of the activated carbon, the amount of hydrogen and oxygen contains, the concentration level of the impurities, duration of the treatment, and of course the pH level of the water used.

Chlorination is used for disinfection of the clarified water which is collected in a filter feed tank. Using filter feed pump sets, the effluent is fed to the pressure sand and activated carbon filter units.

4.8.1 UNIT OPERATIONS AND STRUCTURAL DESIGN

Chlorine contact tank						
HRT	30	minutes	offset to wall	0.3	m	
Average flow	145.83	m^3/hour	wall thickness	0.3	m	
Volume of tank	72.92	m^3	slab thickness	0.35	m	
Assumed liquid depth	3	m	freeboard	0.35	m	
Area of the tank	24.31	m^2				
side of square tank	4.93	m	fix	5	m	
					area in m^2	38.44
Filter feed tank						
HRT	20	minutes	offset to wall	0.3	m	
Average flow	145.83	m^3/hour	wall thickness	0.25	m	
Volume of tank	48.61	m^3	slab thickness	0.3	m	
Assumed liquid depth	3.5	m	freeboard	0.35	m	
Area of the tank	13.89	m^2				
side of square tank	3.73	m	fix	3.75	m	
			fix breadth	3.75	m	
Volume provided	49.22	OK			area in m^2	23.52
Pressure Sand Filter						
Number of units	2					
Average flow to one unit	1750	m^3/day				
Filter operating hours	20	hours				
Operating flow	87.50	m^3/hour				
Filter Loading Rate	12	m^3/m^2/hour				

Area of the filter required	7.36	m^2				
Diameter of filter required	3.06	m	fix	3.1	m	
Height of the filter	3	m	offset to wall	0.5	m	
Operating pressure	4	Bar	wall thickness	11	mm	
Filter media	Sand				area in m^2	16.81
Activated Carbon Filter						
Number of units	2					
Average flow to one unit	1750	m^3/day				
Filter operating hours	20	hours				
Operating flow	87.50	m^3/hour				
Filter Loading Rate	10	m^3/m^2/hour				
Area of the filter required	8.75	m^2				
Diameter of filter required	3.34	m	fix	3.5	m	
Height of the filter	3	m	offset to wall	0.5	m	
Operating pressure	4	Bar	wall thickness	11	mm	
Filter media	Activated Carbon				area in m^2	20.25
Pump for clarified water to PSF and ACF						
Type of pump set	CF					
Number of pumps	2.00	W	SB	1		
Discharge of clarified water required	145.83	m^3/hour				
Working hours of pumps	20.00	hours				
Discharge required/pump	87.50	m^3/hour	2.4E-02	m^3/sec		
Head required	35.00	m				
Efficiency	65%					
Power required	17.45	fix	20.00	HP		
Energy	520.71	kwh				
Treated Water Tank						
HRT	60	minutes	offset to wall	0.3	m	
Average flow	145.83	m^3/hour	wall thickness	0.3	m	
Volume of the tank	145.8	m^3	slab thickness	0.35	m	
Assumed liquid depth	4	m	freeboard	0.5	m	
Area of the tank	36.46	m^2				
Number of tanks	1		fix length	6.2	m	
Area of one tank	36.46	m^2	fix breadth	6.2	m	
Side of square tank	6.04	m				
Volume provided	153.76	m^3	OK			
Administrative Bldg,lab,chemical store (20*25)	500.00					
Transformer yard (12*12)	144.00					

Movement space factor	1.75				area in m^2	54.76
Total area rquired	3199.70	m^2	0.79	Acre		
Design of pile foundation						
Number of pile grid	3	ext piles no	4	int piles no	1	
Toatal maximum length of inner side	6.2	m				
Total length of grid in plan	6.65	m	single span	3.33	m	
Breadth of raft beam	0.45	m	drop	0.75	m	
Side water depth	4	m	freeboard	0.50	m	
Floor slab thickness	0.35	m	offset to wall	0.30	m	
Sidewall thickness	0.30	m				
Value of load computaion constants for piles	A	4.90	B	0.28	C	3.38
Load on piles computation for the grid in Tonnes	corner	28.43	exterior	44.71	interior	65.12
Set pile number per load point	corner	1	exterior	1	interior	1
Load on single pile in Tonne	corner	28.43	exterior	44.71	interior	65.12
Diameter of pile from design	0.45	m	Length	18.00	m	
Diameter of pile from design	0.60	m	Length	18.00	m	
Number of 45cm dia piles	8	4.00		4.00		0.00
Number of 60cm dia piles	1	0.00		0.00		1.00
Total length of 45cm dia piles	144	m				
Total length of 60cm dia piles	18	m				

4.9 SLUDGE DISPOSAL PLAN

Sludge is generated in primary, secondary and advanced wastewater treatment processes. Primary sludge consists of settleable solids carried in the raw wastewater. Secondary sludge consists of biological solids as well as additional settleable solids. In the treatment system, facility for thickening and dewatering of sludge is provided even though it is not essential for small STPs. This is to stabilize the sludge and generate an efficient sludge disposal mechanism. thickening is a procedure used to increase the solids content of sludge by removing a portion of the liquid fraction. Thickening is generally accomplished by physical means like gravity settling and it is adopted in the present system. Whereas centrifuges are used to thicken and dewater sludges. Thickening by centrifugation involves the settling of sludge particles under the influence of centrifugal forces. The design of various components of sludge handling units are illustrates as follows:

Sludge Sump						
Number of tanks	1					
Average flow to one unit	3500	m^3/day				
TSS	400	mg/l				

BOD	263.13	mg/l				
Assumed TSS Sludge	30%					
Assumed BOD Sludge	35%					
Sludge generated-TSS	420.0	kg/day				
Sludge generated-BOD	322.3	kg/day				
Total sludge	742.34	kg/day				
% sludge with 1.02 specific gravity	10%					
Sludge volume per day	72.78	m^3/day				
	3.03	m^3/hour				
Assumed HRT	3	hours	freeboard	1.2	m	
Volume of tank	9.10	m^3	slab thickness	0.45	m	
Assumed SWD	3	m	offset to wall	0.3	m	
Area of the tank	3.03	m^2	wall thickness	0.25	m	
Diameter of circular tank	1.96	m	fix	2	m	
Actual capacity provided	9.42	m^3			area in m^2	9.61
Pump for Sludge transfer to Thickner						
Number of pumps	1.00	W	1	SB		
Specific gravity of liquid	1.03					
Tipe of pump set	submersible centrifugal sewage transfer-non clog					
Working hours	5.00	hours				
Discharge required	14.56	m^3/hour	0.004043	m^3/sec		
Required head	18.00	m				
Velocity in sludge transfer pipe adopted	0.70	m/sec				
Pipe diameter required	85.76	mm	fix	90	mm	
Efficiency	55%					
Power required	1.76	HP	fix	2.00	HP	
Energy	6.58	kwh				
Sludge Thickener						
Number of units	1					
Total sludge to one unit	742.34	kg/day				
Solids Loading Rate	40	kg/m^2/day				
Thickening area required	18.56	m^2				
Surface Loading Rate	12	m^3/m^2/day				
Thickening area required	6.06	m^2	freeboard	1.2	m	
Maximum area	18.56	m^2	slab thickness	0.45	m	
Area of distribution chamber	20%		offset to wall	0.45	m	
Total area required	22.27	m^2	wall thickness	0.3	m	
Diameter of circular tank	5.32	m	fix	5.4	m	

Thickening area available	22.90	m^2				
SWD	3	m				
Actual volume provided	68.71	m^3				
Thickened sludge consistency	3%	of total sludge volume				
Thickened sludge volume	22.27	m^3/day			area in m^2	47.61
Pump for Sludge transfer to Centrifuge						
Type of pump set	Screw pump					
Number of pumps	1.00	W	1	SB		
Volume of thickened sludge to be pumped	22.27	m^3/day				
Working hours of centrifuge	5.00	hours				
Discharge required	4.45	m^3/hour	1.2E-03	m^3/sec		
Head required	20.00	m				
Efficiency	55%					
Power required	0.60	fix	1.00	HP		
Energy	2.238	kwh				
Sludge Centrifuge and Dosing Tanks						
Number of centrifuges	1	SB	1			
Capacity of centrifuge	0.25	m^3/hour				
Poly electrolyte dozing for centrifuge & thickener	10%					
Sludge volume	742.34	kg/day				
Dose	2	kg/1000 kg				
Quantity of Poly Electrolyte	1.48	kg/day				
Concentration	0.1					
Volume of tanks @ 24 hour	1.48	m^3				
	1484.67	litres				
Volume	61.86	litres/hour				
Volume required for 8 hours	0.49	m^3	3			
Liquid depth of tank	1	m				
Area required	0.49	m^2	offset to base slab	0.6	m	
side of square tank	0.70	m	fix	1	area in m^2	9.68

4.10 PRELIMINARY STRUCTURAL DESIGN OF COMPONENTS

For the various units of the STP, structural analysis and design have been performed in accordance with the stipulations of all relevant Indian Standard Codes of practice. For the reinforced concrete elements, special attention has been given to arrive at the preliminary dimensions to satisfy norms and conditions for the water retaining structures. For the metallic structures like pressure filter units, similar approach has been adopted. Since the units are constantly in contact with aggressive environment like sewage, non-corrosive coating for

reinforcing steel and water proofing application for the inner side of reinforced concrete structures are recommended. These provisions are already given in the detailed estimates. During the execution stage, a detailed structural analysis of the components can be performed. However, the dimensions are expected to fall within the limits of the values obtained from the preliminary analysis. In the case of foundations, simple raft and beam-slab type raft is adopted for safety considerations. Since the soil nature is observed to be satisfactory to withstand medium loading conditions, deep foundations are not suggested. Soil analysis reports available for the locality has been examined to arrive at a decision. However, during the execution stage, detailed soil investigations can be performed. Cover for the reinforced concrete elements is to be given in accordance with the exposure conditions given in the IS 456 Code of practice. Even though, most of the components are designed as reinforced concrete, innovative materials with high strength to weight ratio like Fibre Reinforce Polymers (FRPs) can also be tried after performing detailed structural analysis.

Manholes and pipelines are to be checked for external traffic loads pertaining to the characteristics of each road and soil conditions. Since the accurate data of this will be obtained during the execution stage of the project, the detailed structural analysis of the pipelines and manholes will be required to be performed later and the changes are to be incorporated accordingly.

4.11 SITE PROPOSED FOR COLLECTION WELLS AND STP

The tentative sites proposed for the collection wells and sewage treatment plant is given as follows:

Table 18 Site proposed for Lifting Stations, Collection Wells and STP

Sl. No.	Type of structure	Location	GPS Coordinates	Extent of land	Remarks
LIFTING STATIONS					
1	LS-2	Avikkulam Jn. Near Valiya Jaram Ponnani – Ward 35	10.77952529, 75.92065502	2 cents	
2	LS-6	Anappadi Jn. Near Highway Petroleum (IOCL) Pump – Ward 44	10.76092380, 75.92768594	2 cents	
DRAIN INTERCEPTORS					
3	OF-1	Marakkadavu, Ward 50	10.77538405, 75.91824301	1 cent	
4	OF-2	Khilar Palli, Ward 45	10.75711770, 75.92514773	1 cent	
5	OF-3	Puthanpalli, Ward 38	10.77349526, 75.92655573	1 cent	
6	OF-4	Near No.1 Bridge, Ward 35	10.78084880, 75.92323704	1 cent	

COLLECTION WELLS					
7	CW-1	Near Valiya Juma Masjid, JM road, Ward 36	10.778282, 75.923392.	5 cents	
8	CW-2	Near Ponnani Municipal Jn. (Near Municipality) Ward 46	10.76695328, 75.92571543	5 cents	
9	CW-3/STP STP	At Ponnani Harbour, Ward 1	10.78357857, 75.91829133	120 cents	Including garden. Footprint area of STP alone is 90 cents

The soil conditions are observed to be loose soil and at some locations in lateritic nature. However, during execution of the project detailed soil investigations are to be performed. Any changes in the site locations must be incorporated in the hydraulic models and analysed for successful routing subsequently.

4.12 DIMENSIONS AND MATERIAL OF CONSTRUCTION OF STP UNITS

The details of functional sizing and materials of construction of Sewage Treatment Plant (STP) units are illustrated below:

Table 19 Dimensions and material of construction of sewage treatment system

SIZING OF STP UNITS						
Sl. No.	**COMPONENT**	**SIZING (m)**			**Nos.**	**METHOD OF CONSTRUCTION**
	CIVIL CONSTRUCTION UNITS					
		L	**B**	**H**		
1	Receiving Chamber-CTU	0.75	0.5	1.3	2	RCC
2	Receiving Chamber-STP	5	5	3	1	RCC
3	Dilution Tank	4.7	4.7	3.0	2	
4	Oil and Grease Trap-STP	1	3.5	3.5	1	RCC
5	Manual Coarse Screen Channel-STP	2.5	1	1.5	2	RCC
6	Manual Fine Screen Channel-STP	2.50	1	1.5	2	RCC
7	Grit Separator	3.15	3.15	3.55	1	RCC

8	Equalisation Tank	14.75	14.75	4.95	1	RCC
9	Moving Bed Biofilm Reactor-1	10.90	10.90	5	1	RCC
10	Moving Bed Biofilm Reactor-2	12.15	12.15	5	1	RCC
11	Moving Bed Biofilm Reactor-3	7.75	7.75	5.25	1	RCC
12	Moving Bed Biofilm Reactor-4	4.8	4.8	5	1	RCC
13	Clarifier with Plate Settler	6.5	6.5	2.8	1	RCC
14	Filter feed tank	3.75	3.75	3.85	1	RCC
15	Sludge Sump	Dia	2	4.2	1	RCC
16	Sludge Thickener	Dia	5.4	4.2	1	RCC
17	Chlorine Contact Tank	5	5	3.35	1	RCC
18	Treated Water Tank	6.2	6.2	4.5	1	RCC
19	Pump house (fabricated)	1.5	1.5	4	1	Steel Truss and Bricks (common)
20	Sludge Yard	2	2		1	Steel Truss and Bricks (common)
21	Centrifuge Shed	1	1		1	Steel Truss and Bricks (common)
22	Control Room				1	Steel Truss and Bricks (common)
23	Generator Basement	1.5	1		1	RCC
24	Alum solution tank	1	1	1	1	FRP/HDPE
25	Lime solution tank	1	1	1	1	FRP/HDPE
26	Hypodosing tank	1	1	1	1	FRP/HDPE
27	Control Room					Common Space
28	Office					Common Space
SIZING OF STP UNITS						
Sl. No.	**COMPONENT**	**Details**			**Nos.**	**METHOD OF CONSTRUCTION**
	ELECTRO-MECHANICAL UNITS					

1	Sewage transfer pump to MBBR	15	HP		3	Submersible Centrifugal
2	Manual Coarse Screen-STP	20	mm	opening	1	SS 304
3	Manual Fine Screen-STP	10	mm	opening	1	SS 304
4	Air Grid and Diffused aeration system for ET, MBBR Tanks and Sludge Tank			As per design		PVC
5	MBBR carrier			As per design		PVC/HDPE
6	Air Blowers	7558.03	m^3/hour			Centrifugal
7	Plate Settlers			As per design		SS 304
8	Sludge transfer pump to thickener	2.00	HP		2	Submersible Centrifugal
9	Sludge transfer pump to centrifuge	1.0	HP		2	Screw type pump
10	Sludge Centrifuge	4.45	m^3/hour		1	
11	Pump for clarified water to PSF and ACF	20.00	HP		3.00	Submersible Centrifugal
12	Pressure Sand Filter (Dual media)	Dia	3.1	m	8	MS with all specials
13	Activated Carbon Filter	Dia	3.5	m	2	MS with all specials
14	Jetting/Cleaning machine				1	High pressure pump
15	Generator				1	Diesel type automatic switch over
16	Chlorinator					Electro type of similar
17	IoT based sensors					Discharge, BOD, DO, TSS, ph sensors

CHAPTER 5

DETAILED ESTIMATES

5.1 GENERAL

The detailed estimate for the STP components is prepared in accordance with the Delhi Schedule of Rates (DSR) 2018 provisions after applying District Cost Index. For certain items, market rates are adopted. For simplicity and rapid work plan, the dimensions of the design of unit operations, chemical and biological process and structural dimensions of components are given as the input values for the data spread sheet of detailed estimate.

5.2 DETAILED ESTIMATE OF COMPONENTS

The detailed estimate is prepared using Government of Kerala's PRICE 3 estimation package. The detailed estimates have been divided into four sections: a] civil construction b] mechanical works c] electrical and instrumentation works d] operation and maintenance. The detailed estimates are attached as Annexure 1.

5.3 ABSTRACT OF COST

Table 20 Abstract of Cost

ABSTRACT OF COST		
Sl. No.	**ITEM**	**AMOUNT**
CIVIL ITEMS		
1	Soil Investigation	₹ 2,79,430
2	Site Preparation	₹ 15,27,049
3	Collection well at STP	₹ 29,71,592
4	OG Trap, Receiving Chamber, Screen, Grit Chamber	₹ 45,40,655
5	Equalisation Tank	₹ 92,22,242
6	Moving Bed Biofilm Reactors	₹ 1,87,97,329
7	Clarifier with Tube/Plate Settler	₹ 36,25,145
8	Sludge Sump and Thickener	₹ 22,40,591
9	Filter Feed Tank	₹ 10,57,081
10	Chlorine Contact Tank and Treated Water Tank	₹ 41,28,097
11	Pile foundation and PSF/ACF foundation	₹ 1,34,48,668
12	Dilution Tank and Receiving Chamber - CTU	₹ 26,27,878

13	Administrative/laboratory/chemical house /control room building/Security cabin/air blower room and control panel room/chlorination building/compound wall/internal roads/storm water drains/transformer building/dg room/centrifuge building/sludge shed	₹ 2,16,78,220
14	Landscaping and green belt formation	₹ 15,00,000
15	Provision for providing automated system to the entire plant by Scada/Automatic Control system for network	₹ 33,00,000
16	Stair & walk way	₹ 37,58,804
17	Sewer network with pipelines and chambers	₹ 26,29,89,605
18	Sewerage connection charges	₹ 2,76,00,000
19	Control Room, Generator Room and Compound wall with gate for Network	₹ 40,00,000
	TOTAL OF CIVIL ITEMS	**₹ 38,92,92,387**
	GST Component (18%)	₹ 7,00,72,630
	MECHANICAL ITEMS	
1	Gates and Screens	₹ 11,65,453
2	Pump sets and Aeration system	₹ 1,42,32,500
3	PSF & ACF	₹ 85,00,000
4	Centrifuge	₹ 8,00,000
5	Bypass arrangements, Ladder and frame work	₹ 9,34,195
6	Piping and Valves	₹ 10,00,000
7	MBBR Carrier and other items	₹ 1,01,59,706
8	Tube settler media/Odour control unit	₹ 24,82,800
9	Gritting Mechanism/Sludge Mechanism	₹ 36,10,000
10	Alum and Lime dosing systems	₹ 7,10,000
11	Tools and plant/Spare parts/safety items	₹ 15,55,000
12	Supply of GPS fitted vacuum truck	₹ 90,00,000
	TOTAL OF MECHANICAL ITEMS	**₹ 5,41,49,656**
	GST Component (18%)	₹ 97,46,938
	ELECTRICAL ITEMS	
1	Diesel Generator	₹ 44,90,000
2	Electrical works, IoT based sensor and control units	₹ 1,72,18,001
3	Suppling and installing solar panel with all accessories	₹ 28,00,000
	TOTAL OF ELECTRICAL ITEMS	**₹ 2,45,08,001**

	GST Component (18%)	₹ 44,11,440

ABSTRACT OF COST

Sl. No.	ITEM	AMOUNT
1	Civil Works	₹ 38,92,92,387
2	Mechanical Works	₹ 5,41,49,656
3	Electrical Works	₹ 2,45,08,001
4	O&M Charges for 10 years(STP + Network)	₹ 13,83,91,965
5	GST Component (18%)	₹ 10,91,41,562
6	DPR Preparation Charge @ 2.5%	₹ 1,16,98,751
7	Centage Charges@10%	₹ 6,06,34,201
8	Unforeseen	₹ 71,83,478
	GRAND TOTAL	**₹ 79,50,00,000**

Assistant Engineer
Sewerage Camp Office
Kerala Water Authority
Malappuram-676 505

Assistant Executive Engineer
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Executive Engineer (i/c)
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Superintending Engineer
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Office of the Superintending Engineer
Kerala Water Authority
Kochi - 682011
PPD Regional Office

CHAPTER 6

OPERATION AND MAINTENANCE

6.1 GENERAL

For the success of a sewerage treatment system, it is inherent to note that meticulous operation and maintenance planning is the key. In the following sections various aspects of effective operation and maintenance, cost analysis, application of modern technologies for monitoring and process control and maintenance of an eco-friendly system are illustrated.

In engineering parlance, the term operation refers to the daily operation of the components of a sewerage system such as collection system, sewage pumping stations (SPS), pumping mains, sewage treatment plants (STP), machinery and equipment, etc., in an effective manner by various technical personnel, and is a routine function. The term maintenance refers to the art of keeping the structures, plants, machinery and equipment and other facilities in optimum working order and includes preventive maintenance or corrective maintenance of mechanical adjustments, repairs, and planned maintenance. However, replacements, correction of defects etc., are considered as actions excluded from preventive maintenance.

6.2 PLANNING FOR EFFECTIVE OPERATION AND MAINTENANCE

Three categories of variability that can affect the design, performance and reliability of a wastewater treatment plant are a] variability of the influent wastewater flow rate and characteristics, b] inherent variability in wastewater treatment processes and c] variability caused by mechanical breakdown, design deficiencies and operational failures.

It may be noted that effective use of the equalisation facility will balance most of the issues related with the variability of the influent flow rate and abnormal BOD levels at certain points of time. Many of the treatment units exhibit variability in performance despite the efficient planning and design. However, these problems can be eliminated at the design stage itself by adopting some conservative values. At the operational stage, some of the design deficiencies can be addressed by few additions in the system which will not affect the total operational cost. Occurrence of mechanical and electrical breakdown can be addressed by careful planning of maintenance activities. There is a provision for diesel generator back up and solar energy sources also can be relied upon.

It is recommended to form an internal monitoring committee for periodical inspection and control of activities related to the function, efficiency and operation of the STP. Prison inmates can be employed for support activities of monitoring and control.

Operation and maintenance for 10 years is to be performed by the firm who carries out the construction and commissioning of the STP.

6.3 TYPE OF MAINTENANCE

There are three types of maintenance of a sewerage system – preventive, routine and emergency. Preventive or routine maintenance should be carried out to prevent any breakdown of the system and to avoid emergency operations to deal with clogged sewer lines or overflowing manholes or backing up of sewage into a house or structural failure of the system. Preventive maintenance is more economical and provides for reliability in operations of the sewer facilities. Emergency repairs, which would be very rare if proper maintenance is carried out well, also, must be provided for. Proper inspection and preventive maintenance are necessary.

6.4 INSPECTION AND EXAMINATION OF SEWER

Sewer collection systems are intended to be a reliable method of conveying sewage from individual discharge to sewage treatment plants. Inspection and examination are the techniques used to gather information to develop operation and maintenance programmes to ensure that new and existing collection systems serve their intended purposes on a continuing basis. Inspection and testing are necessary to do the following:

• Identify existing or potential problem areas in the collection system,

• Evaluate the seriousness of detected problems,

• Locate the position of problems, and

• Provide clear, concise, and meaningful reports to supervisors regarding problems.

Two major purposes of inspection and examination are to prevent leaks from developing in the sewers and to identify existing leaks so they can be corrected. Due to age, deterioration of the material of the sewer by attack of hydrogen sulphide or other chemicals, settlement of foundations and leaking joints may result in the structural failure of the sewer. It takes a very long time from the onset of the first initial defect to the collapse of the sewer. A crack or a leaking joint will allow subsoil water and soil mixture to enter the sewer causing cavities around it leading to slow settlement of foundation and the eventual collapse of the sewer.

Very often soil with water is carried away below the bedding along the length of the sewer. The type of failures often gives a clue to the cause. A shear failure due to faulty foundation or movement of earth is a clean vertical break in the pipe or barrel. Excessive loading, either internally or externally, causes horizontal breaks. Breaks caused by internal pressure leads to cracks in the sewer while external overload causes the top of the pipe to be crushed. Regular

inspection of the sewer can pinpoint the sewer that needs to be attended to before there is a complete failure or collapse. For preventing the above serious instances of damages to the sewer system, the maintenance engineer should establish adequate inspection and examination programmes.

6.5 SEWER CLEANING

To operate and maintain a sewer collection system to function as intended, the maintenance engineer should try to strive towards the following objectives:

• Minimize the number of blockages per unit length of sewer, and

• Minimize the number of odour complaints. For this purpose, sewer-cleaning using hydraulic or mechanical cleaning methods needs to be done on a scheduled basis to remove accumulated debris in the pipe such as sand, silt, grease, roots and rocks. If debris is allowed to accumulate, it reduces the capacity of the pipe and blockage can eventually occur resulting in overflows from the system onto streets, yards and into surface waters. Roots and corrosion also can cause physical damage to sewers.

6.6 PROTECTION OF SEWER SYSTEMS

A sewer may get damaged if other facilities such as water pipe or electric cable work are done beside or at the cross-section of a sewer. Especially, fluctuations due to ground excavation (pile, underground water drops and pile method) may have a serious impact. To avoid damages of sewer, the maintenance engineer should do the following:

1. Collect all related information about the construction activities which are planned around the sewer location,

2. Advise appropriate construction methods to minimize impact for sewer, and 3. If necessary, request the concerned agencies to adopt the protective measures for sewer prior to the work commencement.

6.7 INSPECTION OF MANHOLES AND APPURTENANCES

Because they are part of the collection system, manholes require the same inspection and attention as the rest of sewer network. When located in streets, these structures are subject to vibrations and pounding by vehicle traffic. Manholes may settle at a different rate than connected sewer, creating cracks in sewer pipe joints. The objectives of manhole inspection are therefore, to determine the proper elevations or grades around the lid, to confirm that the lid is not buried, and to examine structural integrity (look for cracks) of the manhole and its functional capacity.

The condition of the pipelines coming into a manhole may be known merely by observing the content and volume of flows from a specific direction.

Manhole inspection and examination are made by visually inspecting the condition of the cover and the internal parts. Manhole inspection should be carried out together with the inspection and examination of sewer. It is generally carried out together with the cleaning of the sewer. Before entering any manhole, adequate safety measures should be taken in accordance with stipulations. Safety measures during the work should be formulated considering traffic safety, oxygen deficiency, poisoning due to toxic gas such as hydrogen sulphide and so on.

6.8 CLEANING OF MANHOLES

Manhole cleaning should be performed by the most appropriate work method that suits the actual conditions of the work location. In manholes at starting point, junction manholes and manholes at sharp curve of sewers, sand and silt get deposited and environmental problems such as foul odours occur. For this reason, periodic cleaning is necessary. Moreover, when large debris flows in, it should be removed immediately otherwise there is a possibility of an overflow accident, float-off and dispersion of cover. Manhole inspection should be generally carried out together with the cleaning of the sewer. The work on the silt and sand in the bottom part should be pursuant to cleaning of the sewer pipe, while the dirt on the sidewall should be cleaned by high-pressure jet washing vehicle.

6.9 SAFTEY PRACTICES

Sewer cleaning is an occupation that has an overall accident frequency rate that is relatively higher than any other industry. The employer has the responsibility of providing the worker with a safe place to work. Nevertheless, the worker has the overall responsibility and must ensure that it is a safe place to work. This can only be done by constantly thinking of safety and working safely. The worker has the responsibility of protecting not only himself, but also all other plant personnel or visitors by establishing safety procedures for the plant and then ensuring they are followed. He must train himself to analyse jobs, work areas and procedures from a safety standpoint and learn to recognize potentiality hazardous actions or conditions. When he recognizes a hazard, he must take immediate steps to eliminate it through corrective action. If correction is not possible, guard against the hazard by proper use of warning signs and devices / by establishing and maintaining safety procedures. As an individual, the supervisor can be held liable for injuries or property damage, which results from an accident caused by his negligence.

6.10 OPERATION AND MAINTENANCE OF LIFT STATIONS

In general, lift stations are invariably used in gravity sewer network where depth of cut of sewers poses a problem in high water prone areas. The procedure is to sink a wet well on the road shoulder or an acquired plot after the shoulder and divert the deeper sewer there. The submersible pump will lift the sewage and discharge it to the next online shallow sewer. This is a very useful practice in such locations. Equipment located in the wet well should be minimized, including suction and discharge valves, check valves, or other equipment that require routine, periodic maintenance.

6.11 OPERATION AND MAINTENANCE OF PUMPING STATIONS

Pumping machinery is subjected to wear & tear, erosion and corrosion due to its nature of functioning, and therefore it is vulnerable to failures. Generally, failures or interruptions are mostly attributed to pumping machinery rather than any other component. Therefore, correct operation and timely maintenance and upkeep of pumping stations and pumping machinery are of vital importance. Sudden failures can be avoided by timely inspection, follow up actions on observations of inspection and planned periodical maintenance. Downtime can be reduced by maintaining inventory of fast moving spare parts. Obviously due attention needs to be paid to all such aspects for efficient and reliable functioning of pumping machinery.

6.11.1 OPERATION OF PUMPS

The following points should be observed while operating the pumps.

A. Dry running of the pumps should be avoided.

B. Centrifugal pumps if installed with negative suction should be primed before starting.

C. Pumps should be operated only within the recommended range of the head-discharge characteristics of the pump.

• If pump is operated at a point away from duty point, the pump efficiency normally reduces.

• Operation near the shut-off point should be avoided, as it causes substantial recirculation within the pump, resulting in overheating of sewage in the casing and consequently, overheating of the pump.

D. As far as possible positive suction is to be provided to avoid priming during design itself.

E. Voltage during operation of the pump-motor set should be within ±10 % of the rated voltage. Similarly, current should be below the rated current shown on the name plate of the motor.

F. When parallel pumps are to be operated, the pumps should be started and stopped with a time lag between two pumps to restrict change of flow velocity to minimum and to restrict the dip in voltage in the incoming feeder and should be adequate to allow the pump head to stabilise.

G. When the pumps are to be operated in series, they should be started and stopped sequentially, but with minimum time lag. Any pump next in sequence should be started immediately after the delivery valve of the previous pump is even partly opened. Due care should be taken to keep open the air vent of the pump next in sequence, before starting that pump.

H. The stuffing box should allow a drip of leakage to ensure that no air passes into the pump and that the packing gets adequate wetness for cooling and lubrication. When the stuffing box is sealed with grease, adequate refill of the grease should be maintained.

I. The running of duty pumps and standby pumps should be scheduled so that no pump remains idle for a long period and all pumps are in ready-to-run condition. Similarly, the running schedules should be ensured so that all pumps do not wear equally needing simultaneous overhaul.

J. If any undue vibration or noise is noticed, the pump should be stopped immediately and the cause for vibration or noise should be checked and rectified.

K. Generally, the number of starts per hour shall not exceed four. Frequent starting and stopping should be avoided as each start causes overloading of motor, starter, contactor and contacts. Although overloading lasts only for a few seconds, it reduces the life of the equipment.

6.12 SMART MANAGEMENT AND ONLINE MONITORING USING INTERNET OF THINGS (IoT)

Advancement in the field of digital technology has enabled the wastewater treatment system operators and managers to control and enhance the performance of various components of the system. Internet of things (IoT) consists of a network of physical objects using various sensors as end points to enable monitoring from a remote station.

For the sewerage treatment plant, a network of various sensors can capture the variations of values of parameters like temperature, dissolved oxygen, chemical composition, TDS etc. at different control points of the system. The continuous data obtained through IoT is used by a customised algorithm for synthesis to impart a decision-making procedure. A centralised information processing system (CIPS) can be formed for this task. In addition to this smart water flow meters can also be coupled to this digital environment. IoT in wastewater management can also be used to calculate residual chemicals after the treatment. This data can be further used to

calculate the efficiency of the treatment process and ensure that water quality standards are met before it is discharged in a water body.

By using real-time data gathered through different embedded sensors, performance characteristics of machines can be monitored that further increase the productivity of equipment and boost maintenance tasks. In the present study for the hospital, provision for implementing a IoT based control of the units have been suggested.

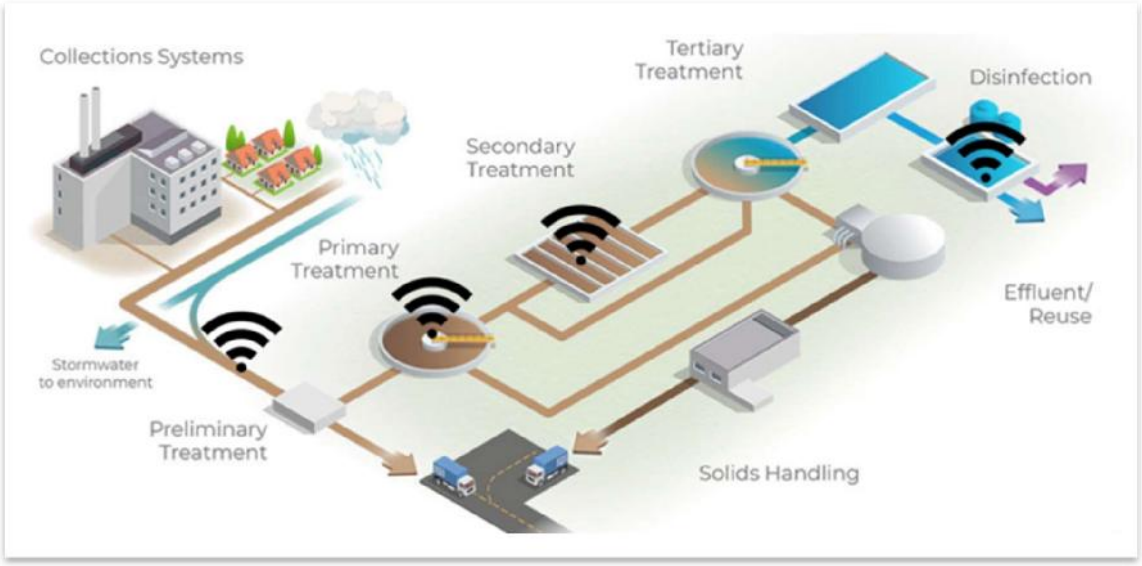


Fig. 34 The continuous data obtained through IoT is used by a customised algorithm for synthesis to impart a smart decision-making procedure (photo courtesy-google)

6.13 ODOUR CONTROL METHODS

Odours are a complex combination of a wide variety of compounds; however, there are certain compounds and groups of compounds that contribute specifically to sewage odours, and significantly determine the selection of the control technology. These include the following:

• Hydrogen sulphide, and

• Ammonia.

Odour control is a complex and time-consuming challenge, often requiring a combination of methods for treating odorous gases and for removing or reducing the potential causes of the odours. If an odour problem is severe enough to affect the community, an emergency response and solution to the problem must be carried out quickly. The approach for selecting an odour control method or technology includes the following steps:

A. Identify the odour source and characteristics through sampling and analysis.

B. List and assign priorities to controlling a specific odour problem, recognizing considerations such as cost, plant location, future upgrading of various sewage processes, severity of the odour problem, and the nature of the affected area.

C. Select one or more odour control method or technology for implementation to meet the objectives of steps “a” and “b”, taking into consideration the advantages and disadvantages of each.

D. Monitor odour emissions from the treated air for process adjustments and for feedback to evaluate the solution’s effectiveness.

Hydrogen sulphide (H2 S) is the most common odorous gas found in sewage collection and treatment systems and results from the reduction of sulphate by bacteria under anaerobic conditions. Its characteristic rotten-egg odour is well known. The gas is corrosive, toxic and soluble in sewage. Hydrogen sulphide is considered a broad-spectrum poison, meaning it can poison several different systems in the body.

6.13.1 PREVENTION OF ODOUR

Hydrogen sulphide production can be controlled by maintaining conditions that prevent the build-up of sulphides in the sewage. The presence of oxygen at concentrations of more than 1.0 mg/L in the sewage prevents sulphide build-up because sulphide produced by anaerobic bacteria is aerobically oxidized. Maintaining an aerobic environment inhibits the anaerobic degradation process, which contributes to the generation of hydrogen sulphide. A checklist is given below:

• Prevent corrosion in the collection well of the facility by blowing air through the facility

• Avoid storing screenings and grit generated in the grit chamber for a long time. Dispose of screenings and grit at appropriate intervals

• Retention time of sludge in the sludge treatment facilities should be appropriate (Do not retain sludge for a long time)

• Maintain sewage at neutral pH range because most of the sulphide is present at a pH value of less than 7.

Following is a short checklist of operational considerations for controlling odours of primary treatment facilities: (May also apply in other facilities)

• Remove scum routinely, with increased frequency during warm weather.

• Remove sludge before it can bubble or float.

• Wash weirs and other points where floatable and slime collect. Some facilities use submerged pipes with holes rather than effluent troughs. The submerged pipes do not splash the primary effluent, thereby reducing the release of hydrogen sulphide.

• Wash down all spills and grease coatings.

• When draining a tank, immediately flush it completely. If sludge does not drain quickly, spray lime, calcium hypochlorite, or potassium permanganate on the sludge surface to reduce odours. Because even a clean tank can produce odours, flushing the tank with a chlorine solution or keeping the tank floor covered with a low concentration of chlorine solution will reduce odours.

• If the sewage is septic, add chemicals in the collection system or at the plant, as appropriate, to reduce sulphides.

• If tanks are covered for odour control, keep plates and access hatches in place.

• Routinely check any odour scrubbers or deodorizers for plugging, adequate supply of chemicals, proper pressures for demisting, and/or effectiveness of carbon.

• The splashing of primary sewage into weir troughs and effluent channels can result in the release of hydrogen sulphide. If possible, try to minimize the splashing of primary sewage into the channel or weirs. If it cannot be accomplished operationally, then installing submerged sewer pipes may be necessary. This will require tank modifications to verify the plant hydraulics and provide proper control to avoid fluctuations in the tank levels.

• Minimize the stripping of hydrogen sulphide from the sewage when using channel air diffuser systems. Adoption of the following regular practices will not only increase removal efficiency but will provide better working conditions for the operator:

• Regularly remove accumulations from the inlet baffles and outlet weirs with a hose or a broom with stiff bristles. Only experience will determine the necessary frequency.

• Clean scum removal equipment regularly; otherwise, obnoxious odours and an unsightly appearance will result.

1• Keep cover plates in place except when operations or maintenance require their removal.

• Immediately flush and remove all sewage and sludge spills. Avoid hosing down motors and enclosed control devices.

• Establish a housekeeping schedule for the primary treatment area, including galleries, stairwells, control rooms, and related buildings, and assign responsibility for each item to a specific employee.

• Repaint surfaces as necessary for surface protection and appearance.

6.13.2 CONTROL OF ODOUR BY CHEMICAL ADDITION

Chemical addition can control odours in STP by preventing anaerobic conditions or controlling the release of odorous substances.

Table 21 Control of odour by chemical addition

Chemical	Effective against
Oxidizers	
Ozone	Atmospheric hydrogen sulphide only
Hydrogen peroxide	Hydrogen sulphide, also acts as oxygen source
Chlorine	Hydrogen sulphide and other reduced sulphur compounds
Sodium and calcium hypochlorite	Hydrogen sulphide and other reduced sulphur compounds
Potassium permanganate	Hydrogen sulphide and other reduced sulphur compounds

6.14 MAINTAINING AN ECO-FRIENDLY SYSTEM

In the proposed system of sewerage treatment, care has been taken to treat the prison sewage and sullage effectively and efficiently to protect the environment. Hence the natural water sources are also benefitted, and a portion of the recycled water can be used for toilet flushing, gardening etc. Since the treated water contains plant nutrients also, it will be beneficial for the environment when discharged as soil infiltration. Care has also been taken to properly treat the sludge produced during the operation. It may also be noted that a septic tank complying with the Indian Standard Code of practice has been designed and given at the initial treatment stage to reduce any shock of load to the biological treatment units.

It has also been decided to impart a green environment to the STP units with special methods of growing plants at the exterior of plant components and space between units. Maximum utilisation of space has been taken at the planning and design stage itself and using the natural treatment properties of the soil, such decentralized systems provide good opportunities to use the natural environment. They can help reduce the level of difficulty and cost to treat pollutants, such as nutrients, and keeping them from entering lakes, rivers, and streams.

Some aspects of the green landscaping eco-friendly unit management are described below for the proposed STP:

Soil: The soil acts as a natural filter and provides final treatment by removing harmful bacteria, viruses, and nutrients.

Odour management: Special attention is also given to proper odour management by using green belt inspired landscaping and chemical application whenever needed at extreme cases.

Trees: barrier formed with fast growing trees are planned for protection against pollution, for defining boundaries and for assisting in the creation of beautiful landscaping. Some of the plants are Casuarina Equisetifolia, golden bamboo, Grevillea Robusta etc.

Shrubs: the use of shrubs in the mass as a basic constituent in the planning of landscape is important. Shrubs with properties of hardiness, vigorous growth and an emphasis on evergreen plants are selected.

Creeping plants for exterior of units: plants like climbing hydrangea attaches itself to walls and grow to impart a green environment.

Air purifying plants: Polluted air contains particles, odours and harmful gases like nitrogen oxides, sulphur dioxide and ammonia. These pollutants settle on the leaves of trees and plants. The leaves and plant surface absorb these pollutants and through their stomata (pores) and filter these harmful substances from the air. Trees also trap heat and reduce greenhouse gases in the atmosphere. They also reduce the ground level ozone level and enrich the air around us with life giving oxygen. For combating a variety of respiratory troubles and other illnesses caused by air pollution, there can be no better way than planting some chosen varieties of plants that can cleanse the air and make our environment better.

The bamboo palm is a popular purifying houseplant due to its tropical look and insect-repelling quality. The bamboo palm can remove substances like benzene, formaldehyde, chloroform, carbon monoxide, and xylene.

6.15 OCCUPATIONAL HEALTH HAZARDS AND SAFTEY MEASURES

The sanitation workers, engaged in operation and maintenance (O&M) of sewerage system or septic tanks, are exposed to different types of occupational hazards like injuries caused by physical actions, chemicals contacts, infections caused by pathogenic organisms, and dangers inherent with oxygen deficiency, hydrogen sulphide, and combustible gases. The employers are obligated to provide their employees with safety equipment or protective gears as well as cleaning devices and ensure observance of safety precautions appropriate for each hazardous condition to reduce the employees' risks to health and safety. Moreover, to guard against human error and carelessness, proper safety training and adequate effective supervision by safety personnel are most essential.

The GOI enacted the "Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993," which declared the employment of scavengers or the construction of dry latrines to be an offence, considering the foregoing, another bill titled "The Prohibition of Employment as Manual Scavengers and their Rehabilitation Bill, 2013" was introduced in the Parliament in September 2013 and has since been passed. The Bill aims to eliminate manual scavenging and insanitary latrines and provides for proper rehabilitation of manual scavengers in alternative occupations so that they can lead a life of dignity. In addition to the Acts mentioned above, employees shall follow "Contract Labour Regulation and Abolition Act, 1970" for secure operational health and safety at their sites. O&M of sewerage facilities, which should not be discontinued at any moment, requires health and safety consciousness equal to or greater than one that is needed for construction projects. In India, "health and safety policy" is defined in construction project management by Bureau of Indian Standard (BIS). Therefore, the same health and safety policy for construction projects may also be adopted for O&M of sewerage facilities. STPs are subject to safety audits, which confirm the status of safety and health organizational setup, education / training, provision / inspection of personal protection, and records of safety, to ensure occupational safety and health at the work sites. The plant engineer should rectify failures immediately, if any. The audit shall be implemented as per IS: 14489 "Code of Practice on Occupational Safety and Health Audit." Standard safety audit procedures of the inspectorate of factories shall be at a frequency of a month and compliance reported to that agency.

6.16 COST ANALYSIS

OPERATION & MAINTENANCE COSTS						
Sl. No.	**Item**	**Rate**	**Nos.**	**Unit**	**Expenditure**	
1	Power Charges for STP @ Rs. 7.8 for kwh @	210398.0		kwh/month	16,41,104	
2	Power Charges for network @ Rs. 7.8 for kwh @	17275.0		kwh/month	1,34,745	
3	Operators rate/month-STP	25000.0	3	Nos.	75,000	
4	Operators rate/month-Wells	15000.0	4	Nos.	60,000	
5	Fitter rate/month-STP	20000.0	1	Nos.	20,000	
6	Driver for septage handling vehicle/month	20000.0	2	Nos.	40,000	
7	Cleaner for septage handling vehicle/month	15000.0	2	Nos.	30,000	

8	Fuel for generator/month				1,00,000	
9	Fuel for vehicle/month@50 km/day	1000			30,000	
10	Gas Chlorine/month				15,000	
11	Alum and Lime dosing/month				15,000	
12	Chemicals for odour management/month				15,000	
13	Chemicals for lab tests/month				10,000	
14	Spares and replacements/month				5,000	
15	Network routine inspection, flushing, cleaning including for manholes/month@	1.5% of cost of network/year			3,81,094	
	Total per month				25,71,943	
	Total per month excluding power charges				7,96,094	
	Annual Operation & Maintenance Charge				3,08,63,319	
	Annual Operation & Maintenance Charge excluding power charges				95,53,127	
	Treatment Cost per Day				84,557	
	Unit Cost of Treatment per Kilo Litre				24	
10 YEAR ANNUAL O&M COST CONSIDERING 8% ANNUAL INCREASE EVERY YEAR						
Including power charges (5% annual increase every year)						
						Power Charges
1	1st year				₹ 95,53,127	₹ 2,13,10,193
2	2nd year				₹ 1,03,17,377	₹ 2,23,75,702
3	3rd year				₹ 1,11,42,767	₹ 2,34,94,488
4	4th year				₹ 1,20,34,188	₹ 2,46,69,212
5	5th year				₹ 1,29,96,923	₹ 2,59,02,673
6	6th year				₹ 1,40,36,677	₹ 2,71,97,806
7	7th year				₹ 1,51,59,611	₹ 2,85,57,696
8	8th year				₹ 1,63,72,380	₹ 2,99,85,581
9	9th year				₹ 1,76,82,171	₹ 3,14,84,860
10	10th year				₹ 1,90,96,744	₹ 3,30,59,103
	Total O&M cost for 10 years				₹ 13,83,91,965	₹ 26,80,37,315
	GST @ 18%				₹ 2,49,10,554	₹ 4,82,46,717
	Total				₹ 16,33,02,519	₹ 31,62,84,032
	Unforeseen charges				₹ 6,97,481	₹ 2,15,968

	Total O&M cost for 10 years excluding power charges & including GST				**₹ 16,40,00,000**	
	Total O&M cost for 10 years including power charges & GST				**₹ 48,05,00,000**	

Assistant Engineer
Sewerage Camp Office
Kerala Water Authority
Malappuram-676 505

Assistant Executive Engineer
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Executive Engineer (i/c)
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Superintending Engineer
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Office of the Superintending Engineer
Kerala Water Authority
Kochi - 682011
PPD Regional Office

CHAPTER 7

CONCLUSIONS

7.1 OBSERVATIONS FROM ANALYSIS

From the analysis performed for the Ponnani Municipality, Malappuram with respect to the planning designing and implementation of a sewerage system, it can be observed that both the Local Body and the society mutually benefits substantially once the project is realised. Adopting a meticulous operation and maintenance plan, the system can be successfully run for a longer period without experiencing any troubles. Since there are many innovative digital technologies for controlling the performance of the system, it is an easy task for the institution to own and run the sewerage system. This will also pave the way for a wider acceptance in the society for decentralised sewerage system applications. Adopting non-conventional energy sources like solar energy, it will be an easy affair to run many of the low-capacity pump sets. Also, a building envelope with eco-friendly materials and construction technologies will give an aesthetically pleasing and healthy system.

7.2 INSTITUTIONAL ARRANGEMENTS

Kerala Water Authority (KWA) has set up four sewerage circles under the sewerage vertical concept recently. The idea and vision behind it are to visualize and materialize complete sewerage schemes for the State. The Sewerage Circle, Thrissur has been assigned the task of preparation of Detailed Engineering Report (DER) for the Districts of Thrissur, Palakkad and Malappuram. The Project Planning and Development wing (PPD), Kochi has been given the additional charge of Sewerage Circle, Thrissur at present.

It is imperative that the institutional structures for the delivery of sewerage services are streamlined. The urban sanitation sector can learn from counterpart rural area programming such as Total Sanitation Campaign (TSC), National Rural Health Mission (NRHM), Sarva Shiksha Abhiyan (SSA), Integrated Child Development Services (ICDS) in establishing such institutional structures with clearly laid out roles and responsibilities. Until Local Self Government Institutions LSGI's develop their robust capacities, it is desired that the technical support is extended in planning, designing, implementation and O&M of sanitation services by other departments. Active involvement of local NGOs, community organizations, self-help groups of women will be ensured through awareness creation and community mobilization for increased ownership of the overall sanitation agenda at the local level. Promotion of active support to specially formed groups at the Ward level with primary focus in eliciting women participation will be paramount to the achievement of the goals of the State Sanitation Strategy.

7.2.1 DISRTICT LEVEL APPROACH

At each district level, water and sanitation mission headed by the District Collector is constituted and all officials pertaining to the sewerage planning and implementation process can contribute to the achievement of complete coverage for the district. District level monitoring committee can also be formed with involvement of representatives of beneficiaries and local bodies. District level offices of KWA can closely associate with the district level sewerage activities of district administration.

7.2.2 URBAN LOCAL BODY (ULB) LEVEL APPROACH

A multi stakeholder comprising of representatives from shops and establishments, sanitary workers unions, educational institutions, women groups, contractors, NGO's, line departments, political and eminent personalities to be led by the Mayor/Chairman/Chairperson along with the Executive head of the ULB shall be constituted. The City Sanitation task force shall be duly supported by a City Sanitation Cell (CSC) that is staffed with relevant human resources. The cell shall be responsible for preparation and implementation of the city sanitation plan.

7.3 PLANNING FOR IMPLEMENTATION

It can be observed that for the perspective of Kerala in social conditions, status of urbanisation, public health issues and environmental characteristics, habitations can be divided into several zones of smaller strength of population for planning and implementing effective sewerage schemes. Hence a decentralised approach is beneficial.

The decentralized sewerage concept implies localized collection and localized treatment of excreta and sullage in micro zones within a major habitation keeping it in tandem with densification and progressively duplicating it as and when other micro zones densify. It will ensure that every micro zone owns up its excreta and sullage management and cannot expect a faraway habitation to receive and inherit it - a prospect which will sooner or later lead to inter conflicts and destabilize progress. Thus, the provision of both the collection system and treatment can be made compatible to the pace of development by juxtaposing on site sanitation as well in its fold.

As described in detail in the previous sections, GIS can be generously made use for the initial planning stages. Several factors influencing the sewage production characteristics and its carriage towards a desirable site for treatment and disposal can be meticulously planned using data analysis with the help of versatile applications of GIS.

In general, prediction of sewage volumes is far easier in decentralized sewerage micro collection areas and to that extent the design becomes realistic. Flows in a decentralized

sewerage are relatively smaller than conventional sewerage and this implies that environmental damages from any mishaps are also minimal. Given the smaller flows, the sewer sizes are also smaller, and the depths of cut are also lesser thus making it easy to construct and maintain. Additions of newer service areas are independent of the existing system and the need to augment or enlarge the existing sewers and STPs are avoided. The STPs are smaller, and it is easier to find the reuse prospects nearby as compared to all the sewage being treated in one far corner. It is also easier to lay out return lines of treated sewage for use in medians, industrial supplies, flushing far flung head manholes, etc. The ecology of rivers, streams and receiving waters are better managed by smaller volumes of discharges of treated sewage at multiple locations than one massive volume in a single location and if the single STP is out of order, the entire stretch of the water course gets polluted.

7.4 DATA INFORMATION AND MANAGEMENT

Accurate and reliable data information and management is a prerequisite for successful operation and maintenance of sewerage systems. As far as KWA is concerned, every district can have a district office with effective subunits for multi-pronged activities in data analysis and decision making. Modern technologies can be utilised for upgrading the existing systems and informed decision-making process can be sorted out for maintaining desirable level of performance of sewerage schemes.

Similarly, it may be noted that LSG officials are to be trained to make latest state of art maps of adequate resolution (1:10,000 and better) and uses WGS84 (World Global System 1984) as the datum for all their spatial information. Such an information system shall make best use of the GIS and MIS platforms that are rapid to access and retrievable for use in planning for urban and rural infrastructure, creates compatible data formats and transforms MIS information (e.g. for property mapping, census etc.) into spatial geo-referenced GIS files for further analysis and interpretation for all the important sectors (e.g. water, waste water, solid waste, storm water).Since ULBs and other LSG's have the final responsibility for ensuring all service delivery of sanitary and environmental outcomes, it is necessary that the state is refining and complementing existing national standards wherever adaption to the regional settings is required if and when required.

7.5 ENVIRONMENTAL IMPACT MANAGEMENT

The project area is not falling under environmental sensitive zones. There are no natural reserve forests or parks or the presence of coastal belt.

During the construction phase, the emissions from movement of vehicles used for project activity may affect the air quality due to the particulate matter generated during loading,

transporting, unloading of materials during construction. Movement of heavy vehicles and concrete mixer would generate considerable noise in the surrounding environment. Hence a proper traffic management plan is recommended during the construction activities.

Sludge generated in the STP must be properly disposed off by transforming it into fertilizer products or bricks for low impact construction activities. Recycled water generated from the STP is to be used as per the guidelines already given.

Regarding the positive impacts, it is to be noted that water quality of the rivers and streams will be greatly improved along with the general environment. The large quantity of recycled water will be useful for multiple purposes including agriculture.

7.6 GENDER EQUALITY AND SOCIAL IMPLICATIONS

The project is envisaged to provide substantial improvements in the life of the people belong to the project area, especially for the womanhood. During the operation of the STP and the sewer network, the ULB can form a special monitoring group comprising of dedicated workforce especially from "Kudumbasree" units or similar groups for continuous appraisal of the sewerage scheme and subsequent upgradations. There must be special programmes organised for capacity building of the beneficiaries and all workforce associated with the operation and maintenance of the sewerage project.

7.7 FINANCIAL PLANNING AND OUTCOMES

It may be noted that overall costs (capital and operating) and financial sustainability must be determined to arrive at the most optimum solution. Hence during the detailed engineering survey and investigations stage these factors are to be considered for better performance of the system.

Fig. 35 Capital cost planning

Fig. 36 Operating cost planning

The Disability-Adjusted-Life-Years (DALY) is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death. Originally developed by the WHO, it is becoming increasingly common in the field of public health and health impact assessment (HIA). It extends the concept of potential years of life lost due to premature death – to include equivalent years of 'healthy' life lost by virtue of being in states of poor health or disability. In doing so, mortality and morbidity are combined into a single common-matrix.

As per the WHO report, 80% of the diseases in human being are water-borne and water-related. It is mainly due to water pollution or water contamination and water logging. Though water logging may be location and weather specific, but water pollution and contamination is a common phenomenon which can occur at any place at any point of time if community is not careful about adverse impact of indiscriminate disposal of sewage. The indiscriminate disposal of human excreta or sewage from habitations may contain hazardous micro-organisms (pathogens) for water pollution and harbouring vectors which act as carriers of pathogens. Improvements in water supply and sanitation including management of municipal solid waste can substantially reduce the incidences and severity of these diseases, as well as infant mortality associated with diarrhoea.

From the above statements, it is evident that environmental pollution by liquid and solid wastes adversely affects the environment and human health directly or indirectly resulting in loss of life and heavy financial burden on exchequers.

7.8 ACTION PLAN FOR IMPLEMENTATION

The following sequence of implementation plan for the institution may be more effective in realising the goals of providing the sewerage system.

Table 22 Action plan for implementation

Priority	Plan
I	Preparation of a detailed engineering report

II	Appraisal of the report
III	Sanction of the project
IV	Fund mobilisation
V	Invitation of Tender for work
VI	Execution of work
VII	Formation of monitoring committee
VIII	Regular maintenance
IX	Assessment of performance
X	Modifications in process/unit operations

7.8.1 IMPLEMENTATION SCHEDULE

Table 23 Implementation schedule

Sl. No.	Activity	December 2022	January 2023	February 2023	March 2023	April – May 2023	June – July 2023	Aug – Dec 2023	Jan – Dec 2024	Jan – Dec 2025	Jan – Dec 2026	Dec 2026
1	Basic planning and discussions with government departments											
2	Survey on Related Plans											
3	Survey on Existing Facilities											
4	Survey on Resources of Sewerage System and its Utilization											
5	Finalization of design and detailed engineering report											
6	Estimate scrutiny and DER revision											
7	Appraisal of the report											
8	Sanction of the project											
9	Fund mobilisation											
10	Implementation											
11	Trial and commissioning											

7.9 RECOMMENDATIONS

The success of the system largely depends upon the commitment and attitude of the people benefitted from it and hence it is inherent that the Local Body will investigate every detail of the sewerage treatment plant and its supporting units to render a model of its kind in the State. Some of the points of action to be taken to enhance the performance of the system are outlined as follows:

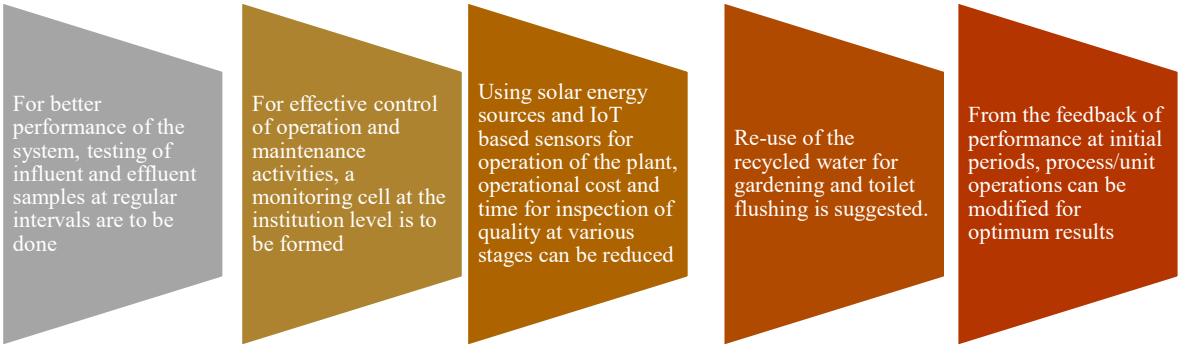


Fig. 37 Suggestions and recommendations

For the design of STP and network, we considered all the available parameters. The flow routing and network design are based on the latest DGPS survey data. However, there may be slight variations in levels, and network design may change due to additional road inclusion. Hence detailed survey is essential before execution and must be included in the tender, and also, the soil conditions for STP may vary. Therefore, the competent authorities must verify the levels and the soil conditions during execution, and corresponding corrections must be made in estimates and tenders.

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GENERAL ABSTRACT

Others-SEWERAGE SCHEME TO HARBOUR AREA IN PONNANI MUNICIPALITY-CONSTRUCTION OF 3.5 MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE NETWORK - SEWAGE TREATMENT PLANT-Sewerage Work

Sl No	Head Description	Amount
1	SOIL INVESTIGATION	279430.00
2	SITE PREPERATION	1527049.13
3	COLLECTION WELL AT STP	2971592.36
4	DILUTION TANK AND RECIEVING CHAMBER - CTU	2627878.21
5	RECEIVING CHEMBER	1610303.03
6	MANNUAL COARSE SCREEN CHANNEL	404360.31
7	MANNUAL FINE SCREEN CHANNEL	225757.70
8	OIL & GREASE TRAP	1013779.52
9	GRIT SEPARATOR	1286454.66
10	EQUALISATION TANK	9222242.32
11	MBBR 1	5837831.25
12	MBBR 2	6980782.49
13	MBBR 3	4085878.17
14	MBBR 4	1892836.97
15	SECONDARY CLARIFIER WITH PLATE SETTLER	3625144.63
16	SLUDGE SUMP	587122.91
17	SLUDGE THICKNER	1653467.59
18	FILTER FEED TANK	1057080.98
19	PSF/ACF FOUNDATION	643590.35
20	CHLORIN CONTACT TANK	1709065.84
21	TREATED WATER TANK	2419031.18
22	PILE FOUNDATION	12805077.46
23	ADMINISTRATIVE/LABORATORY/CHEMICAL HOUSE / CONTROL ROOM BUILDING	4700000.22
24	SECURITY CABIN	320000.01
25	AIR BLOWER ROOM AND CONTROL PANEL ROOM	2700000.12
26	CHLORINATION BUILDING	2500000.11
27	COMPOUND WALL	3503113.63
28	INTERNAL ROADS	1962971.70
29	STORM WATER DRAINS	862133.93
30	TRANSFORMER BUILDING	630000.03

Sl No	Head Description		Amount
31	DG ROOM		540000.03
32	CENTRIFUGE BUILDING		3300000.15
33	SLUDGE SHED		660000.03
34	LANDSCAPING AND GREEN BELT FORMATION		1500000.07
35	PROVISION FOR PROVIDING AUTOMATED SYSTEM TO THE ENTIRE PLANT BY SCADA		2500000.11
36	STAIR & WALK WAY		3758804.48
	Total Estimation PAC		93902781.68
C	**Extra Charges**		
C.001	Provision for GST		
	93902781.68	18.00%	16902500.70
	Grand Total		0.00
	Round off		0.00
	Rounded Total(Rs)		110805282.38
	Rupees Eleven Crore Eight Lakh Five Thousand Two Hundred and Eighty Two		

PRICE
e-PLATFORM FOR THE MANAGEMENT OF PUBLIC WORKS

DETAILED ESTIMATE

Others-SEWERAGE SCHEME TO HARBOUR AREA IN PONNANI MUNICIPALITY-CONSTRUCTION OF 3.5 MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE NETWORK - SEWAGE TREATMENT PLANT-Sewerage Work

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
1	SOIL INVESTIGATION						
1.001	56.17.1						
	Providing access to the site,clearing site and making good to erecting and conducting soil testing transfers within the site and for any other temporary arrangements to be erected within the area in connection with conducting soil testing.						
	SOIL INVESTIGATION						
		1	400.000				400.000
	Total						**400.000**
						Total Quantity in sqm	**400.000**
1.002	56.1.a						
	Mobilization including transportation of all necessary plant and equipment's and materials of boring, field testing and sampling and demobilization after completing the work - For machine boring						
	SOIL INVESTIGATION						
		1					1.000
	Total						**1.000**
						Total Quantity in set	**1.000**
1.003	56.2.a						
	Setting up boring at each bore hole locations including carrying all necessary plant, equipment and materials of boring and field tests and collection of samples at each bore hole location - For machine boring.						
	SOIL INVESTIGATION						
		4					4.000
	Total						**4.000**
						Total Quantity in Bore Holes	**4.000**
1.004	56.3.a.1						
	Boring with rotary power drilling equipment's in - all types of soil having N value less than 50 excluding hard rock, soft rock or medium rock for strata upto 10m including conducting necessary S.P.T and recovery of undisturbed soil samples at 5m intervals - For ordinary soil.						
	SOIL INVESTIGATION						
		1	40.000				40.000
	Total						**40.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in metre	**40.000**
1.005	56.3.b.1						
	Boring with rotary power drilling equipment's in - all types of soil having N value less than 50 excluding hard rock, soft rock or medium rock for strata next 10m and upto a depth of 20m including conducting necessary S.P.T and recovery of undisturbed soil samples at 5m intervals - For ordinary soil.						
	SOIL INVESTIGATION						
		1	40.000				40.000
	Total						**40.000**
						Total Quantity in metre	**40.000**
1.006	56.3.c.1						
	Boring with rotary power drilling equipment's in - all types of soil having N value less than 50 excluding hard rock, soft rock or medium rock for strata next 10m and upto a depth of 30m including conducting necessary S.P.T and recovery of undisturbed soil samples at 5m intervals - For ordinary soil.						
	SOIL INVESTIGATION						
		1	40.000				40.000
	Total						**40.000**
						Total Quantity in metre	**40.000**
1.007	56.3.d.1						
	Boring with rotary power drilling equipment's in - all types of soil having N value less than 50 excluding hard rock, soft rock or medium rock for strata above 30m depth including conducting necessary S.P.T and recovery of undisturbed soil samples at 5m intervals - For ordinary soil.						
	SOIL INVESTIGATION						
		1	40.000				40.000
	Total						**40.000**
						Total Quantity in metre	**40.000**
1.008	56.5.a						
	Boring through all classes of rock excluding hard rocks having N value greater than 50 using tungsten carbide drilling bit - In land						
	SOIL INVESTIGATION						
		1	4.000				4.000
	Total						**4.000**
						Total Quantity in metre	**4.000**
1.009	56.6						
	Recovering undisturbed soil samples using thin tube sampler of 75mm.to 100mm length internal dia 500mm length conforming to relevant IS Code at any required depth including clearing the bore hole etc complete.						
	SOIL INVESTIGATION						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		1	54.000				54.000
	Total						**54.000**
						Total Quantity in each	**54.000**
1.010	56.7						
	Conducting standard penetration test in bore hole at any depth.						
	SOIL INVESTIGATION						
		1	106.000				106.000
	Total						**106.000**
						Total Quantity in each	**106.000**
1.011	56.8						
	Recovering disturbed samples and preserving the same in air tight sample containers including waxing labelling packing storing including cost of containers as per IS Code.						
	SOIL INVESTIGATION						
		1	106.000				106.000
	Total						**106.000**
						Total Quantity in each	**106.000**
1.012	56.11.a						
	Compilation of all field data with recommendation for a suitable foundation after conducting necessary lab test (report in triplicate) - Machine boring for 5 bore holes.						
	SOIL INVESTIGATION						
		1	1.000				1.000
	Total						**1.000**
						Total Quantity in set	**1.000**
2	SITE PREPERATION						
2.001	2.32						
	Clearing grass and removal of the rubbish up to a distance of 50 m outside the periphery of the area cleared.						
	Clearing grass and removal of rubbish						
	120 Cent	1	4855.200				4855.200
	Total						**4855.200**
						Total Quantity in sqm	**4855.200**
2.002	2.33.3						
	Felling trees of the girth (measured at a height of 1 m above ground level) including cutting of trunks and branches, removing the roots and stacking of serviceable material and disposal of unserviceable material.Beyond 120 cm girth up to and including 240 cm girth						
	Felling trees						
	Tree Cutting	5					5.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**5.000**
						Total Quantity in each	**5.000**
2.003	50.2.26.1						
	Filling with contractor own earth (excluding rock) in open areas in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m as per direction of site Engineer-in-charge.						
	Filling with contractor own earth						
		1	4855.200		1.000		4855.200
	Total						**4855.200**
						Total Quantity in cum	**4855.200**
3	COLLECTION WELL AT STP						
3.001	100.3.6.1						
	Earthwork in open well excavation (above water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift up to 1.5m including neat banking.						
	Earth work in open well excavation						
	cw at STP dia 4m	1	3.140	3.2*3.2	1.500		48.230
	Total						**48.230**
						Total Quantity in cum	**48.230**
3.002	100.3.6.2						
	Earthwork in open well excavation (above water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 1.50m to 3.0m including neat banking.						
	Eathwork in open well excavation						
	cw at STP dia 4m	1	3.140	3.2*3.2	1.500		48.230
	Total						**48.230**
						Total Quantity in cum	**48.230**
3.003	100.3.6.13						
	Earthwork in open well excavation (in or under water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.50m including neat banking.						
	Earthwork in open well excavation						
	cw at STP dia 4m	1	3.140	3.2*3.2	1.500		48.230
	Total						**48.230**
						Total Quantity in cum	**48.230**
3.004	100.3.6.14						
	Earthwork in open well excavation (in or under water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.0m including neat banking.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Earthwork in open well excavation						
	cw at STP dia 4m	1	3.140	3.2*3.2	1.500		48.230
	Total						**48.230**
						Total Quantity in cum	**48.230**
3.005	100.3.6.15						
	Earthwork in open well excavation (in or under water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 6.0m to 7.50m including neat banking.						
	Earthwork in open well excavation						
	cw at STP dia 4m	1	3.140	3.2*3.2	1.500		48.230
	Total						**48.230**
						Total Quantity in cum	**48.230**
3.006	100.3.6.16						
	Earthwork in open well excavation (in or under water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 7.50m to 9.0m including neat banking.						
	Earthwork in open well excavation						
	cw at STP dia 4m	1	3.140	3.2*3.2	1.100		35.369
	Total						**35.369**
						Total Quantity in cum	**35.369**
3.007	100.6.1						
	Providing steel sheet shoring to the sides of the trenches to depths of above 4.00 m but not exceeding 6.00m using 6 mm M.S. sheet 0.50 M wide stiffen on edges with 50 mm x 50mm x 6 mm M.S. angles driving down vertically on either side one after another in lines and levels with suitable pile driving equipments and accessories to a maximum depth of 0.50 M below the bottom of the proposed excavation 0.5 M above ground level suitably braced by horizontal walling pieces at 75 x 150 mm x 8 mm angles on either side at intervals not exceeding 1.50M and horizontal screw jack type struts at 1.50M intervals and maintaining the shoring till the pipes are laid and works are completed, dismantling, cleaning and restacking for reuse including all labour, hire charges and conveyance for equipments, tools and plants and sundries etc. complete.						
	Providing steel sheet shoring to the sides of the trenches						
	4m Dia well-8m depth	4	3.140	6.400	6.000		482.304
	Total						**482.304**
						Total Quantity in sqm	**482.304**
3.008	100.6.S.1						
	Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete. (excluding cost of materials)						
	Structural steel work in single section,						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	4m Dia well-8m depth	4	3.140	6.400	6.000	0.300000	144.691
	Total						**144.691**
						Total Quantity in kilogram	**144.691**
3.009	100.7.1						
	Bailing out water with 5HP engine and pump set including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water						
	CW at STP Dia 4m	1	5.000	8.000	5*0.746		149.200
	Total						**149.200**
						Total Quantity in Kwh	**149.200**
3.010	100.7.4						
	Bailing out water with engine and pump set above 20HP up to 30HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water						
	CW at STP Dia 4m	1	5.000	4.000	30*0.746		447.600
	Total						**447.600**
						Total Quantity in Kwh	**447.600**
3.011	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	PCC 1:3:6						
	CW at STP Dia 4m	3.14	3.200	3.200	0.150		4.823
	Total						**4.823**
						Total Quantity in cum	**4.823**
3.012	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work						
	Base concrete	1	3.140	3.2*3.2	0.450		14.469
	Side Wall	3.14	4.450	0.450	8.000		50.303
	Deduction manhole	-1	0.455	0.610	0.300		-0.083
	Cover Slab	1	3.140	2.45*2.45	0.300		5.654
	Total						**70.343**
						Total Quantity in cum	**70.343**
3.013	5.22.1						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelMild steel and Medium Tensile steel bars						
	Steel reinforcement for R.C.C work						
	Qty taken from item no-12 @ 120 Kg/m3	70.343				120.000000	8441.160
	Total						**8441.160**
						Total Quantity in kg	**8441.160**
3.014	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content						
	Qty taken from item no-12	1	70.343				70.343
	Total						**70.343**
						Total Quantity in cum	**70.343**
3.015	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material in cement concrete work						
	Qty taken from item no-12	1	70.343	330.000			23213.190
	Total						**23213.190**
						Total Quantity in kg	**23213.190**
3.016	5.9.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering including strutting						
	CW at STP Dia 4m - Inside Wall	1	3.140	4.000	8.000		100.480
	CW at STP Dia 4m- Outside Wall	1	3.140	4.900	8.000		123.088
	CW at STP Dia 4m - Base Slab	1	3.140	6.100	0.450		8.619
	Total						**232.187**
						Total Quantity in sqm	**232.187**
3.017	5.9.20						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform with water proof ply 12 mm thick						
	Centering and shuttering including strutting						
	For Cover Slab Bottom	1	3.140	2.45*2.45			18.848
	Cover Slab Side	1	3.140	4.900	0.300		4.616
	Total						**23.464**
						Total Quantity in sqm	**23.464**
3.018	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	CW at STP Dia 4m Vertical Surface	1	3.140	4.000	8.000		100.480
	Total						**100.480**
						Total Quantity in sqm	**100.480**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
3.019	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	CW at STP Dia 4m Horizontal Surface	1	3.140	2*2			12.560
	Total						**12.560**
						Total Quantity in sqm	**12.560**
3.020	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished with a floating coat of neat cement of mix:						
	CW at STP Dia 4m - Inside Wall	1	3.140	4.000	8.000		100.480
	CW at STP Dia 4m - Outside Wall	1	3.140	4.900	8.000		123.088
	CW at STP - base slab Top Surface	1	3.140	2*2			12.560
	CW at STP - Top Surface of Cover Slab	1	3.140	2.45*2.45			18.848
	CW at STP - Side Surface of Cover Slab	1	3.140	4.900	0.300		4.616
	Total						**259.592**
						Total Quantity in sqm	**259.592**
3.021	13.65.1						
	Painting with black anti- corrosive bitumastic paint of approved brand and manufacture to give an even shade:Two or more coats on new work						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Painting with black anti- corrosive bitumastic paint						
	CW at STP Dia 6m - Outside Wall	1	3.140	4.900	8.000		123.088
	CW at STP - Top Surface of base slab	1	3.140	2*2			12.560
	CW at STP - Top Surface of Cover Slab	1	3.140	2.45*2.45			18.848
	CW at STP - Side Surface of Cover Slab	1	3.140	4.900	0.300		4.616
	CW at STP Dia 4m - Inside Wall	1	3.140	4.000	8.000		100.480
	Total						**259.592**
						Total Quantity in sqm	**259.592**
3.022	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water with 5000 litre tankers for water test						
	CW at STP Dia 4m	1	3.140	2*2	8.000		100.480
	Total						**100.480**
						Total Quantity in Kilo litre	**100.480**
3.023	100.41.34						
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame (low duty) charges including all cost, labour charges etc., complete.						
	Supplying and fixing Rectangular C.I. manhole cover						
	CI Manhole cover	1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
3.024	2.25						
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.						
	Filling available excavated earth						
	CW at STP Dia 6m	1	3.140	6.4*6.4	8.000		1028.915

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	CW at STP Dia 6m deduction	-1	3.140	4.9*4.9	8.000		-603.131
	Total						**425.784**
						Total Quantity in cum	**425.784**
3.025	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		25					25.000
	Total						**25.000**
						Total Quantity in each	**25.000**
4	DILUTION TANK AND RECIEVING CHAMBER - CTU						
4.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile cap P1	6	1.400	1.400	1.150		13.524
	Grade Beam	7	3.850	0.650	0.850		14.890
	PCC	1	45.600		0.150		6.840
	Dilution Tank	1	11.050	6.100	2.000		134.810
	Total						**170.064**
						Total Quantity in cum	**170.064**
4.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile cap P1	6	1.400	1.400	0.150		1.764
	Grade Beam	7	3.850	0.650	0.100		1.752
	PCC	1	45.600		0.150		6.840
	Total						**10.356**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in cum	**10.356**
4.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Pile cap P1	6	1.100	1.100	1.000		7.260
	Grade Beam	7	3.850	0.450	0.750		9.096
	Dilution Tank base slab	1	11.050	6.100	0.350		23.592
	Total						**39.948**
						Total Quantity in cum	**39.948**
4.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Wall	1	34.400	0.250	3.000		25.800
	Reciving chamber	2	2.250	0.250	1.150		1.294
	Top slab	1	10.150	5.200	0.250		13.195
	Deduction Manhole	-2	0.455	0.610	0.250		-0.139
	Total						**40.150**
						Total Quantity in cum	**40.150**
4.005	5.34.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.3	1	39.948				39.948
	Quantity as per item No.4	1	40.150				40.150
	Total						**80.098**
						Total Quantity in cum	**80.098**
4.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material in cement concrete work in doses						
	Quantity as per item No.3	1	39.948	330.000			13182.840
	Quantity as per item No.4	1	40.150	330.000			13249.500
	Total						**26432.340**
						Total Quantity in kg	**26432.340**
4.007	OD244668/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Quantity as per item No.3	1	39.948				39.948
	Quantity as per item No.4	1	40.150				40.150
	Total						**80.098**
						Total Quantity in cum	**80.098**
4.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.3	1	39.948	120.000			4793.760
	Quantity as per item No.4	1	40.150	120.000			4818.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**9611.760**
						Total Quantity in kilogram	**9611.760**
4.009	OD246798/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.3	1	39.948	120.000			4793.760
	Quantity as per item No.4	1	40.150	120.000			4818.000
	Total						**9611.760**
						Total Quantity in kg	**9611.760**
4.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Pile cap P1	24	1.100		1.000		26.400
	Grade Beam	14	3.850		0.750		40.425
	Dilution Tank base slab	2	6.100+11.05		0.350		12.005
	Total						**78.830**
						Total Quantity in sqm	**78.830**
4.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of walls	1	28.700		3.000		86.100
	Out side of walls	1	30.700		3.000		92.100
	Partition Wall	2	4.700		3.000		28.200
	Reciving chamber out side wall	2	2.750		1.150		6.325
	Reciving chamber in side wall	2	1.750		1.150		4.025
	Total						**216.750**
						Total Quantity in sqm	**216.750**
4.012	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Top slab	1	10.150	5.200			52.780
	Deduction man hole	-2	0.455	0.610			-0.555
	Total						**52.225**
						Total Quantity in sqm	**52.225**
4.013	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Base slab	2	6.100+11.05		0.350		12.005
	Base slab offset	1	32.500		0.450		14.625
	Inside of walls	1	28.700		3.000		86.100
	Out side of walls	1	30.700		3.000		92.100
	Partition Wall	2	4.700		3.000		28.200
	Reciving chamber inside wall	2	1.750		1.150		4.025
	Reciving chamber out side wall	2	2.750		1.150		6.325
	Top of wall	2	34.400		0.250		17.200
	Total						**260.580**
						Total Quantity in sqm	**260.580**
4.014	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	Out side of walls	1	30.700		3.000		92.100
	Reciving chamber out side wall	2	2.750		1.150		6.325
	Top of wall	2	34.400		0.250		17.200
	Total						**115.625**
						Total Quantity in sqm	**115.625**
4.015	22.23.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Inside of walls	8	4.700		3.000		112.800
	Reciving chamber inside wall	2	1.750		1.350		4.725
	Total						**117.525**
						Total Quantity in sqm	**117.525**
4.016	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	Base Slab top	2	4.700	4.700			44.180
	Reciving chamber base slab top	2	0.750	0.500			0.750
	Total						**44.930**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**44.930**
4.017	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Tank	2	4.700	4.700	3.000		132.540
	Total						**132.540**
						Total Quantity in Kilo litre	**132.540**
4.018	100.41.34						
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame (low duty) charges including all cost, labour charges etc., complete.						
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame						
		2					2.000
	Total						**2.000**
						Total Quantity in no	**2.000**
4.019	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		2	8.000				16.000
	Total						**16.000**
						Total Quantity in each	**16.000**
5	RECEIVING CHEMBER						
5.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means						
	Pile Cap P1	4	1.400	1.400	1.150		9.016

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Grade Beam	1	16.800	0.650	0.850		9.282
	Total						**18.298**
						Total Quantity in cum	**18.298**
5.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile Cap P1	4	1.400	1.400	0.150		1.176
	Grade Beam	1	16.800	0.650	0.100		1.092
	Total						**2.268**
						Total Quantity in cum	**2.268**
5.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Pile Cap P1	4	1.100	1.100	1.000		4.840
	Grade Beam	1	16.800	0.450	0.750		5.670
	Base Slab Beam	1	21.200	0.450	0.500		4.770
	Base Slab	1	6.200	6.200	0.450		17.298
	Total						**32.578**
						Total Quantity in cum	**32.578**
5.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 grade concrete						
	Wall	1	21.200	0.300	3.000		19.080
	Total						**19.080**
						Total Quantity in cum	**19.080**
5.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.3	1	32.578				32.578
	Quantity as per item No.4	1	19.080				19.080
	Total						**51.658**
						Total Quantity in cum	**51.658**
5.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.3	1	32.578	330.000			10750.740
	Quantity as per item No.4	1	19.080	330.000			6296.400
	Total						**17047.140**
						Total Quantity in kg	**17047.140**
5.007	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C						
	From item no 3 @120 kg/m3	1			32.578	120.000000	3909.360
	From item no 4 @120 kg/m3	1			19.080	120.000000	2289.600
	Total						**6198.960**
						Total Quantity in kilogram	**6198.960**
5.008	OD235090/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Extra for providing sulphate resistant cement						
	Quantity as per item No.3	1	32.578	1.000			32.578
	Quantity as per item No.4	1	19.080	1.000			19.080
	Total						**51.658**
						Total Quantity in cum	**51.658**
5.009	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Pile Cap P1	16	1.100		1.000		17.600
	Grade Beam	2	16.800		0.750		25.200
	Total						**42.800**
						Total Quantity in sqm	**42.800**
5.010	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of walls	4	5.000		3.000		60.000
	outside of walls	4	5.600		3.000		67.200
	Total						**127.200**
						Total Quantity in sqm	**127.200**
5.011	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						
	Base slab	1	6.400	6.400			40.960
	Base slabside	4	6.400		0.450		11.520
	Base slab Beam deduction	-1	21.200	0.450			-9.540
	Total						**42.940**
						Total Quantity in sqm	**42.940**
5.012	5.9.5						
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers						
	Centering and shuttering						
	Base Salb beam side	2	21.200	0.500			21.200

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**21.200**
						Total Quantity in sqm	**21.200**
5.013	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished with a floating coat of neat cement of mix:						
	Base Slab beam out side	4	5.750		0.500		11.500
	Base Slab	4	6.200		0.450		11.160
	Base slab offset	1	21.200	0.300			6.360
	Outside of walls	1	23.600		3.000		70.800
	In side of walls	4	5.000		3.000		60.000
	Wall top	1	21.200	0.300			6.360
	Total						**166.180**
						Total Quantity in sqm	**166.180**
5.014	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint (two or more coats)						
	Base Slab beam side	4	5.750		0.500		11.500
	Outside of walls	4	5.600		3.000		67.200
	Wall top	1	21.200	0.300			6.360
	Total						**85.060**
						Total Quantity in sqm	**85.060**
5.015	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Inside of wall	4	5.000		3.000		60.000
	Total						**60.000**
						Total Quantity in sqm	**60.000**
5.016	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	Bottom of Tank	1	5.000	5.000			25.000
	Total						**25.000**
						Total Quantity in sqm	**25.000**
5.017	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Receiving chamber	1	5.000	5.000	3.000		75.000
	Total						**75.000**
						Total Quantity in Kilo litre	**75.000**
5.018	19.16						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		8					8.000
	Total						**8.000**
						Total Quantity in each	**8.000**
6	MANNUAL COARSE SCREEN CHANNEL						
6.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile cap P1	2	1.400	1.400	1.150		4.508
	Grade Beam	1	1.350	0.650	0.850		0.746
	Total						**5.254**
						Total Quantity in cum	**5.254**
6.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile cap P1	2	1.400	1.400	0.150		0.588
	Grade Beam	1	1.350	0.650	0.100		0.088
	Total						**0.676**
						Total Quantity in cum	**0.676**
6.003	5.37.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Pile cap P1	2	1.100	1.100	1.000		2.420
	Grade Beam	1	1.350	0.450	0.750		0.456
	Total						**2.876**
						Total Quantity in cum	**2.876**
6.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Column	2	0.450	0.450	1.250		0.506
	Base Slab beam	1	4.450	0.450	0.750		1.502
	Base Slab	2	1.25+1.55	2.000	0.300		3.360
	Wall	4	2.500	1.500	0.250		3.750
	Total						**9.118**
						Total Quantity in cum	**9.118**
6.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.3	1	2.876				2.876

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Quantity as per item No.3	1	9.118				9.118
	Total						**11.994**
						Total Quantity in cum	**11.994**
6.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.3	1	2.876	330.000			949.080
	Quantity as per item No.4	1	9.118	330.000			3008.940
	Total						**3958.020**
						Total Quantity in kg	**3958.020**
6.007	OD244264/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Quantity as per item No.3	1	2.876				2.876
	Quantity as per item No.3	1	9.118				9.118
	Total						**11.994**
						Total Quantity in cum	**11.994**
6.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.3	1	2.876	120.000			345.120
	Quantity as per item No.3	1	9.118	120.000			1094.160
	Total						**1439.280**
						Total Quantity in kilogram	**1439.280**
6.009	OD246784/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.3	1	2.876				2.876
	Quantity as per item No.3	1	9.118				9.118

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**11.994**
						Total Quantity in kg	**11.994**
6.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Pile cap P1	8	1.100		1.000		8.800
	Grade Beam	2	1.350		0.750		2.025
	Total						**10.825**
						Total Quantity in sqm	**10.825**
6.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Column	8		0.450	1.250		4.500
	Inside of wall	4	2.500	1.500			15.000
	Outside of walls	4	2.500	1.500			15.000
	Total						**34.500**
						Total Quantity in sqm	**34.500**
6.012	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						
	Base Slab	2	1.25+1.55	2.000			11.200
	Total						**11.200**
						Total Quantity in sqm	**11.200**
6.013	5.9.5						
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers						
	Centering and shuttering						
	Base slab beam side	2	4.450		0.750		6.675
	Base slab beam bottom	2	4.450		0.450		4.005
	Total						**10.680**
						Total Quantity in sqm	**10.680**
6.014	13.7.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Column	8		0.450	1.250		4.500
	Inside of wall	4	2.500	1.500			15.000
	Outside of walls	4	2.500	1.500			15.000
	Base Slab bottom	2	1.25+1.55	2.000			11.200
	Base Slab top	2	1.25+1.55	1.000			5.600
	Base slab beam side	2	4.450		0.750		6.675
	Total						**57.975**
						Total Quantity in sqm	**57.975**
6.015	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	Column	8		0.450	1.250		4.500
	Inside of wall	4	2.500	1.500			15.000
	Outside of walls	4	2.500	1.500			15.000
	Base Slab bottom	2	1.25+1.55	2.000			11.200
	Base slab top	2	1.25+1.55	1.000			5.600
	Base slab beam side	2	4.450		0.750		6.675
	Total						**57.975**
						Total Quantity in sqm	**57.975**
6.016	22.23.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Inside of wall	4	2.500	1.500			15.000
	Total						**15.000**
						Total Quantity in sqm	**15.000**
6.017	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Base Slab top	2	1.25+1.55	1.000			5.600
	Total						**5.600**
						Total Quantity in sqm	**5.600**
7	MANNUAL FINE SCREEN CHANNEL						
7.001	5.37.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Base Slab	1	1.55+1.55	2.000	0.300		1.860
	Wall	4	2.500	1.500	0.250		3.750
	Total						**5.610**
						Total Quantity in cum	**5.610**
7.002	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.1	1	5.610				5.610
	Total						**5.610**
						Total Quantity in cum	**5.610**
7.003	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material in cement concrete work in doses						
	Quantity as per item No.1	1	5.610	330.000			1851.300
	Total						**1851.300**
						Total Quantity in kg	**1851.300**
7.004	OD244422/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Quantity as per item No.1	1	5.610				5.610
	Total						**5.610**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in cum	**5.610**
7.005	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.1	1	5.610	120.000			673.200
	Total						**673.200**
						Total Quantity in kilogram	**673.200**
7.006	OD246785/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.1	1	5.610				5.610
	Total						**5.610**
						Total Quantity in kg	**5.610**
7.007	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of walls	4	1.55+1.55	1.500			18.600
	Out side of walls	4	1.55+1.55	1.500			18.600
	Total						**37.200**
						Total Quantity in sqm	**37.200**
7.008	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						
	Base slab	1	1.55+1.55	2.000			6.200
	Total						**6.200**
						Total Quantity in sqm	**6.200**
7.009	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Inside of walls	4	1.55+1.55	1.500			18.600
	Out side of walls	4	1.55+1.55	1.500			18.600
	Base Slab Bottom	2	1.55+1.55	2.000			12.400
	Base Slab top	2	1.55+1.55	1.000			6.200
	Total						**55.800**
						Total Quantity in sqm	**55.800**
7.010	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	Inside of walls	4	1.55+1.55	1.500			18.600
	Out side of walls	4	1.55+1.55	1.500			18.600
	Base Slab Bottom	2	1.55+1.55	2.000			12.400
	Base Slab top	2	1.55+1.55	1.000			6.200
	Total						**55.800**
						Total Quantity in sqm	**55.800**
7.011	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Inside of walls	4	1.55+1.55	1.500			18.600
	Total						**18.600**
						Total Quantity in sqm	**18.600**
7.012	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Base Slab top	2	1.55+1.55	1.000			6.200
	Total						**6.200**
						Total Quantity in sqm	**6.200**
8	OIL & GREASE TRAP						
8.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile cap P1	4	1.400	1.400	1.150		9.016
	Grade Beam	4	2.700	0.650	0.850		5.967
	Base Slab	1	4.400	4.400	0.350		6.776
	Oil and grease trap	1	4.900	4.900	0.600		14.406
	PCC	1	10.800		0.150		1.620
	Total						**37.785**
						Total Quantity in cum	**37.785**
8.002	4.1.5						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile cap P1	4	1.400	1.400	0.150		1.176
	Grade Beam	4	2.700	0.650	0.100		0.702
	PCC	1	4.600	4.600	0.150		3.174
	Total						**5.052**
						Total Quantity in cum	**5.052**
8.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Pile cap P1	4	1.100	1.100	1.000		4.840
	Grade Beam	4	2.700	0.450	0.750		3.645
	Base Slab	1	4.400	4.400	0.350		6.776
	Total						**15.261**
						Total Quantity in cum	**15.261**
8.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Wall	1	15.200	0.300	3.250		14.820
	Partition wall	1	3.500	0.150	0.750		0.394
	Total						**15.214**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in cum	**15.214**
8.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.3	1	15.261				15.261
	Quantity as per item No.4	1	15.214				15.214
	Total						**30.475**
						Total Quantity in cum	**30.475**
8.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.3	1	15.261	330.000			5036.130
	Quantity as per item No.4	1	15.214	330.000			5020.620
	Total						**10056.750**
						Total Quantity in kg	**10056.750**
8.007	OD244458/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Quantity as per item No.3	1	15.261				15.261
	Quantity as per item No.4	1	15.214				15.214
	Total						**30.475**
						Total Quantity in cum	**30.475**
8.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.3	1	15.261	120.000			1831.320

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Quantity as per item No.4	1	15.214	120.000			1825.680
	Total						**3657.000**
						Total Quantity in kilogram	**3657.000**
8.009	OD246788/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.3	1	15.261	120.000			1831.320
	Quantity as per item No.4	1	15.214	120.000			1825.680
	Total						**3657.000**
						Total Quantity in kg	**3657.000**
8.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Pile cap P1	16	1.100		1.000		17.600
	Grade Beam	8	2.700		0.750		16.200
	Base Slab	4	4.900		0.350		6.860
	Total						**40.660**
						Total Quantity in sqm	**40.660**
8.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of walls	4	3.500		3.250		45.500
	Out side of walls	4	4.100		3.250		53.300
	Partition Wall side	2	3.500		0.750		5.250
	Partition Wall bottom	1	3.500	0.150			0.525
	Total						**104.575**
						Total Quantity in sqm	**104.575**
8.012	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Inside of walls	4	3.500	3.250			45.500

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Out side of walls	4	4.100	3.250			53.300
	Base Slab	4	4.900	0.350			6.860
	Base slab offset	1	17.000	0.150			2.550
	Wall top	1	15.200	0.300			4.560
	Partition wall side	2	3.500		0.750		5.250
	Partition wall top and bottom	2	3.500	0.150			1.050
	Total						**119.070**
						Total Quantity in sqm	**119.070**
8.013	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	Out side wall	4	4.100	3.250			53.300
	Wall top	1	15.200	0.300			4.560
	Partition Wall side	2	3.500		0.750		5.250
	Partition Wall bottom and top	2	3.500	0.150			1.050
	Total						**64.160**
						Total Quantity in sqm	**64.160**
8.014	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Inside of walls	4	3.500	3.250			45.500
	Total						**45.500**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**45.500**
8.015	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Base Slab top	1	3.500	3.500			12.250
	Total						**12.250**
						Total Quantity in sqm	**12.250**
8.016	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Tank	1	3.500	3.500	3.250		39.813
	Total						**39.813**
						Total Quantity in Kilo litre	**39.813**
8.017	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		9					9.000
	Total						**9.000**
						Total Quantity in each	**9.000**
9	GRIT SEPARATOR						
9.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile cap P1	4	1.400	1.400	1.150		9.016
	Grade Beam	4	2.350	0.650	0.850		5.194
	Pcc	1	10.650	0.650	0.150		1.038
	Base Slab	1	4.350	4.350	0.350		6.623
	Grit Separator	1	4.350	4.350	1.450		27.438
	Total						**49.309**
						Total Quantity in cum	**49.309**
9.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile cap P1	4	1.400	1.400	0.150		1.176
	Grade Beam	4	2.350	0.650	0.100		0.611
	Pcc	1	4.600	4.600	0.150		3.174
	Total						**4.961**
						Total Quantity in cum	**4.961**
9.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Pile cap P1	4	1.100	1.100	1.000		4.840

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Grade Beam	4	2.350	0.450	0.750		3.173
	Base Slab	1	4.350	4.350	0.350		6.623
	Total						**14.636**
						Total Quantity in cum	**14.636**
9.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Wall	1	13.800	0.300	3.550		14.697
	Channel slab	1	4.000	3.000	0.300		3.600
	Channel wall	2	4.000	3.000	0.250		6.000
	Total						**24.297**
						Total Quantity in cum	**24.297**
9.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.3	1	14.636				14.636
	Quantity as per item No.4	1	24.297				24.297
	Total						**38.933**
						Total Quantity in cum	**38.933**
9.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.3	1	14.636	330.000			4829.880
	Quantity as per item No.4	1	24.297	330.000			8018.010

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**12847.890**
						Total Quantity in kg	**12847.890**
9.007	OD244602/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Quantity as per item No.3	1	14.636				14.636
	Quantity as per item No.4	1	24.297				24.297
	Total						**38.933**
						Total Quantity in cum	**38.933**
9.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.3	1	14.636	120.000			1756.320
	Quantity as per item No.4	1	24.297	120.000			2915.640
	Total						**4671.960**
						Total Quantity in kilogram	**4671.960**
9.009	OD246796/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.3	1	14.636	120.000			1756.320
	Quantity as per item No.4	1	24.297	120.000			2915.640
	Total						**4671.960**
						Total Quantity in kg	**4671.960**
9.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Pile cap P1	16	1.100		1.000		17.600
	Grade Beam	8	2.350		0.750		14.100
	Base Slab	4		4.350	0.350		6.090

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**37.790**
						Total Quantity in sqm	**37.790**
9.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of walls	4	3.150		3.550		44.730
	Out side of walls	4	3.750		3.550		53.250
	Channel wall	4	4.000		1.350		21.600
	Total						**119.580**
						Total Quantity in sqm	**119.580**
9.012	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						
	Channel slab	1	4.000	3.000			12.000
	Total						**12.000**
						Total Quantity in sqm	**12.000**
9.013	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Inside of walls	4	3.150		3.550		44.730
	Out side of walls	4	3.750		3.550		53.250
	Channel wall	4	4.000		1.350		21.600
	Channel wall top	2	4.000	0.250			2.000
	Channel slab bottom	1	4.000	3.000			12.000
	Channel slab top	1	4.000	2.000			8.000
	Base slab offset	1	16.200	0.300			4.860
	Base slab side	4	4.350		0.300		5.220
	Wall top	1	13.800	0.300			4.140
	Total						**155.800**
						Total Quantity in sqm	**155.800**
9.014	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Out side of walls	4	3.750		3.550		53.250
	Channel wall	2	4.000		1.350		10.800
	Channel slab bottom	1	4.000	3.000			12.000
	Channel slab top	1	4.000	2.000			8.000
	Channel wall top	2	4.000	0.250			2.000
	Wall top	1	13.800	0.300			4.140
	Total						**90.190**
						Total Quantity in sqm	**90.190**
9.015	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Inside of walls	4	3.150		3.550		44.730
	Channel	2	4.000		1.350		10.800
	Total						**55.530**
						Total Quantity in sqm	**55.530**
9.016	22.23.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Base Slab top	1	3.150	3.150			9.923
	Channel Slab top	1	4.000	2.000			8.000
	Total						**17.923**
						Total Quantity in sqm	**17.923**
9.017	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Tank	1	3.150	3.150	3.550		35.225
	Total						**35.225**
						Total Quantity in Kilo litre	**35.225**
9.018	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		10					10.000
	Total						**10.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in each	**10.000**
10	EQUALISATION TANK						
10.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Equalisation tank	1	16.250	16.250	3.200		845.000
	Base slab	1	16.250	16.250	0.450		118.828
	Base Slab PCC	1	161.360		0.150		24.204
	Base Slab PCC outer	16	1.000		0.150		2.400
	Pilecap P1	4	1.400	1.400	1.150		9.016
	Pilecap P1a	12	1.500	1.500	1.350		36.450
	Pilecap P2	9	2.480	1.400	1.150		35.935
	Grade Beam	1	95.000	0.650	0.850		52.488
	Total						**1124.321**
						Total Quantity in cum	**1124.321**
10.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Base Slab PCC	1	16.250	16.250	0.150		39.609
	Base Slab PCC outer	16	1.000		0.150		2.400
	Pilecap P1	4	1.400	1.400	0.150		1.176
	Pilecap P1a	12	1.500	1.500	0.150		4.050
	Pilecap P2	9	2.480	1.400	0.150		4.687
	Grade Beam	1	95.000	0.650	0.100		6.175
	Total						**58.097**
						Total Quantity in cum	**58.097**
10.003	5.37.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Base slab	1	16.250	16.250	0.450		118.828
	Pilecap P1	4	1.100	1.100	1.000		4.840
	Pilecap P1a	12	1.200	1.200	1.200		20.736
	Pilecap P2	9	2.180	1.100	1.000		21.582
	Grade Beam	1	95.000	0.450	0.750		32.063
	Total						**198.049**
						Total Quantity in cum	**198.049**
10.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	C/C	1	4*15.35	0.300	4.950		91.179
	Total						**91.179**
						Total Quantity in cum	**91.179**
10.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Qty Vide Item No:3	1	198.049				198.049

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Qty Vide Item No:4	1	91.179				91.179
	Total						**289.228**
						Total Quantity in cum	**289.228**
10.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Qty Vide Item No:3	1	198.049	330.000			65356.170
	Qty Vide Item No:4	1	91.179	330.000			30089.070
	Total						**95445.240**
						Total Quantity in kg	**95445.240**
10.007	OD235084/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cemen						
	Qty Vide Item No:3	1	198.049				198.049
	Qty Vide Item No:4	1	91.179				91.179
	Total						**289.228**
						Total Quantity in cum	**289.228**
10.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Qty Vide Item No:3@120 kg/m3	1	198.049	120.000			23765.880
	Qty Vide Item No:4@120 kg/m3	1	91.179	120.000			10941.480
	Total						**34707.360**
						Total Quantity in kilogram	**34707.360**
10.009	OD235085/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Qty Vide Item No:3@120 kg/m3	1	198.049	120.000			23765.880
	Qty Vide Item No:4@120 kg/m3	1	91.179	120.000			10941.480
	Total						**34707.360**
						Total Quantity in kg	**34707.360**
10.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Base slab	4	16.250		0.450		29.250
	Pilecap P1	16	1.100		1.000		17.600
	Pilecap P1a	48	1.200		1.200		69.120
	Pilecap P2	18	2.180+1.1		1.000		59.040
	Grade Beam	2	95.000		0.750		142.500
	Total						**317.510**
						Total Quantity in sqm	**317.510**
10.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of walls	4	14.750	4.950			292.050
	outside of walls	4	15.350	4.950			303.930
	Total						**595.980**
						Total Quantity in sqm	**595.980**
10.012	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Base Slab side	4	16.250		0.450		29.250
	Base Slab top	1	63.200		0.450		28.440
	Inside of wall	4	14.750		4.950		292.050
	Outside of walls	4	15.350		4.950		303.930
	Wall top	1	60.200		0.300		18.060
	Total						**671.730**
						Total Quantity in sqm	**671.730**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
10.013	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	outer wall	4	15.350		1.500		92.100
	Wall top	1	60.200		0.300		18.060
	Total						**110.160**
						Total Quantity in sqm	**110.160**
10.014	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	inside wall	4	14.750		4.950		292.050
	Total						**292.050**
						Total Quantity in sqm	**292.050**
10.015	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	Base Slab top	1	14.750	14.750			217.563
	Total						**217.563**
						Total Quantity in sqm	**217.563**
10.016	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Equalisation tank	1	14.750	14.750	4.950		1076.934
	Total						**1076.934**
						Total Quantity in Kilo litre	**1076.934**
10.017	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		14					14.000
	Total						**14.000**
						Total Quantity in each	**14.000**
11	MBBR 1						
11.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile cap P1	4	1.400	1.400	1.150		9.016
	Pile cap P1a	8	1.500	1.500	1.350		24.300
	Pile cap P2	4	2.480	1.400	1.150		15.971
	Grade Beam	1	57.700	0.650	0.850		31.879
	Total						**81.166**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in cum	**81.166**
11.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile cap P1	4	1.400	1.400	0.150		1.176
	Pile cap P1a	8	1.500	1.500	0.150		2.700
	Pile cap P2	4	2.480	1.400	0.150		2.083
	Grade Beam	1	57.700	0.650	0.100		3.751
	Base Slab	1	10.750	10.750	0.150		17.334
	Total						**27.044**
						Total Quantity in cum	**27.044**
11.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Base Slab beam	1	44.800	0.450	0.550		11.088
	Base Slab	1	12.700	12.700	0.350		56.452
	Pile cap P1	4	1.100	1.100	1.000		4.840
	Pile cap P1a	8	1.200	1.200	1.200		13.824
	Pile cap P2	4	2.180	1.100	1.000		9.592
	Grade Beam	1	57.700	0.450	0.750		19.474
	Total						**115.270**
						Total Quantity in cum	**115.270**
11.004	5.37.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Wall	1	44.800	0.300	5.000		67.200
	Total						**67.200**
						Total Quantity in cum	**67.200**
11.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.3	1	115.270				115.270
	Quantity as per item No.4	1	67.200				67.200
	Total						**182.470**
						Total Quantity in cum	**182.470**
11.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra providing and mixing water proofing material						
	Quantity as per item No.3	1	115.270	330.000			38039.100
	Quantity as per item No.4	1	67.200	330.000			22176.000
	Total						**60215.100**
						Total Quantity in kg	**60215.100**
11.007	OD243745/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Quantity as per item No.3	1	115.270				115.270
	Quantity as per item No.4	1	67.200				67.200
	Total						**182.470**
						Total Quantity in cum	**182.470**
11.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C						
	Quantity as per item No.3	1	115.270	120.000			13832.400
	Quantity as per item No.4	1	67.200	120.000			8064.000
	Total						**21896.400**
						Total Quantity in kilogram	**21896.400**
11.009	OD246773/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.3	1	115.270	120.000			13832.400
	Quantity as per item No.4	1	67.200	120.000			8064.000
	Total						**21896.400**
						Total Quantity in kg	**21896.400**
11.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Pile cap P1	16		1.100	1.000		17.600
	Pile cap P1a	32		1.200	1.200		46.080
	Pile cap P2	8	3.280		1.000		26.240
	Grade Beam	2	57.700		0.750		86.550
	Total						**176.470**
						Total Quantity in sqm	**176.470**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
11.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of walls	4	10.900	5.000			218.000
	Out side of walls	4	11.500	5.000			230.000
	Total						**448.000**
						Total Quantity in sqm	**448.000**
11.012	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						
	Base Slab side	4		12.700	0.350		17.780
	Base Slab offset bottom	1	48.700	0.525			25.568
	Total						**43.348**
						Total Quantity in sqm	**43.348**
11.013	5.9.5						
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers						
	Centering and shuttering						
	Base Slab beam	2	44.800		0.550		49.280
	Total						**49.280**
						Total Quantity in sqm	**49.280**
11.014	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Out side wall	4	11.500		5.000		230.000
	Inside of wall	4	10.900		5.000		218.000
	Base Slab side	4	12.700		0.350		17.780
	Wall top	1	44.800	0.300			13.440
	Base slab offset	1	48.400	0.600			29.040
	Total						**508.260**
						Total Quantity in sqm	**508.260**
11.015	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Finishing with Epoxy paint						
	Wall outside	4	11.500	5.000			230.000
	Base Slab side	4	12.700		0.350		17.780
	Wall top	1	44.800	0.300			13.440
	Base slab offset	1	48.400	0.600			29.040
	Total						**290.260**
						Total Quantity in sqm	**290.260**
11.016	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Wall Inside	4	10.900	5.000			218.000
	Total						**218.000**
						Total Quantity in sqm	**218.000**
11.017	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Base Slab top	1	10.900	10.900			118.810
	Total						**118.810**
						Total Quantity in sqm	**118.810**
11.018	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Tank	1	10.900	10.900	5.000		594.050
	Total						**594.050**
						Total Quantity in Kilo litre	**594.050**
11.019	2.25						
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.						
	Filling available excavated earth						
	Base slab	1	10.750	10.750	0.550		63.559
	Total						**63.559**
						Total Quantity in cum	**63.559**
11.020	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		14					14.000
	Total						**14.000**
						Total Quantity in each	**14.000**
12	MBBR 2						
12.001	2.6.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile Cap p1	4	1.400	1.400	1.150		9.016
	Pile Cap P2	8	2.480	1.400	1.150		31.942
	Pile cap P2a	4	3.000	1.500	1.350		24.300
	Grade Beam	1	58.200	0.650	0.850		32.156
	Total						**97.414**
						Total Quantity in cum	**97.414**
12.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile Cap p1	4	1.400	1.400	0.150		1.176
	Pile Cap P2	8	2.480	1.400	0.150		4.166
	Pile cap P2a	4	3.000	1.500	0.150		2.700
	Grade Beam	1	58.200	0.650	0.100		3.783
	Base Slab	1	12.050	12.050	0.150		21.780
	Total						**33.605**
						Total Quantity in cum	**33.605**
12.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Base slab	1	14.050	14.050	0.450		88.831
	Base Slab beam	1	50.000	0.450	0.150		3.375
	Pile Cap p1	4	1.100	1.100	1.000		4.840
	Pile Cap P2	8	2.180	1.100	1.000		19.184
	Pile cap P2a	4	2.700	1.200	1.200		15.552

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Grade Beam	1	58.200	0.450	0.750		19.643
	Total						**151.425**
						Total Quantity in cum	**151.425**
12.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Wall	1	49.800	0.300	5.000		74.700
	Total						**74.700**
						Total Quantity in cum	**74.700**
12.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified						
	Qty vide item 3	1	151.425				151.425
	Qty vide item 4	1	74.700				74.700
	Total						**226.125**
						Total Quantity in cum	**226.125**
12.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Qty vide item 3	1	151.425		330.000		49970.250
	Qty vide item 4	1	74.700		330.000		24651.000
	Total						**74621.250**
						Total Quantity in kg	**74621.250**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
12.007	OD235099/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Qty vide item 3	1	151.425				151.425
	Qty vide item 4	1	74.700				74.700
	Total						**226.125**
						Total Quantity in cum	**226.125**
12.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work including straightening, cutting,						
	Qty vide item 3	1	151.425		120.000		18171.000
	Qty vide item 4	1	74.700		120.000		8964.000
	Total						**27135.000**
						Total Quantity in kilogram	**27135.000**
12.009	OD235100/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Qty vide item 3	1	151.425		120.000		18171.000
	Qty vide item 4	1	74.700		120.000		8964.000
	Total						**27135.000**
						Total Quantity in kg	**27135.000**
12.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering including strutting, etc. and removal of form for:						
	Pile Cap p1	16	1.100		1.000		17.600
	Pile Cap p2	16	2.18+1.1		1.000		52.480
	Pile cap P2a	8	2.7+1.2		1.200		37.440
	Grade Beam	2	58.200		0.750		87.300
	Total						**194.820**
						Total Quantity in sqm	**194.820**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
12.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside	4	12.150		5.000		243.000
	Outside	4	12.850		5.000		257.000
	Total						**500.000**
						Total Quantity in sqm	**500.000**
12.012	5.9.5						
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers						
	Centering and shuttering						
	Base slab beam	1	51.800		0.150		7.770
	Total						**7.770**
						Total Quantity in sqm	**7.770**
12.013	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished with a floating coat of neat cement of mix:						
	Base slab beam	1	51.800	0.150			7.770
	Inside	4	12.150		5.000		243.000
	Outside	4	12.850		5.000		257.000
	Base slabside	4	14.450		0.450		26.010
	Base slab offset	1	53.800	0.600			32.280
	Wall top	1	50.000	0.350			17.500
	Total						**583.560**
						Total Quantity in sqm	**583.560**
12.014	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint (two or more coats) at all locations						
	Outer wall	4	12.850	1.000			51.400
	Base Slab side	1	14.450	0.450			6.503
	Base slab offset	1	53.800	0.600			32.280
	Wall top	1	49.800	0.350			17.430
	Total						**107.613**
						Total Quantity in sqm	**107.613**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
12.015	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	Tank	4	12.150		5.000		243.000
	Total						**243.000**
						Total Quantity in sqm	**243.000**
12.016	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	Base slab	1	12.150	12.150			147.623
	Total						**147.623**
						Total Quantity in sqm	**147.623**
12.017	100.36.1 Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Filling water						
	Tank	1	12.150	12.150	5.000		738.113
	Total						**738.113**
						Total Quantity in Kilo litre	**738.113**
12.018	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		14					14.000
	Total						**14.000**
						Total Quantity in each	**14.000**
13	MBBR 3						
13.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile Cap P1	4	1.400	1.400	1.150		9.016
	Pile Cap P1a	4	1.500	1.500	1.350		12.150
	Pile Cap P2	1	2.480	1.400	1.150		3.993
	Grade Beam	1	33.420	0.650	0.850		18.465
	Base Slab	1	9.550	9.550	0.050		4.560
	Base Slab pcc	1	63.140		0.150		9.471
	Total						**57.655**
						Total Quantity in cum	**57.655**
13.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile Cap P1	4	1.400	1.400	0.150		1.176

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Pile Cap P1a	4	1.500	1.500	0.150		1.350
	Pile Cap P2	1	2.480	1.400	0.150		0.521
	Grade Beam	1	33.100	0.650	0.100		2.152
	Base Slab pcc	1	63.140		0.150		9.471
	Total						**14.670**
						Total Quantity in cum	**14.670**
13.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Pile Cap P1	4	1.100	1.100	1.000		4.840
	Pile Cap P1a	4	1.200	1.200	1.200		6.912
	Pile Cap P2	1	2.180	1.100	1.000		2.398
	Grade Beam	1	33.420	0.450	0.750		11.279
	Base Slab	1	9.550	9.550	0.350		31.921
	Total						**57.350**
						Total Quantity in cum	**57.350**
13.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Wall	1	32.200	0.300	5.250		50.715
	Top Slab	1	8.350	8.350	0.200		13.945
	Inverted Beam	1	8.350	0.350	0.550		1.607

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Manhole deduction	-2	0.455	0.610	0.200		-0.111
	Total						**66.156**
						Total Quantity in cum	**66.156**
13.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.3	1	57.350				57.350
	Quantity as per item No.4	1	66.156				66.156
	Total						**123.506**
						Total Quantity in cum	**123.506**
13.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.3	1	57.350	330.000			18925.500
	Quantity as per item No.4	1	66.156	330.000			21831.480
	Total						**40756.980**
						Total Quantity in kg	**40756.980**
13.007	OD243859/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Quantity as per item No.3	1	57.350				57.350
	Quantity as per item No.4	1	66.156				66.156
	Total						**123.506**
						Total Quantity in cum	**123.506**
13.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Steel reinforcement for R.C.C						
	Quantity as per item No.3	1	57.350	120.000			6882.000
	Quantity as per item No.4	1	66.156	120.000			7938.720
	Total						**14820.720**
						Total Quantity in kilogram	**14820.720**
13.009	OD246775/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.3	1	57.350	120.000			6882.000
	Quantity as per item No.4	1	66.156	120.000			7938.720
	Total						**14820.720**
						Total Quantity in kg	**14820.720**
13.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Pile Cap P1	16	1.100		1.000		17.600
	Pile Cap P1a	16	1.200		1.200		23.040
	Pile Cap P2	2	3.280		1.000		6.560
	Grade Beam	2	33.420		0.750		50.130
	Base Slab	4		9.550	0.350		13.370
	Total						**110.700**
						Total Quantity in sqm	**110.700**
13.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of wall	4	7.750	5.250			162.750
	Out side of walls	4	8.350	5.250			175.350
	Total						**338.100**
						Total Quantity in sqm	**338.100**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
13.012	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						
	Top slab	1	7.750	7.750			60.063
	Top slab side	4	8.350		0.200		6.680
	Total						**66.743**
						Total Quantity in sqm	**66.743**
13.013	5.9.5						
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers						
	Centering and shuttering						
	Inverted Beam	2	8.350		0.550		9.185
	Total						**9.185**
						Total Quantity in sqm	**9.185**
13.014	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Base slab	4	9.550		0.350		13.370
	Out side of walls	4	8.350		5.250		175.350
	In side of wall	4	7.750		5.250		162.750
	Top slab bottom	1	7.750	7.750			60.063
	Top slab side	4	8.350		0.200		6.680
	Top slab top	1	8.350	8.350			69.723
	Base slab offset	1	35.800	0.600			21.480
	Invertd Beam	1	8.350	1.450			12.108
	Invertd Beam side	2		0.350	0.550		0.385
	Total						**521.909**
						Total Quantity in sqm	**521.909**
13.015	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	Base slab	4	9.550		0.350		13.370
	Out side of walls	4	8.350		5.250		175.350
	Top slab bottom	1	7.750	7.750			60.063

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Top slab side	4	8.350		0.200		6.680
	Top slab top	1	8.350	8.350			69.723
	Invertd Beam	1	8.350	1.450			12.108
	Invertd Beam side	2		0.350	0.550		0.385
	Base slab offset	1	35.800	0.600			21.480
	Total						**359.159**
						Total Quantity in sqm	**359.159**
13.016	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	c						
	Inside of walls	4	7.750		5.250		162.750
	Total						**162.750**
						Total Quantity in sqm	**162.750**
13.017	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	Base slab	1	7.750	7.750			60.063
	Total						**60.063**
						Total Quantity in sqm	**60.063**
13.018	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Tank	1	7.750	7.750	5.250		315.328
	Total						**315.328**
						Total Quantity in Kilo litre	**315.328**
13.019	100.41.34						
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame (low duty) charges including all cost, labour charges etc., complete.						
	Supplying and fixing Rectangular C.I. manhole cover						
		2					2.000
	Total						**2.000**
						Total Quantity in no	**2.000**
13.020	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		15					15.000
	Total						**15.000**
						Total Quantity in each	**15.000**
14	MBBR 4						
14.001	2.6.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Base slab	1	6.600	6.600	0.350		15.246
	Pile cap P1a	4	1.500	1.500	1.350		12.150
	Grade Beam	1	15.600	0.650	0.850		8.619
	Total						**36.015**
						Total Quantity in cum	**36.015**
14.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Base slab pcc	1	6.600	6.600	0.150		6.534
	Pile Cap P1a	4	1.500	1.500	0.150		1.350
	Grade Beam	1	15.600	0.650	0.100		1.014
	Total						**8.898**
						Total Quantity in cum	**8.898**
14.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Base slab	1	6.300	6.300	0.350		13.892
	Pile Cap P1a	4	1.200	1.200	1.200		6.912
	Grade Beam	1	15.600	0.450	0.750		5.265
	Total						**26.069**
						Total Quantity in cum	**26.069**
14.004	5.37.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Wall	1	20.400	5.000	0.300		30.600
	Total						**30.600**
						Total Quantity in cum	**30.600**
14.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Qty vide item 3	1	26.069				26.069
	Qty vide item 4	1	30.600				30.600
	Total						**56.669**
						Total Quantity in cum	**56.669**
14.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Qty vide item 3	1	26.069		330.000		8602.770
	Qty vide item 4	1	30.600		330.000		10098.000
	Total						**18700.770**
						Total Quantity in kg	**18700.770**
14.007	OD235088/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Qty vide item 3	1	26.069				26.069
	Qty vide item 4	1	30.600				30.600

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**56.669**
						Total Quantity in cum	**56.669**
14.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Qty vide item 3	1	26.069		120.000		3128.280
	Qty vide item 4	1	30.600		120.000		3672.000
	Total						**6800.280**
						Total Quantity in kilogram	**6800.280**
14.009	OD235089/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Qty vide item 3	1	26.069		120.000		3128.280
	Qty vide item 4	1	30.600		120.000		3672.000
	Total						**6800.280**
						Total Quantity in kg	**6800.280**
14.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Base slab	4	6.300		0.350		8.820
	Pile Cap P1a	16	1.200		1.200		23.040
	Grade Beam	2		15.600	0.750		23.400
	Total						**55.260**
						Total Quantity in sqm	**55.260**
14.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of walls	4	4.800		5.000		96.000
	Outside of walls	4	5.400		5.000		108.000
	Total						**204.000**
						Total Quantity in sqm	**204.000**
14.012	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	12 mm cement plaster finished						
	Base Slab side	1	4.000	6.300	0.350		8.820
	Inside of walls	4	4.800		5.000		96.000
	Outside of walls	4	5.400		5.000		108.000
	Top of wall	1	20.400	0.300			6.120
	Base slab offset	1	23.400	0.450			10.530
	Total						**229.470**
						Total Quantity in sqm	**229.470**
14.013	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint (two or more coats) at all locations						
	Out side wall	1	21.600	5.000			108.000
	Top of wall	1	20.400	0.300			6.120
	Total						**114.120**
						Total Quantity in sqm	**114.120**
14.014	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	MBBR 4	4	4.800		5.000		96.000
	Total						**96.000**
						Total Quantity in sqm	**96.000**
14.015	22.23.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	Base Slab top	1	4.800	4.800			23.040
	Total						**23.040**
						Total Quantity in sqm	**23.040**
14.016	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	MBBR 4	1	4.800	4.800	5.000		115.200
	Total						**115.200**
						Total Quantity in Kilo litre	**115.200**
14.017	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		14					14.000
	Total						**14.000**
						Total Quantity in each	**14.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
15	SECONDARY CLARIFIER WITH PLATE SETTLER						
15.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile cap P1	12	1.400	1.400	1.150		27.048
	Grade Beam	1	35.004	0.650	0.850		19.340
	Base Slab	1	8.300	8.300	0.450		31.001
	Base Slab pcc	1	39.240		0.150		5.886
	Structure	1	8.300	8.300	1.350		93.002
	Total						**176.277**
						Total Quantity in cum	**176.277**
15.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete of specified grade						
	Pile cap P1	12	1.400	1.400	0.150		3.528
	Grade Beam	1	35.004	0.650	0.100		2.275
	Base Slab pcc	1	39.240		0.150		5.886
	Total						**11.689**
						Total Quantity in cum	**11.689**
15.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work						
	Base slab-raft beam slab type	1	8.300	8.300	0.450		31.001
	Base slab-inverted beams	1	11.400	0.450	0.600		3.078

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Pile cap P1	12	1.100	1.100	1.000		14.520
	Grade Beam	1	35.004	0.450	0.750		11.814
	Total						**60.413**
						Total Quantity in cum	**60.413**
15.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Columns-long	4	0.450	0.450	2.200		1.782
	Columns-short	4	0.450	0.450	0.750		0.608
	Clarifier-square container	1	27.200	0.300	2.800		22.848
	Clarifier-hopper container	4	9.900	0.300			11.880
	Clarifier-hopper container bottom	1	3.300	3.300	0.300		3.267
	Top Channel	1	30.800	1.650	0.200		10.164
	Inlet pipe	-1	0.031	0.300			-0.009
	Total						**50.540**
						Total Quantity in cum	**50.540**
15.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.3	1	60.413				60.413
	Quantity as per item No.4	1	50.540				50.540
	Total						**110.953**
						Total Quantity in cum	**110.953**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
15.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.3	1	60.413			340.000000	20540.420
	Quantity as per item No.4	1	50.540			340.000000	17183.600
	Total						**37724.020**
						Total Quantity in kg	**37724.020**
15.007	OD235095/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Qty taken from item no-3	1	60.413				60.413
	Qty taken from item no-4	1	50.540				50.540
	Total						**110.953**
						Total Quantity in cum	**110.953**
15.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.3	1	60.413		120.000		7249.560
	Quantity as per item No.4	1	50.540		120.000		6064.800
	Total						**13314.360**
						Total Quantity in kilogram	**13314.360**
15.009	OD235096/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.3	1	60.413	120.000			7249.560
	Quantity as per item No.4	1	50.540	120.000			6064.800

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**13314.360**
						Total Quantity in kg	**13314.360**
15.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering including strutting						
	Base slab-raft beam slab type	4	8.300		0.450		14.940
	Total						**14.940**
						Total Quantity in sqm	**14.940**
15.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Top channels	2	30.800		1.650		101.640
	Inside Walls	4	6.500		2.800		72.800
	Outside Walls	4	7.100		2.800		79.520
	Total						**253.960**
						Total Quantity in sqm	**253.960**
15.012	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						
	Clarifier-hopper container	4	4.750	2.500			47.500
	Total						**47.500**
						Total Quantity in sqm	**47.500**
15.013	5.9.5						
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers						
	Centering and shuttering						
	Base slab-inverted beams	2	11.400		0.600		13.680
	Total						**13.680**
						Total Quantity in sqm	**13.680**
15.014	5.9.6						
	Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Centering and shuttering						
	Columns-long	16		0.450	2.200		15.840
	Columns-short	16		0.450	0.750		5.400
	Total						**21.240**
						Total Quantity in sqm	**21.240**
15.015	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished with a floating coat of neat cement of mix:						
	Inside of walls-upper	4	6.500		2.800		72.800
	Inside of walls-lower	4	7.700		2.800		86.240
	Top channels	2	30.800		1.650		101.640
	Base slab inside	1	3.300	3.300			10.890
	Hopper Top and Bottom	8	4.750	2.500			95.000
	Clarifier Outside	4	7.100		2.8+2.5		150.520
	Columns-long	16		0.450	2.200		15.840
	Columns-short	16		0.450	0.750		5.400
	Top of wall	1	27.200	0.300			8.160
	Total						**546.490**
						Total Quantity in sqm	**546.490**
15.016	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint (two or more coats) at all locations						
	Inside of walls-upper	4	6.500		2.800		72.800
	Top channels	1	30.800		1.650		50.820
	Hopper Bottom	4	4.750	2.500			47.500
	Clarifier Outside	4	7.100		2.8+2.5		150.520
	Columns-long	16		0.450	2.200		15.840
	Columns-short	16		0.450	0.750		5.400
	Top of wall	1	27.200	0.300			8.160
	Total						**351.040**
						Total Quantity in sqm	**351.040**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
15.017	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	Bottom slab inside	1	3.300	3.300			10.890
	Total						**10.890**
						Total Quantity in sqm	**10.890**
15.018	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures						
	Inside of walls-upper	4	6.500		2.800		72.800
	Inside of walls-lower	4	4.750		2.500		47.500
	Top channels	1	30.800	1.650			50.820
	Total						**171.120**
						Total Quantity in sqm	**171.120**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
15.019	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
		1	6.500	6.500	2.800		118.300
		1	4.750	4.750	2.500		56.406
	Total						**174.706**
						Total Quantity in Kilo litre	**174.706**
15.020	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		8					8.000
	Total						**8.000**
						Total Quantity in each	**8.000**
16	SLUDGE SUMP						
16.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Base slab	1	3.140	1.550*1.550	4.2+0.450		35.079
	Pile cap P1	4	1.400	1.400	1.150		9.016
	Grade Beam	1	4.290	0.650	0.850		2.370
	Base slab pcc	1	1.000		0.150		0.150
	Total						**46.615**
						Total Quantity in cum	**46.615**
16.002	4.1.5						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile cap P1	4	1.400	1.400	0.150		1.176
	Grade Beam	1	4.290	0.650	0.100		0.279
	Base slab pcc	1	1.000		0.150		0.150
	Total						**1.605**
						Total Quantity in cum	**1.605**
16.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work						
	Pile cap P1	4	1.100	1.100	1.000		4.840
	Grade Beam	1	4.290	0.450	0.750		1.448
	Base slab	1	3.140	1.550*1.550	0.450		3.395
	Total						**9.683**
						Total Quantity in cum	**9.683**
16.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	For tank wall	3.14	2.250	0.250	4.200		7.418

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Covering slab	3.14	1.250	1.250	0.150		0.736
	Deduction manhole	-1	0.455	0.610			-0.278
	Total						**7.876**
						Total Quantity in cum	**7.876**
16.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes at all floor levels						
	Qty vide item no-3	1	9.683				9.683
	Qty vide item no-4	1	7.876				7.876
	Total						**17.559**
						Total Quantity in cum	**17.559**
16.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.3	1	9.683		330.000		3195.390
	Quantity as per item No.4	1	7.876		330.000		2599.080
	Total						**5794.470**
						Total Quantity in kg	**5794.470**
16.007	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.3	1	9.683	120.000			1161.960
	Quantity as per item No.4	1	7.876	120.000			945.120
	Total						**2107.080**
						Total Quantity in kilogram	**2107.080**
16.008	OD235093/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing sulphate resistant cement						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Quantity as per item No.3	1	9.683	120.000			1161.960
	Quantity as per item No.4	1	7.876	120.000			945.120
	Total						**2107.080**
						Total Quantity in kg	**2107.080**
16.009	OD235094/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.3	1	9.683				9.683
	Quantity as per item No.4	1	7.876				7.876
	Total						**17.559**
						Total Quantity in cum	**17.559**
16.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Pile cap P1	16	1.100		1.000		17.600
	Grade Beam	2	4.290		0.750		6.435
	Base slab	1	2*3.14	1.550	0.450		4.380
	PCC	4	1.320		0.150		0.792
	Total						**29.207**
						Total Quantity in sqm	**29.207**
16.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering including strutting, etc. and removal of form for:						
	Inside of walls	1	3.14*2	1.000	4.200		26.376
	outside of walls	1	3.14*2.5		4.200		32.970
	Total						**59.346**
						Total Quantity in sqm	**59.346**
16.012	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						
	Cover slab	3.14	1.000	1.000			3.140
	Total						**3.140**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**3.140**
16.013	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Inside of walls	1	2*3.14	1.000	4.200		26.376
	outside of walls	1	2*3.14	1.250	4.200		32.970
	Base slabside	1	2*3.14	1.550	0.450		4.380
	Base salb offset	1	2*3.14	1.400	0.300		2.638
	Top of wall	1	2*3.14	1.125	0.250		1.766
	Base slabtop	1	3.140	1.000	1.000		3.140
	Top slab bottom	1	3.140	1.000	1.000		3.140
	Total						**74.410**
						Total Quantity in sqm	**74.410**
16.014	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	outside of walls	1	2*3.14	1.250	4.200		32.970
	Top of wall	1	2*3.140	1.125	0.250		1.766
	Total						**34.736**
						Total Quantity in sqm	**34.736**
16.015	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	Inside of walls	1	2*3.14	1.000	4.200		26.376

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**26.376**
						Total Quantity in sqm	**26.376**
16.016	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the						
	Base Slab top	3.14	1.000	1.000			3.140
	Total						**3.140**
						Total Quantity in sqm	**3.140**
16.017	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Tank	3.14	1.000	1.000	4.200		13.188
	Total						**13.188**
						Total Quantity in Kilo litre	**13.188**
16.018	100.41.34						
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame (low duty) charges including all cost, labour charges etc., complete.						
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
16.019	19.16						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		12					12.000
	Total						**12.000**
						Total Quantity in each	**12.000**
17	SLUDGE THICKNER						
17.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile cap P1	4	1.400	1.400	1.150		9.016
	Grade Beam	1	22.230	0.650	0.850		12.282
	Base Slab PCC	4	5.590		0.150		3.354
	Base Slab	1	3.140	3.45*3.45	0.450		16.818
	Total						**41.470**
						Total Quantity in cum	**41.470**
17.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile cap P1	4	1.400	1.400	0.150		1.176
	Grade Beam	1	22.230	0.650	0.100		1.445
	Base Slab PCC	4	5.590		0.150		3.354
	Total						**5.975**
						Total Quantity in cum	**5.975**
17.003	5.37.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Pile cap P1	4	1.100	1.100	1.000		4.840
	Grade Beam	1	22.230	0.450	0.750		7.503
	Base Slab	1	3.140	3.45*3.45	0.450		16.818
	Total						**29.161**
						Total Quantity in cum	**29.161**
17.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement						
	Wall	6.28	2.850	0.300	4.200		22.551
	Total						**22.551**
						Total Quantity in cum	**22.551**
17.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Qty Vide Item No: 3	1	29.161				29.161
	Qty Vide Item No: 4	1	22.551				22.551

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**51.712**
						Total Quantity in cum	**51.712**
17.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Qty Vide Item No: 3	1	29.161			340.000000	9914.740
	Qty Vide Item No: 4	1	22.551			340.000000	7667.340
	Total						**17582.080**
						Total Quantity in kg	**17582.080**
17.007	OD235097/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Qty Vide Item No: 3	1	29.161				29.161
	Qty Vide Item No: 4	1	22.551				22.551
	Total						**51.712**
						Total Quantity in cum	**51.712**
17.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Qty Vide Item No: 3@120km/m3	1	29.161	120.000			3499.320
	Qty Vide Item No: 4@120km/m3	1	22.551	120.000			2706.120
	Total						**6205.440**
						Total Quantity in kilogram	**6205.440**
17.009	OD235098/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Qty Vide Item No: 3@120km/m3	1	29.161	120.000			3499.320

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Qty Vide Item No: 4@120km/m3	1	22.551	120.000			2706.120
	Total						**6205.440**
						Total Quantity in kg	**6205.440**
17.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering including strutting						
	Pile cap P1	16	1.100		1.000		17.600
	Grade Beam	2	22.230		0.750		33.345
	Base Slab	1	2*3.140	3.450	0.450		9.750
	Total						**60.695**
						Total Quantity in sqm	**60.695**
17.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of walls	3.14	5.400		4.200		71.215
	Out side of walls	3.14	6.000		4.200		79.128
	Total						**150.343**
						Total Quantity in sqm	**150.343**
17.012	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Base Slab	1	3.140	6.900	0.450		9.750
	Base slab offset	3.14	6.450	0.450			9.114
	Inside of walls	3.14	5.400		4.200		71.215
	Out side of walls	3.14	6.000		4.200		79.128
	Top of wall	3.14	5.700	0.300			5.369
	Total						**174.576**
						Total Quantity in sqm	**174.576**
17.013	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	Out side of walls	3.14	6.000		4.200		79.128

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Top of wall	3.14	5.700	0.300			5.369
	Total						**84.497**
						Total Quantity in sqm	**84.497**
17.014	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Inside of walls	3.14	5.400		4.200		71.215
	Total						**71.215**
						Total Quantity in sqm	**71.215**
17.015	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Base Slab top	3.14	2.700	2.700			22.891
	Total						**22.891**
						Total Quantity in sqm	**22.891**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
17.016	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km						
	Tank	3.14	2.700	2.700	4.200		96.141
	Total						**96.141**
						Total Quantity in Kilo litre	**96.141**
17.017	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		12					12.000
	Total						**12.000**
						Total Quantity in each	**12.000**
18	FILTER FEED TANK						
18.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	filter feed tank	1	4.250	4.250	0.850		15.353
	Base slab	1	4.850	4.850	0.300		7.057
	Base slab PCC	1	14.780		0.150		2.217
	Pile cap P1	4	1.400	1.400	1.150		9.016
	Grade Beam	1	11.600	0.650	0.850		6.409
	Total						**40.052**
						Total Quantity in cum	**40.052**
18.002	4.1.5						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Base slab PCC	1	14.780		0.150		2.217
	Pile cap P1	4	1.400	1.400	0.150		1.176
	Grade Beam	1	11.600	0.650	0.100		0.754
	Total						**4.147**
						Total Quantity in cum	**4.147**
18.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Base slab	1	4.850	4.850	0.300		7.057
	Pile cap P1	4	1.100	1.100	1.000		4.840
	Grade Beam	1	11.600	0.450	0.750		3.915
	Total						**15.812**
						Total Quantity in cum	**15.812**
18.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	wall	1	16.000	3.850	0.250		15.400
	Total						**15.400**
						Total Quantity in cum	**15.400**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
18.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Qty Vide Item No:3	1	15.812				15.812
	Qty Vide Item No:4	1	15.400				15.400
	Total						**31.212**
						Total Quantity in cum	**31.212**
18.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.3	1	15.812		330.000		5217.960
	Quantity as per item No.4	1	15.400		330.000		5082.000
	Total						**10299.960**
						Total Quantity in kg	**10299.960**
18.007	OD235101/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Qty Vide Item No:3	1	15.812				15.812
	Qty Vide Item No:4	1	15.400				15.400
	Total						**31.212**
						Total Quantity in cum	**31.212**
18.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Qty Vide Item No:3	1	15.812	120.000			1897.440
	Qty Vide Item No:4	1	15.400	120.000			1848.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**3745.440**
						Total Quantity in kilogram	**3745.440**
18.009	OD235102/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Qty Vide Item No:3	1	15.812	120.000			1897.440
	Qty Vide Item No:4	1	15.400	120.000			1848.000
	Total						**3745.440**
						Total Quantity in kg	**3745.440**
18.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Base slab	4	4.850		0.300		5.820
	Pile cap P1	8	1.100		1.000		8.800
	Grade Beam	2	11.600		0.750		17.400
	Total						**32.020**
						Total Quantity in sqm	**32.020**
18.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	Inside of walls	4	3.750	3.850			57.750
	Out side of walls	4	4.250	3.850			65.450
	Total						**123.200**
						Total Quantity in sqm	**123.200**
18.012	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Inside of walls	4	3.750	3.850			57.750
	Out side of walls	4	4.250	3.850			65.450
	Base slab side	4	4.850		0.300		5.820
	Base slab offset	1	18.200	0.300			5.460
	Top of wall	1	16.000	0.250			4.000
	Total						**138.480**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**138.480**
18.013	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	Out side wall	4	4.250	3.850			65.450
	Top of wall	1	16.000	0.250			4.000
	Total						**69.450**
						Total Quantity in sqm	**69.450**
18.014	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tank						
	Wall Inside	4	3.750	3.850			57.750
	Total						**57.750**
						Total Quantity in sqm	**57.750**
18.015	22.23.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tan						
	Base Slab top	1	3.750	3.750			14.063
	Total						**14.063**
						Total Quantity in sqm	**14.063**
18.016	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Tank	1	3.750	3.750	3.850		54.141
	Total						**54.141**
						Total Quantity in Kilo litre	**54.141**
18.017	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		11					11.000
	Total						**11.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in each	**11.000**
19	PSF/ACF FOUNDATION						
19.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
		2	9.300	4.800	0.450		40.176
	Total						**40.176**
						Total Quantity in cum	**40.176**
19.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
		2	9.300	4.800	0.150		13.392
	Total						**13.392**
						Total Quantity in cum	**13.392**
19.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
		2	9.000	4.500	0.300		24.300
	Total						**24.300**
						Total Quantity in cum	**24.300**
19.004	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.3	1	24.300	120.000			2916.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**2916.000**
						Total Quantity in kilogram	**2916.000**
19.005	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
		4	9+4.5		0.300		16.200
	Total						**16.200**
						Total Quantity in sqm	**16.200**
20	CHLORIN CONTACT TANK						
20.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile Cap	4	1.400	1.400	1.150		9.016
	Grade Beam	1	16.800	0.650	0.850		9.282
	Total						**18.298**
						Total Quantity in cum	**18.298**
20.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile Cap	4	1.400	1.400	0.150		1.176
	Grade Beam	1	16.800	0.650	0.100		1.092
	Base slab	1	4.850	4.850	0.150		3.528
	Total						**5.796**
						Total Quantity in cum	**5.796**
20.003	5.37.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Pile Cap	4	1.100	1.100	1.000		4.840
	Grade Beam	1	16.800	0.450	0.750		5.670
	Base Slab	1	6.200	6.200	0.350		13.454
	column	4	0.450	0.450	0.300		0.243
	Base slab beam	1	21.200	0.450	0.650		6.201
	Total						**30.408**
						Total Quantity in cum	**30.408**
20.004	5.37.2						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Wall	1	21.200	0.300	3.350		21.306
	Total						**21.306**
						Total Quantity in cum	**21.306**
20.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.3	1	30.408				30.408

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Quantity as per item No.4	1	21.306				21.306
	Total						**51.714**
						Total Quantity in cum	**51.714**
20.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.3	1	30.408		330.000		10034.640
	Quantity as per item No.4	1	21.306		330.000		7030.980
	Total						**17065.620**
						Total Quantity in kg	**17065.620**
20.007	OD243546/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Quantity as per item No.3	1	30.408				30.408
	Quantity as per item No.4	1	21.306				21.306
	Total						**51.714**
						Total Quantity in cum	**51.714**
20.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.3	1	30.408	120.000			3648.960
	Quantity as per item No.4	1	21.306	120.000			2556.720
	Total						**6205.680**
						Total Quantity in kilogram	**6205.680**
20.009	OD246779/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.3	1	30.408	120.000			3648.960

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Quantity as per item No.4	1	21.306	120.000			2556.720
	Total						**6205.680**
						Total Quantity in kg	**6205.680**
20.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Pile Cap	16	1.100		1.000		17.600
	Grade Beam	2	16.800		0.750		25.200
	Total						**42.800**
						Total Quantity in sqm	**42.800**
20.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	c						
	Inside of walls	4	5.000		3.350		67.000
	Out side of walls	4	5.600		3.350		75.040
	Total						**142.040**
						Total Quantity in sqm	**142.040**
20.012	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						
	Base Slab side	4	6.200		0.350		8.680
	Base Slab offset	1	23.600	0.300			7.080
	Total						**15.760**
						Total Quantity in sqm	**15.760**
20.013	5.9.5						
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers						
	Centering and shuttering						
	Base slab beam side	2	21.200		0.650		27.560
	Base slab beam bottom	2	21.200		0.450		19.080
	Total						**46.640**
						Total Quantity in sqm	**46.640**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
20.014	5.9.6						
	Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts						
	Centering and shuttering						
	Base slab column	16		0.450	0.300		2.160
	Total						**2.160**
						Total Quantity in sqm	**2.160**
20.015	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Inside of walls	4	5.000		3.350		67.000
	Out side of walls	4	5.600		3.350		75.040
	Base Slab side	4	6.200		0.350		8.680
	Base slab offset	1	23.600	0.300			7.080
	Base slab beam	1	23.000		0.650		14.950
	beam bottom	1	23.000	0.450			10.350
	Base slab Column	16	0.450		0.300		2.160
	Top of wall	1	21.200	0.300			6.360
	Total						**191.620**
						Total Quantity in sqm	**191.620**
20.016	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	Inside of walls	4	5.000		3.350		67.000
	Out side of walls	4	5.600		3.350		75.040
	Base Slab	4	6.200		0.350		8.680
	Base slab beam	1	23.000		0.650		14.950
	Bottom	1	23.600	0.450			10.620
	Base slab Column	16	0.450		0.300		2.160
	Base slab offset	1	23.600	0.300			7.080
	Top of wall	1	21.200	0.300			6.360
	Total						**191.890**
						Total Quantity in sqm	**191.890**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
20.017	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Inside of walls	4	5.000		3.350		67.000
	Total						**67.000**
						Total Quantity in sqm	**67.000**
20.018	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC						
	Bottom Slab top	1	5.000	5.000			25.000
	Total						**25.000**
						Total Quantity in sqm	**25.000**
20.019	100.36.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Tank	1	5.000	5.000	3.350		83.750
	Total						**83.750**
						Total Quantity in Kilo litre	**83.750**
20.020	2.25						
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.						
	filling under base slab						
		1	4.850	4.850	0.950		22.346
	Total						**22.346**
						Total Quantity in cum	**22.346**
20.021	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		9					9.000
	Total						**9.000**
						Total Quantity in each	**9.000**
21	TREATED WATER TANK						
21.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Earth work in excavation by mechanical means						
	Pile Cap P1	8	1.400	1.400	1.150		18.032
	Pile Cap P1a	1	1.500	1.500	1.350		3.038
	Grade Beam	1	25.600	0.650	0.850		14.144

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Base Slab	1	7.400	7.400	0.350		19.166
	Base Slab Pcc	1	35.200		0.150		5.280
	Total						**59.660**
						Total Quantity in cum	**59.660**
21.002	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Pile Cap P1	8	1.400	1.400	0.150		2.352
	Pile Cap P1a	1	1.500	1.500	0.150		0.338
	Grade Beam	1	25.600	0.650	0.100		1.664
	Base Slab Pcc	1	35.200		0.150		5.280
	Total						**9.634**
						Total Quantity in cum	**9.634**
21.003	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Pile Cap P1	8	1.100	1.100	1.000		9.680
	Pile cap P1a	1	1.200	1.200	1.200		1.728
	Grade Beam	1	25.600	0.450	0.750		8.640
	Base Slab	1	7.400	7.400	0.350		19.166
	Total						**39.214**
						Total Quantity in cum	**39.214**
21.004	5.37.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Wall	1	26.000	4.500	0.300		35.100
	Total						**35.100**
						Total Quantity in cum	**35.100**
21.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.3	1	39.214				39.214
	Quantity as per item No.4	1	35.100				35.100
	Total						**74.314**
						Total Quantity in cum	**74.314**
21.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's						
	Quantity as per item No.3	1	39.214	330.000			12940.620
	Quantity as per item No.4	1	35.100	330.000			11583.000
	Total						**24523.620**
						Total Quantity in kg	**24523.620**
21.007	OD235081/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Quantity as per item No.3	1	39.214				39.214
	Quantity as per item No.4	1	35.100				35.100
	Total						**74.314**
						Total Quantity in cum	**74.314**
21.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.3	1	39.214	120.000			4705.680
	Quantity as per item No.4	1	35.100	120.000			4212.000
	Total						**8917.680**
						Total Quantity in kilogram	**8917.680**
21.009	OD235082/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.3	1	39.214	120.000			4705.680
	Quantity as per item No.4	1	35.100	120.000			4212.000
	Total						**8917.680**
						Total Quantity in kg	**8917.680**
21.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Pile Cap P1	32	1.100		1.000		35.200
	Pile Cap P1a	4	1.200		1.200		5.760
	Grade Beam	2	25.600		0.750		38.400
	Base Slab	4	7.400		0.350		10.360
	Total						**89.720**
						Total Quantity in sqm	**89.720**
21.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Centering and shuttering						
	Inside of walls	4	6.200		4.500		111.600
	Out side of walls	4	6.800		4.500		122.400
	Total						**234.000**
						Total Quantity in sqm	**234.000**
21.012	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished						
	Inside Wall	4	6.200		4.500		111.600
	Outside Wall	4	6.800		4.500		122.400
	Base Slab	4	7.400		0.350		10.360
	Base slab offset	1	28.400	0.300			8.520
	Top of wall	1	26.000	0.300			7.800
	Total						**260.680**
						Total Quantity in sqm	**260.680**
21.013	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	Out side wall	4	6.800		4.500		122.400
	Top of wall	1	26.000	0.300			7.800
	Total						**130.200**
						Total Quantity in sqm	**130.200**
21.014	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Inside of walls	4	6.200		4.500		111.600
	Total						**111.600**
						Total Quantity in sqm	**111.600**
21.015	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment						
	Base Slab top	1	6.200	6.200			38.440
	Total						**38.440**
						Total Quantity in sqm	**38.440**
21.016	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	Tank	1	6.200	6.200	4.500		172.980
	Total						**172.980**
						Total Quantity in Kilo litre	**172.980**
21.017	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
		13					13.000
	Total						**13.000**
						Total Quantity in each	**13.000**
22	PILE FOUNDATION						
22.001	20.2.3						
	Boring, providing and installing bored cast-in-situ reinforced cement concrete piles of grade M-25 of specified diameter and length below the pile cap to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring, with bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. all complete, including removal of excavated earth with all lifts and leads (Length of pile for payment shall be measured upto bottom of pile cap).450 mm dia piles						
	Boring, providing and installing bored cast-in-situ reinforced cement concrete piles						
	Equalisation tank	22	18.000				396.000
	MBBR-1	12	18.000				216.000
	MBBR-2	20	18.000				360.000
	MBBR-3	6	18.000				108.000
	Secondary Clarifier with Plate/Tube Settler	16	18.000				288.000
	Sludge sump	4	18.000				72.000
	Sludge thickener	4	18.000				72.000
	Chlorine contact tank	4	18.000				72.000
	Filter feed tank	4	18.000				72.000
	Treated water tank	8	18.000				144.000
	Total						**1800.000**
						Total Quantity in metre	**1800.000**
22.002	20.2.5						
	Boring, providing and installing bored cast-in-situ reinforced cement concrete piles of grade M-25 of specified diameter and length below the pile cap to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring, with bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. all complete, including removal of excavated earth with all lifts and leads (Length of pile for payment shall be measured upto bottom of pile cap).600 mm dia piles						
	Boring, providing and installing bored cast-in-situ reinforced cement concrete piles 600mm Día pile						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Equalisation tank	12	18.000				216.000
	MBBR -1	8	18.000				144.000
	MBBR -2	8	18.000				144.000
	MBBR -3	4	18.000				72.000
	MBBR -4	4	18.000				72.000
	Treated water tank	1	18.000				18.000
	Total						**666.000**
						Total Quantity in metre	**666.000**
22.003	20.6.1.1						
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Single pile upto 50 tonne capacityInitial test						
	Vertical load testing of piles in accordance with IS 2911(Part IV)						
	Vertical load testing of piles in accordance with IS 2911(Part IV)	2					2.000
	Total						**2.000**
						Total Quantity in per test	**2.000**
22.004	20.6.2.1						
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Single pile above 50 tonne and upto 100 tonne capacityInitial test						
	Vertical load testing of piles in accordance with IS 2911(Part IV)						
	Vertical load testing of piles in accordance with IS 2911(Part IV)	2					2.000
	Total						**2.000**
						Total Quantity in per test	**2.000**
22.005	20.6.2.2						
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Single pile above 50 tonne and upto 100 tonne capacityRoutine test						
	Vertical load testing of piles in accordance with IS 2911(Part IV)						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Vertical load testing of piles in accordance with IS 2911(Part IV)	5					5.000
	Total						**5.000**
						Total Quantity in per test	**5.000**
22.006	OD246261/2022-2023						
	Extra over charges for core cutting of 30cm depth in the rock strata while doing the piling works						
	Extra over charges for core cutting of 30cm depth						
	450 mm dia pile	100			0.300		30.000
	600 mm dia pile	37			0.300		11.100
	Total						**41.100**
						Total Quantity in metre	**41.100**
22.007	OD252171/2022-2023						
	Epoxy coated steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level. Thermo Mechanically Treated bars of grade Fe-500D or more (5.22.6+OD 16)						
	Epoxy coated steel reinforcement for R.C.C						
	450 mm dia Pile	100	3.140	.225*.225	18.000	125.000000	35766.563
	600 mm dia Pile	37	3.140	.3*.3	18.000	125.000000	23526.450
	Total						**59293.013**
						Total Quantity in kg	**59293.013**
23	ADMINISTRATIVE/LABORATORY/CHEMICAL HOUSE / CONTROL ROOM BUILDING						
23.001	OD251949/2022-2023						
	Administrative / Laboratory / Chemical House / Control Room Building						
	Administrative / Laboratory / Chemical House / Control Room Building						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
24	SECURITY CABIN						
24.001	OD251957/2022-2023						
	Security Cabin						
	Security Cabin						
		1					1.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**1.000**
						Total Quantity in no	**1.000**
25	AIR BLOWER ROOM AND CONTROL PANEL ROOM						
25.001	OD251962/2022-2023						
	Air Blower room and control panel room						
	Air Blower room and control panel room						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
26	CHLORINATION BUILDING						
26.001	OD251969/2022-2023						
	Chlorination Building						
	Chlorination Building						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
27	COMPOUND WALL						
27.001	2.8.1						
	Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil						
	Earth work in excavation by mechanical means						
		1	275.000	0.700	0.400		77.000
	Total						**77.000**
						Total Quantity in cum	**77.000**
27.002	4.1.8						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)						
	Providing and laying in position cement concrete						
		1	275.000	0.700	0.200		38.500
	Total						**38.500**
						Total Quantity in cum	**38.500**
27.003	5.37.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete						
	Strip Footing	1	275.000	0.600	0.200		33.000
	Strip Beam	1	275.000	0.250	0.300		20.625
	Total						**53.625**
						Total Quantity in cum	**53.625**
27.004	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.3	1	53.625		100.000		5362.500
	Total						**5362.500**
						Total Quantity in kilogram	**5362.500**
27.005	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering						
	Strip Footing	2	275.000		0.200		110.000
	Strip Beam	2	275.000		0.300		165.000
	Total						**275.000**
						Total Quantity in sqm	**275.000**
27.006	50.6.7.2						
	Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for super structure above plinth level up to floor two level including all cost of materials, labour charges etc.						
	Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size						
	Wall	1	238.200	0.200	2.500		119.100
	Column	92	0.400	0.400	2.500		36.800
	Total						**155.900**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in cum	**155.900**
27.007	10.25.2						
	Item Shifted to Sub head 14 as item 14.73 Item Shifted to head 14 as item 14.74 Steel work welded in built up sections/framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works						
	Item Shifted to Sub head 14 as item 14.73 Item Shifted to head 14 as item 14.74						
	Gate	1	5.000	2.400	40.000		480.000
	Total						**480.000**
						Total Quantity in kg	**480.000**
27.008	13.83.2						
	Wall painting with premium acrylic emulsion paint of interior grade, having VOC (Volatile including applying additional coats wherever required to achieve even shade and colour.Two coats						
	Wall painting with premium acrylic emulsion paint of interior grade, having						
	Gate	1	5.000	2.400			12.000
	Total						**12.000**
						Total Quantity in sqm	**12.000**
27.009	13.1.1						
	12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)						
	12 mm cement plaster finished						
	Wall	2	238.200		2.500		1191.000
	column	276	0.400		2.500		276.000
	Wall top	1	238.200		0.200		47.640
	column top	92	0.400	0.400			14.720
	Total						**1529.360**
						Total Quantity in sqm	**1529.360**
27.010	13.48.1						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Two or more coats applied on walls @ 1.25 ltr/10 sqm over and including one coat of special primer applied @ 0.75 ltr /10 sqm						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:						
	Wall	2	238.200		2.500		1191.000
	column	276	0.400		2.500		276.000
	Wall top	1	238.200		0.200		47.640
	column top	92	0.400	0.400			14.720
	Total						**1529.360**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**1529.360**
28	INTERNAL ROADS						
28.001	16.91.2						
	Providing and laying factory made chamfered edge Cement Concrete paver blocks in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength, thickness & size/ shape, made by table vibratory method using PU mould, laid in required colour & pattern over 50mm thick compacted bed of sand, compacting and proper embedding/laying of inter locking paver blocks into the sand bedding layer through vibratory compaction by using plate vibrator, filling the joints with sand and cutting of paver blocks as per required size and pattern, finishing and sweeping extra sand. complete all as per direction of Engineer-in-Charge.80 mm thick C.C. paver block of M-30 grade with approved color design and pattern.						
	Providing and laying factory made chamfered edge Cement Concrete paver blocks						
	5m wide road	1	270.000	5.000			1350.000
	Total						**1350.000**
						Total Quantity in sqm	**1350.000**
28.002	16.59.1						
	Manufacturing, supplying and fixing retro reflective sign boards made up of 2 mm thick aluminium sheet, face to be fully covered with high intensity encapsulated type heat activated retro reflective sheeting conforming to type - IV of ASTM-D 4956-01 in blue and silver white or other colour combination including subject matter, message (bi-lingual), symbols and borders etc. as per IRC: 67- 2001, pasted on substrate by an adhesive backing which shall be activated by applying heat and pressure conforming to class-2 of ASTM-D-4956-01 and fixing the same with suitable sized aluminium alloy rivets @ 20 cm c/c to back support frame of M.S. angle iron of size 25x25x3 mm along with theft resistant measures, mounted and fixed with 2 Nos M.S. angles of size 35x35x5 mm to a vertical post made up to M.S. Tee section ISMT 50x50x6 mm welded with base plate of size 100x100x 5 mm at the bottom end and including making holes in pipes, angles flats, providing & fixing M.S. message plate of required size, steel work to be painted with two or more coats of synthetic enamel paint of required shade and of approved brand & manufacture over priming coat of zinc chromate yellow primer (vertical MS-Tee support to be painted in black and white colours). Backside of aluminium sheet to be painted with two or more coats of epoxy paint over and including appropriate priming coat including all leads and lifts etc. complete as per drawing , specification and direction of Engineer-in-Charge.Mandatory / Regulatory sign boards of 900 mm diametre with support length of 3750 mm						
	Manufacturing, supplying and fixing retro reflective sign boards						
		2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
28.003	16.59.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Manufacturing, supplying and fixing retro reflective sign boards made up of 2 mm thick aluminium sheet, face to be fully covered with high intensity encapsulated type heat activated retro reflective sheeting conforming to type - IV of ASTM-D 4956-01 in blue and silver white or other colour combination including subject matter, message (bi-lingual), symbols and borders etc. as per IRC: 67- 2001, pasted on substrate by an adhesive backing which shall be activated by applying heat and pressure conforming to class-2 of ASTM-D-4956-01 and fixing the same with suitable sized aluminium alloy rivets @ 20 cm c/c to back support frame of M.S. angle iron of size 25x25x3 mm along with theft resistant measures, mounted and fixed with 2 Nos M.S. angles of size 35x35x5 mm to a vertical post made up to M.S. Tee section ISMT 50x50x6 mm welded with base plate of size 100x100x 5 mm at the bottom end and including making holes in pipes, angles flats, providing & fixing M.S. message plate of required size, steel work to be painted with two or more coats of synthetic enamel paint of required shade and of approved brand & manufacture over priming coat of zinc chromate yellow primer (vertical MS-Tee support to be painted in black and white colours). Backside of aluminium sheet to be painted with two or more coats of epoxy paint over and including appropriate priming coat including all leads and lifts etc. complete as per drawing , specification and direction of Engineer-in-Charge.Cautionary / warning sign boards of equilateral triangular shape having each side of 900 mm with support length of 3650 mm						
	Manufacturing, supplying and fixing retro reflective sign boards						
		2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
28.004	16.63						
	Providing, laying and making kerb channel 30 cm wide and 50 mm thick with cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) over 75 mm bed of dry brick ballast 40 mm nominal size, well rammed and consolidated and grouted with fine sand, including finishing the top smooth etc. complete and as per direction Engineer - in-Charge.						
	Providing, laying and making kerb channel 30 cm wide and 50 mm thick with cement concrete 1:3:6						
	5m wide road	2	270.000	0.300			162.000
	Total						**162.000**
						Total Quantity in sqm	**162.000**
28.005	16.69						
	Providing and laying at or near ground level factory made kerb stone of M-25 grade cement concrete in position to the required line, level and curvature jointed with cement mortar 1:3 (1 cement : 3 coarse sand) , including making joints with or without grooves (thickness of joints except at sharp curve shall not to more than 5 mm), including making drainage opening wherever required complete etc. as per direction of Engineer-in-charge (length of finished kerb edging shall be measured for payment). (Precast C.C. kerb stone shall be approved by Engineer-in-Charge)						
	Providing and laying at or near ground level factory made kerb stone						
	5m wide road	2	270.000	0.200	0.300		32.400
	Total						**32.400**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in cum	**32.400**
29	STORM WATER DRAINS						
29.001	2.8.1						
	Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil						
	Earth work in excavation by mechanical means						
	Drainage	1	250.000	0.800	0.600		120.000
	Total						**120.000**
						Total Quantity in cum	**120.000**
29.002	4.1.8						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)						
	Providing and laying in position cement concrete						
	Draina Base	1	250.000	0.800	0.100		20.000
	Total						**20.000**
						Total Quantity in cum	**20.000**
29.003	4.1.5						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Side wall	2	250.000	0.150	0.500		37.500
	Total						**37.500**
						Total Quantity in cum	**37.500**
29.004	4.1.3						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand (zone-III) : 4 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	Wearing coat	1	250.000	0.500	0.050		6.250
	Total						**6.250**
						Total Quantity in cum	**6.250**
29.005	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	wall	4	250.000		0.500		500.000
	Total						**500.000**
						Total Quantity in sqm	**500.000**
30	TRANSFORMER BUILDING						
30.001	OD251973/2022-2023						
	Transformer Building						
	Transformer Building						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
31	DG ROOM						
31.001	OD251974/2022-2023						
	DG Room						
	DG Room						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
32	CENTRIFUGE BUILDING						
32.001	OD251983/2022-2023						
	Centrifuge Building						
	Centrifuge Building						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
33	SLUDGE SHED						
33.001	OD251991/2022-2023						
	Sludge Shed						
	Sludge Shed						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
34	LANDSCAPING AND GREEN BELT FORMATION						
34.001	OD252102/2022-2023						
	Landscaping and green belt formation						
	Landscaping and green belt formation						
		1					1.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**1.000**
						Total Quantity in no	**1.000**
35	PROVISION FOR PROVIDING AUTOMATED SYSTEM TO THE ENTIRE PLANT BY SCADA						
35.001	OD252007/2022-2023						
	Provision for providing automated system to the entire plant by SCADA						
	Provision for providing automated system to the entire plant by SCADA						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
36	STAIR & WALK WAY						
36.001	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	MANNUAL COARSE SCREEN CHANNEL						
	Walk way	2	3.300	1.000			6.600
	side	2	3.300		0.100		0.660
	Total						**7.260**
	MANNUAL FINE SCREEN CHANNEL						
	Walk way	2	3.300	1.000	0.100		0.660
	side	2	3.300		0.100		0.660
	Total						**1.320**
	OIL & GREASE TRAP						
	Walk way	2	5.100	1.000			10.200
	side	2	5.100	0.100			1.020
	Total						**11.220**
	MBBR 1						
	Walk way	1	37.500	1.000			37.500
	side	1	37.500	0.100			3.750
	Total						**41.250**
	SECONDARY CLARIFIER						
	Walk way	1	24.300	1.000			24.300
	side	1	24.300	0.100			2.430
	Total						**26.730**
	Channel						
	Walk way	2	4.000	1.000			8.000
	side	2	4.000	0.100			0.800

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**8.800**
	GRIT SEPERATOR						
	Walk way	1	13.250	1.000			13.250
	Walk way side	1	13.250	0.100			1.325
	Total						**14.575**
	MBBR 3						
	Walk way	1	37.400	1.000			37.400
	side	1	37.400	0.100			3.740
	MBBR 2 - MBBR 3	1	2.000	2.000			4.000
	side	2	2.000	0.100			0.400
	Total						**45.540**
	EQUALIZATION TANK						
	Walk way	1	49.050	1.000			49.050
	side	1	49.050	0.100			4.905
	Total						**53.955**
	RECEIVING CHAMBER						
	Walk way	1	19.800	1.000			19.800
	walk way side	1	19.800	0.100			1.980
	Total						**21.780**
	MBBR 2						
	Walk way	1	55.400	1.000			55.400
	side	1	55.400	0.100			5.540
	MBBR 1 - MBBR 2	1	2.000	2.000			4.000
	side	2	2.000	0.100			0.400
	Total						**65.340**
	SLUDGE THICKNER						
	Walk way	1	15.000	1.000			15.000
	side	1	15.000	0.100			1.500
	Total						**16.500**
	MBBR 4						
	Walk way	1	19.200	1.000			19.200
	side	1	19.200	0.100			1.920
	MBBR 3 - MBBR 4	1	2.000	2.000			4.000
	side	2	2.000	0.100			0.400
	Total						**25.520**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	CHLORINE CONTACT TANK						
	Walk way	1	19.800	1.000			19.800
	side	1	19.800	0.100			1.980
	Total						**21.780**
	TREATED WATER TANK						
	Walk way	1	23.400	1.000			23.400
	side	1	23.400	0.100			2.340
	CCT - TWT	1	2.000	2.000			4.000
	side	2	2.000	0.100			0.400
	Total						**30.140**
	FILTER FEED TANK						
	Walk way	1	15.750	1.000			15.750
	side	1	15.750	0.100			1.575
	Total						**17.325**
						Total Quantity in sqm	**409.035**
36.002	5.9.5						
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers						
	Channel						
	Cantilever beams	12	1.000	0.250			3.000
	side	4	0.250	0.250			0.250
	Total						**3.250**
	MANNUAL COARSE SCREEN CHANNEL						
	Cantilever beams	12	1.000	0.250			3.000
	side	4	0.250	0.250			0.250
	Total						**3.250**
	RECEIVING CHAMBER						
	Cantilever beams	24	1.000	0.250			6.000
	side	8		0.250	0.250		0.500
	Total						**6.500**
	MANNUAL FINE SCREEN CHANNEL						
	Cantilever beams	12	1.000	0.250			3.000
	side	4	0.250	0.250			0.250
	Total						**3.250**
	OIL & GREASE TRAP						
	Cantilever beams	12	1.000	0.250			3.000
	side	4	0.250	0.250			0.250

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**3.250**
	GRIT SEPERATOR						
	Cantilever beams	24	1.000	0.250			6.000
	side	8	0.250	0.250			0.500
	Total						**6.500**
	EQUALIZATION TANK						
	Cantilever beams	24	1.000	0.250			6.000
	side	8	0.250	0.250			0.500
	Total						**6.500**
	MBBR 1						
	Cantilever beams	24	1.000	0.250			6.000
	side	8	0.250	0.250			0.500
	Total						**6.500**
	SECONDARY CLARIFIER						
	Cantilever beams	24	1.000	0.250			6.000
	side	8	0.250	0.250			0.500
	Total						**6.500**
	MBBR 4						
	Cantilever beams	24	1.000		0.250		6.000
	Cantilever beams	8	0.250		0.250		0.500
	Total						**6.500**
	TREATED WATER TANK						
	Cantilever beams	24	1.000		0.250		6.000
	side	8	0.250		0.250		0.500
	Total						**6.500**
	FILTER FEED TANK						
	Cantilever beams	24	1.000	0.250			6.000
	side	8	0.250	0.250			0.500
	Total						**6.500**
	SLUDGE THICKNER						
	Cantilever beams	24	1.000		0.250		6.000
	side	8	0.250	0.250			0.500
	Total						**6.500**
	CHLORINE CONTACT TANK						
	Cantilever beams	24	1.000		0.250		6.000
	side	8	0.250	0.250			0.500
	Total						**6.500**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**78.000**
36.003	5.9.7						
	Centering and shuttering including strutting, etc. and removal of form for:Stairs, (excluding landings) except spiral - staircases)						
	SLUDGE THICKNER						
	Stair-step	29		.5*.3*.15			0.653
	side	29	1.000	0.450			13.050
	Stair-Waist	1	9.250	1.000			9.250
	side	1	9.250		0.120		1.110
	Stair-landing	1	1.000	1.000			1.000
	side	1	1.000	0.120			0.120
	Total						**25.183**
	RECEIVING CHAMBER						
	Stair-step	23	1.000	0.450			10.350
	side	23	.5*.3*.15				0.518
	Stair-Waist	1	7.300	1.000	0.120		0.876
	side	1	7.300	0.120			0.876
	Stair-landing	1	1.000	1.000	0.120		0.120
	side	1	1.000	0.120			0.120
	Total						**12.860**
	MBBR 1						
	Stair-step	39		.5*.3*.15			0.878
	Stair-Waist	39	1.000	0.450			17.550
	Stair-Waist	1	12.750	1.000			12.750
	side	1	12.750	0.120			1.530
	Stair-landing	2	1.000	1.000			2.000
	side	2	1.000	0.100			0.200
	Total						**34.908**
	EQUALIZATION TANK						
	Stair-step	12	1.000	0.450			5.400
	side	12	.5*.3*.15				0.270
	Stair-Waist	1	3.700	1.000			3.700
	side	1	3.750	0.120			0.450
	Stair-landing	1	1.000	1.000	0.120		0.120
	side	1	1.000	0.120			0.120
	Total						**10.060**
	MBBR 4						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Stair-step side	34		.5*.3*.15			0.765
	Stair-Waist	34	1.000	0.450			15.300
	Stair-Waist	1	10.700	1.000			10.700
	side	1	10.700	0.120			1.284
	Stair-landing	2	1.000	1.000			2.000
	side	2	1.000	0.120			0.240
	Total						**30.289**
	SECONDARY CLARIFIER						
	Stair-step	31		.5*.3*.15			0.698
	Stair-Waist	31	0.450	1.000			13.950
	Stair-Waist	1	10.050	1.000			10.050
	side	1	10.050	0.120			1.206
	Stair-landing	1	1.000	1.000			1.000
	side	1	10.050	0.120			1.206
	Total						**28.110**
	FILTER FEED TANK						
	Stair-step	20		.5*.3*.15			0.450
	side	2	1.000	0.450			0.900
	Stair-Waist	1	6.370	1.000			6.370
	side	1	6.370	0.120			0.764
	Stair-landing	1	1.000	1.000			1.000
	side	1	1.000	0.120			0.120
	Total						**9.604**
	TREATED WATER TANK						
	Stair-step	30		.5*.3*.15			0.675
	side	30	0.450	1.000			13.500
	Stair-Waist	1	9.750	1.000			9.750
	side	1	9.750	0.120	0.120		0.140
	Stair-landing	1	1.000	1.000			1.000
	side	1	1.000	0.120			0.120
	Total						**25.185**
	CHLORINE CONTACT TANK						
	Stair-step	31		.5*.3*.15			0.698
	side	31	1.000	0.450	0.120		1.674
	Stair-Waist	1	10.050	1.000			10.050
	side	1	10.050		0.120		1.206
	Stair-landing	1	1.000	1.000			1.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	side	1	1.000	0.120			0.120
	Total						**14.748**
						Total Quantity in sqm	**190.947**
36.004	5.37.2 Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	TREATED WATER TANK						
	Walk way	1	23.400	1.000	0.100		2.340
	Cantilever beams	8	1.000	0.250	0.250		0.500
	Stair-step	30	1.000	.5*.3*.15			0.675
	Stair-Waist	1	9.750	1.000	0.120		1.170
	Stair-landing	1	1.000	1.000	0.120		0.120
	CCT - TWT	1	2.000	2.000	0.100		0.400
	Total						**5.205**
	SECONDARY CLARIFIER						
	Walk way	1	24.300	1.000	0.100		2.430
	Cantilever beams	8	1.000	0.250	0.250		0.500
	Stair-step	31	1.000	.5*.3*.15			0.698
	Stair-Waist	1	10.050	1.000	0.120		1.206
	Stair-landing	1	1.000	1.000	0.120		0.120
	Total						**4.954**
	Channel						
	Walk way	2	4.000	1.000	0.100		0.800
	Cantilever beams	4	1.000	0.250	0.250		0.250
	Total						**1.050**
	EQUALIZATION TANK						
	Walk way	1	49.050	1.000	0.100		4.905
	Cantilever beams	8	1.000	0.250	0.250		0.500
	Stair-step	12	1.000	.5*.3*.15			0.270
	Stair-Waist	1	3.700	1.000	0.120		0.444

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Stair-landing	1	1.000	1.000	0.120		0.120
	Total						**6.239**
	SLUDGE THICKNER						
	Walk way	1	15.000	1.000	0.100		1.500
	Cantilever beams	8	1.000	0.250	0.250		0.500
	Stair-step	29	1.000	.5*.3*.15			0.653
	Stair-Waist	1	9.250	1.000	0.120		1.110
	Stair-landing	1	1.000	1.000	0.120		0.120
	Total						**3.883**
	CHLORINE CONTACT TANK						
	Walk way	1	19.800	1.000	0.100		1.980
	Cantilever beams	8	1.000	0.250	0.250		0.500
	Stair-step	31	1.000	.5*.3*.15			0.698
	Stair-Waist	1	10.050	1.000	0.120		1.206
	Stair-landing	1	1.000	1.000	0.120		0.120
	Total						**4.504**
	GRIT SEPERATOR						
	Walk way	1	13.250	1.000	0.100		1.325
	Cantilever beams	8	1.000	0.250	0.250		0.500
	Total						**1.825**
	RECEIVING CHAMBER						
	Walk way	1	19.800	1.000	0.100		1.980
	Cantilever beams	8	1.000	0.250	0.250		0.500
	Stair-step	23	1.000	.5*.3*.15			0.518
	Stair-Waist	1	7.300	1.000	0.120		0.876
	Stair-landing	1	1.000	1.000	0.120		0.120
	Total						**3.994**
	OIL & GREASE TRAP						
	Walk way	2	5.100	1.000	0.100		1.020
	Cantilever beams	4	1.000	0.250	0.250		0.250
	Total						**1.270**
	MANNUAL COARSE SCREEN CHANNEL						
	Walk way	2	3.300	1.000	0.100		0.660
	Cantilever beams	4	1.000	0.250	0.250		0.250
	Total						**0.910**
	MANNUAL FINE SCREEN CHANNEL						
	Walk way	2	3.300	1.000	0.100		0.660

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Cantilever beams	4	1.000	0.250	0.250		0.250
	Total						**0.910**
	MBBR 4						
	Walk way	1	19.200	1.000	0.100		1.920
	MBBR 3 - MBBR 4	1	2.000	2.000	0.100		0.400
	Cantilever beams	8	1.000	0.250	0.250		0.500
	Stair-step	34	1.000	.5*.3*.15			0.765
	Stair-Waist	1	10.700	1.000	0.120		1.284
	Stair-landing	2	1.000	1.000	0.120		0.240
	Total						**5.109**
	MBBR 1						
	Walk way	1	37.500	1.000	0.100		3.750
	Cantilever beams	8	1.000	0.250	0.250		0.500
	Stair-step	39	1.000	.5*.3*.15			0.878
	Stair-Waist	1	12.750	1.000	0.120		1.530
	Stair-landing	2	1.000	1.000	0.120		0.240
	Total						**6.898**
	MBBR 2						
	Walk way	1	55.400	1.000	0.100		5.540
	MBBR 1 - MBBR 2	1	2.000	2.000	0.100		0.400
	Total						**5.940**
	MBBR 3						
	Walk way	1	37.400	1.000	0.100		3.740
	MBBR 2 - MBBR 3	1	2.000	2.000	0.100		0.400
	Total						**4.140**
	FILTER FEED TANK						
	Walk way	1	15.750	1.000	0.100		1.575
	Cantilever beams	8	1.000	0.250	0.250		0.500
	Stair-step	20	1.000	.5*.3*.15			0.450
	Stair-Waist	1	6.370	1.000	0.120		0.764
	Stair-landing	1	1.000	1.000	0.120		0.120
	Total						**3.409**
						Total Quantity in cum	**60.240**
36.005	5.22.6						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.4	1	60.240	120.000			7228.800
	Total						**7228.800**
						Total Quantity in kilogram	**7228.800**
36.006	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.4	1	60.240				60.240
	Total						**60.240**
						Total Quantity in cum	**60.240**
36.007	OD254074/2022-2023						
	Extra for providing epoxy coating for reinforcement bars.						
	Extra for providing epoxy coating for reinforcement bars.						
	Quantity as per item No.4	1	60.240	120.000			7228.800
	Total						**7228.800**
						Total Quantity in kg	**7228.800**
36.008	OD254073/2022-2023						
	Extra for providing sulphate resistant cement for the structures above plinth level.						
	Extra for providing sulphate resistant cement						
	Quantity as per item No.4	1	60.240				60.240
	Total						**60.240**
						Total Quantity in cum	**60.240**
36.009	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.4	1	60.240	330.000			19879.200
	Total						**19879.200**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in kg	**19879.200**
36.010	13.52.2						
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work						
	Finishing with Epoxy paint						
	Quantity as per item No.10	1	677.982				677.982
	Total						**677.982**
						Total Quantity in sqm	**677.982**
36.011	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	RECEIVING CHAMBER						
	Walk way	1	19.800	1.000			19.800
	walk way side	1	19.800	0.100			1.980
	Cantilever beams	24	1.000	0.250			6.000
	side	8		0.250	0.250		0.500
	Stair-step	23	1.000	0.450			10.350
	side	23	.5*.3*.15				0.518
	Stair-Waist	1	7.300	1.000	0.120		0.876
	side	1	7.300	0.120			0.876
	Stair-landing	1	1.000	1.000	0.120		0.120
	side	1	1.000	0.120			0.120
	Total						**41.140**
	SLUDGE THICKNER						
	Walk way	1	15.000	1.000			15.000
	side	1	15.000	0.100			1.500
	Cantilever beams	24	1.000		0.250		6.000
	side	8	0.250	0.250			0.500
	Stair-step	29		.5*.3*.15			0.653
	side	29	1.000	0.450			13.050
	Stair-Waist	1	9.250	1.000			9.250
	side	1	9.250		0.120		1.110
	Stair-landing	1	1.000	1.000			1.000
	side	1	1.000	0.120			0.120
	Total						**48.183**
	TREATED WATER TANK						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Walk way	1	23.400	1.000			23.400
	side	1	23.400	0.100			2.340
	Cantilever beams	24	1.000		0.250		6.000
	side	8	0.250		0.250		0.500
	Stair-step	30		.5*.3*.15			0.675
	side	30	0.450	1.000			13.500
	Stair-Waist	1	9.750	1.000			9.750
	side	1	9.750	0.120	0.120		0.140
	Stair-landing	1	1.000	1.000			1.000
	side	1	1.000	0.120			0.120
	CCT - TWT	1	2.000	2.000			4.000
	side	2	2.000	0.100			0.400
	Total						**61.825**
	SECONDARY CLARIFIER						
	Walk way	1	24.300	1.000			24.300
	side	1	24.300	0.100			2.430
	Cantilever beams	24	1.000	0.250			6.000
	side	8	0.250	0.250			0.500
	Stair-step	31		.5*.3*.15			0.698
	Stair-Waist	31	0.450	1.000			13.950
	Stair-Waist	1	10.050	1.000			10.050
	side	1	10.050	0.120			1.206
	Stair-landing	1	1.000	1.000			1.000
	side	1	10.050	0.120			1.206
	Total						**61.340**
	OIL & GREASE TRAP						
	Walk way	2	5.100	1.000			10.200
	side	2	5.100	0.100			1.020
	Cantilever beams	12	1.000	0.250			3.000
	side	4	0.250	0.250			0.250
	Total						**14.470**
	MBBR 4						
	Walk way	1	19.200	1.000			19.200
	side	1	19.200	0.100			1.920
	MBBR 3 - MBBR 4	1	2.000	2.000			4.000
	side	2	2.000	0.100			0.400
	Cantilever beams	24	1.000		0.250		6.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Cantilever beams	8	0.250		0.250		0.500
	Stair-step side	34		.5*.3*.15			0.765
	Stair-Waist	34	1.000	0.450			15.300
	Stair-Waist	1	10.700	1.000			10.700
	side	1	10.700	0.120			1.284
	Stair-landing	2	1.000	1.000			2.000
	side	2	1.000	0.120			0.240
	Total						**62.309**
	MBBR 2						
	Walk way	1	55.400	1.000			55.400
	side	1	55.400	0.100			5.540
	MBBR 1 - MBBR 2	1	2.000	2.000			4.000
	side	2	2.000	0.100			0.400
	Total						**65.340**
	EQUALIZATION TANK						
	Walk way	1	49.050	1.000			49.050
	side	1	49.050	0.100			4.905
	Cantilever beams	24	1.000	0.250			6.000
	side	8	0.250	0.250			0.500
	Stair-step	12	1.000	0.450			5.400
	side	12	.5*.3*.15				0.270
	Stair-Waist	1	3.700	1.000			3.700
	side	1	3.750	0.120			0.450
	Stair-landing	1	1.000	1.000	0.120		0.120
	side	1	1.000	0.120			0.120
	Total						**70.515**
	MBBR 3						
	Walk way	1	37.400	1.000			37.400
	side	1	37.400	0.100			3.740
	MBBR 2 - MBBR 3	1	2.000	2.000			4.000
	side	2	2.000	0.100			0.400
	Total						**45.540**
	FILTER FEED TANK						
	Walk way	1	15.750	1.000			15.750
	side	1	15.750	0.100			1.575
	Cantilever beams	24	1.000	0.250			6.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	side	8	0.250	0.250			0.500
	Stair-step	20		.5*.3*.15			0.450
	side	2	1.000	0.450			0.900
	Stair-Waist	1	6.370	1.000			6.370
	side	1	6.370	0.120			0.764
	Stair-landing	1	1.000	1.000			1.000
	side	1	1.000	0.120			0.120
	Total						**33.429**
	MBBR 1						
	Walk way	1	37.500	1.000			37.500
	side	1	37.500	0.100			3.750
	Cantilever beams	24	1.000	0.250			6.000
	side	8	0.250	0.250			0.500
	Stair-step	39		.5*.3*.15			0.878
	Stair-Waist	39	1.000	0.450			17.550
	Stair-Waist	1	12.750	1.000			12.750
	side	1	12.750	0.120			1.530
	Stair-landing	2	1.000	1.000			2.000
	side	2	1.000	0.100			0.200
	Total						**82.658**
	GRIT SEPERATOR						
	Walk way	1	13.250	1.000			13.250
	Walk way side	1	13.250	0.100			1.325
	Cantilever beams	24	1.000	0.250			6.000
	side	8	0.250	0.250			0.500
	Total						**21.075**
	MANNUAL COARSE SCREEN CHANNEL						
	Walk way	2	3.300	1.000			6.600
	side	2	3.300		0.100		0.660
	Cantilever beams	12	1.000	0.250			3.000
	side	4	0.250	0.250			0.250
	Total						**10.510**
	MANNUAL FINE SCREEN CHANNEL						
	Walk way	2	3.300	1.000	0.100		0.660
	side	2	3.300		0.100		0.660
	Cantilever beams	12	1.000	0.250			3.000
	side	4	0.250	0.250			0.250

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**4.570**
	Channel						
	Walk way	2	4.000	1.000			8.000
	side	2	4.000	0.100			0.800
	Cantilever beams	12	1.000	0.250			3.000
	side	4	0.250	0.250			0.250
	Total						**12.050**
	CHLORINE CONTACT TANK						
	Walk way	1	19.800	1.000			19.800
	side	1	19.800	0.100			1.980
	Cantilever beams	24	1.000		0.250		6.000
	side	8	0.250	0.250			0.500
	Stair-step	31		.5*.3*.15			0.698
	side	31	1.000	0.450	0.120		1.674
	Stair-Waist	1	10.050	1.000			10.050
	side	1	10.050		0.120		1.206
	Stair-landing	1	1.000	1.000			1.000
	side	1	1.000	0.120			0.120
	Total						**43.028**
						Total Quantity in sqm	**677.982**
36.012	50.10.1						
	Steel work in built up G I tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting,fixing in position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete						
	Steel work in built up G I tubular (round, square or rectangular hollow tubes etc.)						
	RECEIVING CHAMBER	1	45.000			10.000000	450.000
	MANNUAL COARSE SCREEN CHANNEL	2	3.300			10.000000	66.000
	MANNUAL FINE SCREEN CHANNEL	2	3.300			10.000000	66.000
	OIL & GREASE TRAP	2	5.100			10.000000	102.000
	Channel	2	4.000			10.000000	80.000
	GRIT SEPERATOR	1	13.250			10.000000	132.500

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	EQUALIZATION TANK	1	62.000			10.000000	620.000
	MBBR 1	1	79.000			10.000000	790.000
	MBBR 2	1	60.000			10.000000	600.000
	MBBR 3	1	42.000			10.000000	420.000
	MBBR 4	1	58.000			10.000000	580.000
	SECONDARY CLARIFIER	1	57.000			10.000000	570.000
	FILTER FEED TANK	1	38.000			10.000000	380.000
	CHLORINE CONTACT TANK	1	52.000			10.000000	520.000
	TREATED WATER TANK	1	60.000			10.000000	600.000
	SLUDGE THICKNER	1	45.000			10.000000	450.000
	Total						**6426.500**
						Total Quantity in kg	**6426.500**

DRAFT
PRICE
e-PLATFORM FOR THE KERALA SCHEDULE OF PUBLIC WORKS

ABSTRACT ESTIMATE

Others-SEWERAGE SCHEME TO HARBOUR AREA IN PONNANI MUNICIPALITY-CONSTRUCTION OF 3.5 MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE NETWORK - SEWAGE TREATMENT PLANT-Sewerage Work

Sl No	Specification	Quantity	Rate	Amount
1	**SOIL INVESTIGATION**			
1.001	56.17.1			
	Providing access to the site,clearing site and making good to erecting and conducting soil testing transfers within the site and for any other temporary arrangements to be erected within the area in connection with conducting soil testing.			
	Net Total	400.000sqm	@29.85/sqm	11940.00
1.002	56.1.a			
	Mobilization including transportation of all necessary plant and equipment's and materials of boring, field testing and sampling and demobilization after completing the work - For machine boring			
	Net Total	1.000set	@15798.00/set	15798.00
1.003	56.2.a			
	Setting up boring at each bore hole locations including carrying all necessary plant, equipment and materials of boring and field tests and collection of samples at each bore hole location - For machine boring.			
	Net Total	4.000Bore Holes	@3000.00/Bore Holes	12000.00
1.004	56.3.a.1			
	Boring with rotary power drilling equipment's in - all types of soil having N value less than 50 excluding hard rock, soft rock or medium rock for strata upto 10m including conducting necessary S.P.T and recovery of undisturbed soil samples at 5m intervals - For ordinary soil.			
	Net Total	40.000metre	@923.00/metre	36920.00
1.005	56.3.b.1			
	Boring with rotary power drilling equipment's in - all types of soil having N value less than 50 excluding hard rock, soft rock or medium rock for strata next 10m and upto a depth of 20m including conducting necessary S.P.T and recovery of undisturbed soil samples at 5m intervals - For ordinary soil.			
	Net Total	40.000metre	@1025.00/metre	41000.00
1.006	56.3.c.1			
	Boring with rotary power drilling equipment's in - all types of soil having N value less than 50 excluding hard rock, soft rock or medium rock for strata next 10m and upto a depth of 30m including conducting necessary S.P.T and recovery of undisturbed soil samples at 5m intervals - For ordinary soil.			
	Net Total	40.000metre	@1050.00/metre	42000.00

Sl No	Specification	Quantity	Rate	Amount
1.007	56.3.d.1			
	Boring with rotary power drilling equipment's in - all types of soil having N value less than 50 excluding hard rock, soft rock or medium rock for strata above 30m depth including conducting necessary S.P.T and recovery of undisturbed soil samples at 5m intervals - For ordinary soil.			
	Net Total	40.000metre	@1100.00/metre	44000.00
1.008	56.5.a			
	Boring through all classes of rock excluding hard rocks having N value greater than 50 using tungsten carbide drilling bit - In land			
	Net Total	4.000metre	@2401.00/metre	9604.00
1.009	56.6			
	Recovering undisturbed soil samples using thin tube sampler of 75mm.to 100mm length internal dia 500mm length conforming to relevant IS Code at any required depth including clearing the bore hole etc complete.			
	Net Total	54.000each	@518.00/each	27972.00
1.010	56.7			
	Conducting standard penetration test in bore hole at any depth.			
	Net Total	106.000each	@203.00/each	21518.00
1.011	56.8			
	Recovering disturbed samples and preserving the same in air tight sample containers including waxing labelling packing storing including cost of containers as per IS Code.			
	Net Total	106.000each	@63.00/each	6678.00
1.012	56.11.a			
	Compilation of all field data with recommendation for a suitable foundation after conducting necessary lab test (report in triplicate) - Machine boring for 5 bore holes.			
	Net Total	1.000set	@10000.00/set	10000.00
			Heading Total(Rs)	279430.00
2	**SITE PREPERATION**			
2.001	2.32			
	Clearing grass and removal of the rubbish up to a distance of 50 m outside the periphery of the area cleared.			
	Net Total	4855.200sqm	@7.57/sqm	36753.86
2.002	2.33.3			
	Felling trees of the girth (measured at a height of 1 m above ground level) including cutting of trunks and branches, removing the roots and stacking of serviceable material and disposal of unserviceable material.Beyond 120 cm girth up to and including 240 cm girth			
	Net Total	5.000each	@9310.60/each	46553.00
2.003	50.2.26.1			

Sl No	Specification	Quantity	Rate	Amount
	Filling with contractor own earth (excluding rock) in open areas in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m as per direction of site Engineer-in-charge.			
	Net Total	4855.200cum	@297.36/cum	1443742.27
			Heading Total(Rs)	1527049.13
3	**COLLECTION WELL AT STP**			
3.001	100.3.6.1			
	Earthwork in open well excavation (above water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift up to 1.5m including neat banking.			
	Net Total	48.230cum	@1196.44/cum	57704.30
3.002	100.3.6.2			
	Earthwork in open well excavation (above water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 1.50m to 3.0m including neat banking.			
	Net Total	48.230cum	@1316.09/cum	63475.02
3.003	100.3.6.13			
	Earthwork in open well excavation (in or under water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.50m including neat banking.			
	Net Total	48.230cum	@1722.86/cum	83093.54
3.004	100.3.6.14			
	Earthwork in open well excavation (in or under water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.0m including neat banking.			
	Net Total	48.230cum	@1866.44/cum	90018.40
3.005	100.3.6.15			
	Earthwork in open well excavation (in or under water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 6.0m to 7.50m including neat banking.			
	Net Total	48.230cum	@2009.99/cum	96941.82
3.006	100.3.6.16			
	Earthwork in open well excavation (in or under water) for wells of diameter above 3.5m and up to 6.0m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 7.50m to 9.0m including neat banking.			
	Net Total	35.369cum	@2153.58/cum	76169.97
3.007	100.6.1			
	Providing steel sheet shoring to the sides of the trenches to depths of above 4.00 m but not exceeding 6.00m using 6 mm M.S. sheet 0.50 M wide stiffen on edges with 50 mm x 50mm x 6 mm M.S. angles driving down vertically on either side one after another in lines and levels with suitable pile driving equipments and accessories to a			

Sl No	Specification	Quantity	Rate	Amount
	maximum depth of 0.50 M below the bottom of the proposed excavation 0.5 M above ground level suitably braced by horizontal walling pieces at 75 x 150 mm x 8 mm angles on either side at intervals not exceeding 1.50M and horizontal screw jack type struts at 1.50M intervals and maintaining the shoring till the pipes are laid and works are completed, dismantling, cleaning and restacking for reuse including all labour, hire charges and conveyance for equipments, tools and plants and sundries etc. complete.			
	Net Total	482.304sqm	@753.79/sqm	363555.93
3.008	100.6.S.1			
	Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete. (excluding cost of materials)			
	Net Total	144.691kilogram	@25.38/kilogram	3672.26
3.009	100.7.1			
	Bailing out water with 5HP engine and pump set including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	149.200Kwh	@37.17/Kwh	5545.76
3.010	100.7.4			
	Bailing out water with engine and pump set above 20HP up to 30HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	447.600Kwh	@6.19/Kwh	2770.64
3.011	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	4.823cum	@7256.34/cum	34997.33
3.012	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	70.343cum	@9947.98/cum	699770.76
3.013	5.22.1			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing			

Sl No	Specification	Quantity	Rate	Amount
	in position and binding all complete upto plinth levelMild steel and Medium Tensile steel bars			
	Net Total	8441.160kg	@97.25/kg	820902.81
3.014	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	70.343cum	@82.60/cum	5810.33
3.015	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	23213.190kg	@1.35/kg	31337.81
3.016	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	232.187sqm	@721.70/sqm	167569.36
3.017	5.9.20			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform with water proof ply 12 mm thick			
	Net Total	23.464sqm	@923.03/sqm	21657.98
3.018	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	100.480sqm	@573.84/sqm	57659.44
3.019	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts			

Sl No	Specification	Quantity	Rate	Amount
	integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	12.560sqm	@442.30/sqm	5555.29
3.020	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	259.592sqm	@403.74/sqm	104807.67
3.021	13.65.1			
	Painting with black anti- corrosive bitumastic paint of approved brand and manufacture to give an even shade:Two or more coats on new work			
	Net Total	259.592sqm	@125.61/sqm	32607.35
3.022	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	100.480Kilo litre	@185.72/Kilo litre	18661.15
3.023	100.41.34			
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame (low duty) charges including all cost, labour charges etc., complete.			
	Net Total	1.000no	@2815.71/no	2815.71
3.024	2.25			
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.			
	Net Total	425.784cum	@260.18/cum	110780.48
3.025	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having			

Sl No	Specification	Quantity	Rate	Amount
	manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	25.000each	@548.45/each	13711.25
			Heading Total(Rs)	2971592.36
4	**DILUTION TANK AND RECIEVING CHAMBER - CTU**			
4.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	170.064cum	@215.37/cum	36626.68
4.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	10.356cum	@7413.74/cum	76776.69
4.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	39.948cum	@9947.98/cum	397401.91
4.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	40.150cum	@11610.44/cum	466159.17

Sl No	Specification	Quantity	Rate	Amount
4.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	80.098cum	@82.60/cum	6616.09
4.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	26432.340kg	@1.35/kg	35683.66
4.007	OD244668/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	80.098cum	@1899.46/cum	152142.95
4.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	9611.760kilogram	@98.92/kilogram	950795.30
4.009	OD246798/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	9611.760kg	@2.32/kg	22299.28
4.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	78.830sqm	@337.42/sqm	26598.82
4.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	216.750sqm	@721.70/sqm	156428.48
4.012	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	52.225sqm	@820.86/sqm	42869.41
4.013	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	260.580sqm	@403.74/sqm	105206.57
4.014	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied			

Sl No	Specification	Quantity	Rate	Amount
	as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	115.625sqm	@224.33/sqm	25938.16
4.015	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	117.525sqm	@573.84/sqm	67440.55
4.016	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	44.930sqm	@442.30/sqm	19872.54
4.017	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	132.540Kilo litre	@185.72/Kilo litre	24615.33

Sl No	Specification	Quantity	Rate	Amount
4.018	100.41.34			
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame (low duty) charges including all cost, labour charges etc., complete.			
	Net Total	2.000no	@2815.71/no	5631.42
4.019	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	16.000each	@548.45/each	8775.20
			Heading Total(Rs)	2627878.21
5	**RECEIVING CHEMBER**			
5.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	18.298cum	@215.37/cum	3940.84
5.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	2.268cum	@7413.74/cum	16814.36
5.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	32.578cum	@9947.98/cum	324085.29
5.004	5.37.2			

Sl No	Specification	Quantity	Rate	Amount
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	19.080cum	@11610.44/cum	221527.20
5.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	51.658cum	@82.60/cum	4266.95
5.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	17047.140kg	@1.35/kg	23013.64
5.007	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	6198.960kilogram	@98.92/kilogram	613201.12
5.008	OD235090/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	51.658cum	@1899.46/cum	98122.30
5.009	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	42.800sqm	@337.42/sqm	14441.58
5.010	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	127.200sqm	@721.70/sqm	91800.24
5.011	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	42.940sqm	@820.86/sqm	35247.73
5.012	5.9.5			
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers			
	Net Total	21.200sqm	@653.88/sqm	13862.26
5.013	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	166.180sqm	@403.74/sqm	67093.51
5.014	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	85.060sqm	@224.33/sqm	19081.51
5.015	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	60.000sqm	@573.84/sqm	34430.40
5.016	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the			

Sl No	Specification	Quantity	Rate	Amount
	engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	25.000sqm	@442.30/sqm	11057.50
5.017	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	75.000Kilo litre	@185.72/Kilo litre	13929.00
5.018	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	8.000each	@548.45/each	4387.60
			Heading Total(Rs)	1610303.03
6	**MANNUAL COARSE SCREEN CHANNEL**			
6.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	5.254cum	@215.37/cum	1131.55
6.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	0.676cum	@7413.74/cum	5011.69
6.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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			

Sl No	Specification	Quantity	Rate	Amount
	workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	2.876cum	@9947.98/cum	28610.39
6.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	9.118cum	@11610.44/cum	105863.99
6.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	11.994cum	@82.60/cum	990.70
6.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	3958.020kg	@1.35/kg	5343.33
6.007	OD244264/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	11.994cum	@1899.46/cum	22782.12
6.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	1439.280kilo gram	@98.92/kilogram	142373.58
6.009	OD246784/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	11.994kg	@2.32/kg	27.83
6.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form			

Sl No	Specification	Quantity	Rate	Amount
	for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	10.825sqm	@337.42/sqm	3652.57
6.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	34.500sqm	@721.70/sqm	24898.65
6.012	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	11.200sqm	@820.86/sqm	9193.63
6.013	5.9.5			
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers			
	Net Total	10.680sqm	@653.88/sqm	6983.44
6.014	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	57.975sqm	@403.74/sqm	23406.83
6.015	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	57.975sqm	@224.33/sqm	13005.53
6.016	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	15.000sqm	@573.84/sqm	8607.60
6.017	22.23.2			

Sl No	Specification	Quantity	Rate	Amount
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	5.600sqm	@442.30/sqm	2476.88
			Heading Total(Rs)	404360.31
7	**MANNUAL FINE SCREEN CHANNEL**			
7.001	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	5.610cum	@11610.44/cum	65134.57
7.002	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	5.610cum	@82.60/cum	463.39
7.003	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	1851.300kg	@1.35/kg	2499.26
7.004	OD244422/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	5.610cum	@1899.46/cum	10655.97
7.005	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	673.200kilogram	@98.92/kilogram	66592.94
7.006	OD246785/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	5.610kg	@2.32/kg	13.02
7.007	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	37.200sqm	@721.70/sqm	26847.24
7.008	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	6.200sqm	@820.86/sqm	5089.33
7.009	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	55.800sqm	@403.74/sqm	22528.69
7.010	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	55.800sqm	@224.33/sqm	12517.61
7.011	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any			

Sl No	Specification	Quantity	Rate	Amount
	leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	18.600sqm	@573.84/sqm	10673.42
7.012	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	6.200sqm	@442.30/sqm	2742.26
			Heading Total(Rs)	225757.70
8	**OIL & GREASE TRAP**			
8.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	37.785cum	@215.37/cum	8137.76
8.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	5.052cum	@7413.74/cum	37454.21
8.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto			

Sl No	Specification	Quantity	Rate	Amount
	plinth level			
	Net Total	15.261cum	@9947.98/cum	151816.12
8.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	15.214cum	@11610.44/cum	176641.23
8.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	30.475cum	@82.60/cum	2517.24
8.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	10056.750kg	@1.35/kg	13576.61
8.007	OD244458/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	30.475cum	@1899.46/cum	57886.04
8.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	3657.000kilo gram	@98.92/kilogram	361750.44
8.009	OD246788/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	3657.000kg	@2.32/kg	8484.24
8.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	40.660sqm	@337.42/sqm	13719.50

Sl No	Specification	Quantity	Rate	Amount
8.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	104.575sqm	@721.70/sqm	75471.78
8.012	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	119.070sqm	@403.74/sqm	48073.32
8.013	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	64.160sqm	@224.33/sqm	14393.01
8.014	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	45.500sqm	@573.84/sqm	26109.72
8.015	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the			

Sl No	Specification	Quantity	Rate	Amount
	engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	12.250sqm	@442.30/sqm	5418.18
8.016	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	39.813Kilo litre	@185.72/Kilo litre	7394.07
8.017	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	9.000each	@548.45/each	4936.05
			Heading Total(Rs)	1013779.52
9	**GRIT SEPARATOR**			
9.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	49.309cum	@215.37/cum	10619.68
9.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	4.961cum	@7413.74/cum	36779.56
9.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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			

Sl No	Specification	Quantity	Rate	Amount
	workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	14.636cum	@9947.98/cum	145598.64
9.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	24.297cum	@11610.44/cum	282098.86
9.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	38.933cum	@82.60/cum	3215.87
9.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	12847.890kg	@1.35/kg	17344.65
9.007	OD244602/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	38.933cum	@1899.46/cum	73951.68
9.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	4671.960kilo gram	@98.92/kilogram	462150.28
9.009	OD246796/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	4671.960kg	@2.32/kg	10838.95
9.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form			

Sl No	Specification	Quantity	Rate	Amount
	for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	37.790sqm	@337.42/sqm	12751.10
9.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	119.580sqm	@721.70/sqm	86300.89
9.012	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	12.000sqm	@820.86/sqm	9850.32
9.013	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	155.800sqm	@403.74/sqm	62902.69
9.014	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	90.190sqm	@224.33/sqm	20232.32
9.015	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	55.530sqm	@573.84/sqm	31865.34
9.016	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts			

Sl No	Specification	Quantity	Rate	Amount
	integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	17.923sqm	@442.30/sqm	7927.34
9.017	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	35.225Kilo litre	@185.72/Kilo litre	6541.99
9.018	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	10.000each	@548.45/each	5484.50
			Heading Total(Rs)	1286454.66
10	**EQUALISATION TANK**			
10.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	1124.321cum	@215.37/cum	242145.01
10.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	58.097cum	@7413.74/cum	430716.05
10.003	5.37.1			

Sl No	Specification	Quantity	Rate	Amount
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	198.049cum	@9947.98/cum	1970187.49
10.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	91.179cum	@11610.44/cum	1058628.31
10.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	289.228cum	@82.60/cum	23890.23
10.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	95445.240kg	@1.35/kg	128851.07
10.007	OD235084/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	289.228cum	@1899.46/cum	549377.02
10.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	34707.360kil	@98.92/kilogram	3433252.05

Sl No	Specification	Quantity	Rate	Amount
		ogram		
10.009	OD235085/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	34707.360kg	@2.32/kg	80521.08
10.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	317.510sqm	@337.42/sqm	107134.22
10.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	595.980sqm	@721.70/sqm	430118.77
10.012	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	671.730sqm	@403.74/sqm	271204.27
10.013	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	110.160sqm	@224.33/sqm	24712.19
10.014	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	292.050sqm	@573.84/sqm	167589.97
10.015	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts			

Sl No	Specification	Quantity	Rate	Amount
	integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	217.563sqm	@442.30/sqm	96228.11
10.016	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	1076.934Kilo litre	@185.72/Kilo litre	200008.18
10.017	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	14.000each	@548.45/each	7678.30
			Heading Total(Rs)	9222242.32
11	**MBBR 1**			
11.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	81.166cum	@215.37/cum	17480.72
11.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	27.044cum	@7413.74/cum	200497.18

Sl No	Specification	Quantity	Rate	Amount
11.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	115.270cum	@9947.98/cum	1146703.65
11.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	67.200cum	@11610.44/cum	780221.57
11.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	182.470cum	@82.60/cum	15072.02
11.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	60215.100kg	@1.35/kg	81290.39
11.007	OD243745/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	182.470cum	@1899.46/cum	346594.47
11.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	21896.400kilogram	@98.92/kilogram	2165991.89
11.009	OD246773/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	21896.400kg	@2.32/kg	50799.65
11.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	176.470sqm	@337.42/sqm	59544.51
11.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	448.000sqm	@721.70/sqm	323321.60
11.012	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	43.348sqm	@820.86/sqm	35582.64
11.013	5.9.5			
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers			
	Net Total	49.280sqm	@653.88/sqm	32223.21
11.014	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	508.260sqm	@403.74/sqm	205204.89
11.015	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	290.260sqm	@224.33/sqm	65114.03
11.016	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The			

Sl No	Specification	Quantity	Rate	Amount
	crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	218.000sqm	@573.84/sqm	125097.12
11.017	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	118.810sqm	@442.30/sqm	52549.66
11.018	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	594.050Kilo litre	@185.72/Kilo litre	110326.97
11.019	2.25			
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.			
	Net Total	63.559cum	@260.18/cum	16536.78
11.020	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including			

Sl No	Specification	Quantity	Rate	Amount
	fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	14.000each	@548.45/each	7678.30
			Heading Total(Rs)	5837831.25
12	**MBBR 2**			
12.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	97.414cum	@215.37/cum	20980.05
12.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	33.605cum	@7413.74/cum	249138.73
12.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	151.425cum	@9947.98/cum	1506372.87
12.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	74.700cum	@11610.44/cum	867299.87
12.005	5.34.1			

Sl No	Specification	Quantity	Rate	Amount
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	226.125cum	@82.60/cum	18677.93
12.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	74621.250kg	@1.35/kg	100738.69
12.007	OD235099/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	226.125cum	@1899.46/cum	429515.39
12.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	27135.000kilogram	@98.92/kilogram	2684194.20
12.009	OD235100/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	27135.000kg	@2.32/kg	62953.20
12.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	194.820sqm	@337.42/sqm	65736.16
12.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	500.000sqm	@721.70/sqm	360850.00
12.012	5.9.5			
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers			
	Net Total	7.770sqm	@653.88/sqm	5080.65
12.013	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	583.560sqm	@403.74/sqm	235606.51
12.014	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	107.613sqm	@224.33/sqm	24140.82

Sl No	Specification	Quantity	Rate	Amount
12.015	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	243.000sqm	@573.84/sqm	139443.12
12.016	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	147.623sqm	@442.30/sqm	65293.65
12.017	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	738.113Kilo litre	@185.72/Kilo litre	137082.35
12.018	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on			

Sl No	Specification	Quantity	Rate	Amount
	top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	14.000each	@548.45/each	7678.30
			Heading Total(Rs)	6980782.49
13	**MBBR 3**			
13.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	57.655cum	@215.37/cum	12417.16
13.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	14.670cum	@7413.74/cum	108759.57
13.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	57.350cum	@9947.98/cum	570516.65
13.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above			

Sl No	Specification	Quantity	Rate	Amount
	plinth level upto floor V level			
	Net Total	66.156cum	@11610.44/cum	768100.27
13.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	123.506cum	@82.60/cum	10201.60
13.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	40756.980kg	@1.35/kg	55021.92
13.007	OD243859/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	123.506cum	@1899.46/cum	234594.71
13.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	14820.720kilogram	@98.92/kilogram	1466065.62
13.009	OD246775/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	14820.720kg	@2.32/kg	34384.07
13.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	110.700sqm	@337.42/sqm	37352.39
13.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	338.100sqm	@721.70/sqm	244006.77
13.012	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	66.743sqm	@820.86/sqm	54786.66
13.013	5.9.5			
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers			
	Net Total	9.185sqm	@653.88/sqm	6005.89

Sl No	Specification	Quantity	Rate	Amount
13.014	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	521.909sqm	@403.74/sqm	210715.54
13.015	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	359.159sqm	@224.33/sqm	80570.14
13.016	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	162.750sqm	@573.84/sqm	93392.46
13.017	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	60.063sqm	@442.30/sqm	26565.86

Sl No	Specification	Quantity	Rate	Amount
13.018	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	315.328Kilo litre	@185.72/Kilo litre	58562.72
13.019	100.41.34			
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame (low duty) charges including all cost, labour charges etc., complete.			
	Net Total	2.000no	@2815.71/no	5631.42
13.020	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	15.000each	@548.45/each	8226.75
			Heading Total(Rs)	4085878.17
14	**MBBR 4**			
14.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	36.015cum	@215.37/cum	7756.55
14.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	8.898cum	@7413.74/cum	65967.46
14.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended			

Sl No	Specification	Quantity	Rate	Amount
	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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	26.069cum	@9947.98/cum	259333.89
14.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	30.600cum	@11610.44/cum	355279.46
14.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	56.669cum	@82.60/cum	4680.86
14.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	18700.770kg	@1.35/kg	25246.04
14.007	OD235088/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	56.669cum	@1899.46/cum	107640.50
14.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	6800.280kilogram	@98.92/kilogram	672683.70
14.009	OD235089/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	6800.280kg	@2.32/kg	15776.65
14.010	5.9.1			

Sl No	Specification	Quantity	Rate	Amount
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	55.260sqm	@337.42/sqm	18645.83
14.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	204.000sqm	@721.70/sqm	147226.80
14.012	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	229.470sqm	@403.74/sqm	92646.22
14.013	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	114.120sqm	@224.33/sqm	25600.54
14.014	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	96.000sqm	@573.84/sqm	55088.64
14.015	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline			

Sl No	Specification	Quantity	Rate	Amount
	slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	23.040sqm	@442.30/sqm	10190.59
14.016	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	115.200Kilo litre	@185.72/Kilo litre	21394.94
14.017	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	14.000each	@548.45/each	7678.30
			Heading Total(Rs)	1892836.97
15	**SECONDARY CLARIFIER WITH PLATE SETTLER**			
15.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	176.277cum	@215.37/cum	37964.78
15.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	11.689cum	@7413.74/cum	86659.21
15.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering			

Sl No	Specification	Quantity	Rate	Amount
	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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	60.413cum	@9947.98/cum	600987.32
15.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	50.540cum	@11610.44/cum	586791.64
15.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	110.953cum	@82.60/cum	9164.72
15.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	37724.020kg	@1.35/kg	50927.43
15.007	OD235095/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	110.953cum	@1899.46/cum	210750.79
15.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	13314.360kilogram	@98.92/kilogram	1317056.49
15.009	OD235096/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	13314.360kg	@2.32/kg	30889.32
15.010	5.9.1			

Sl No	Specification	Quantity	Rate	Amount
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	14.940sqm	@337.42/sqm	5041.05
15.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	253.960sqm	@721.70/sqm	183282.93
15.012	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	47.500sqm	@820.86/sqm	38990.85
15.013	5.9.5			
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers			
	Net Total	13.680sqm	@653.88/sqm	8945.08
15.014	5.9.6			
	Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts			
	Net Total	21.240sqm	@869.03/sqm	18458.20
15.015	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	546.490sqm	@403.74/sqm	220639.87
15.016	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	351.040sqm	@224.33/sqm	78748.80
15.017	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-			

Sl No	Specification	Quantity	Rate	Amount
	charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	10.890sqm	@442.30/sqm	4816.65
15.018	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	171.120sqm	@573.84/sqm	98195.50
15.019	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	174.706Kilo litre	@185.72/Kilo litre	32446.40
15.020	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	8.000each	@548.45/each	4387.60
			Heading Total(Rs)	3625144.63
16	**SLUDGE SUMP**			
16.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed			

Sl No	Specification	Quantity	Rate	Amount
	earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	46.615cum	@215.37/cum	10039.47
16.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	1.605cum	@7413.74/cum	11899.05
16.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	9.683cum	@9947.98/cum	96326.29
16.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	7.876cum	@11610.44/cum	91443.83
16.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	17.559cum	@82.60/cum	1450.37
16.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	5794.470kg	@1.35/kg	7822.53

Sl No	Specification	Quantity	Rate	Amount
16.007	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	2107.080kilogram	@98.92/kilogram	208432.35
16.008	OD235093/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	2107.080kg	@2.32/kg	4888.43
16.009	OD235094/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	17.559cum	@1899.46/cum	33352.62
16.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	29.207sqm	@337.42/sqm	9855.03
16.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	59.346sqm	@721.70/sqm	42830.01
16.012	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	3.140sqm	@820.86/sqm	2577.50
16.013	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	74.410sqm	@403.74/sqm	30042.29
16.014	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	34.736sqm	@224.33/sqm	7792.33
16.015	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material			

Sl No	Specification	Quantity	Rate	Amount
	shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	26.376sqm	@573.84/sqm	15135.60
16.016	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	3.140sqm	@442.30/sqm	1388.82
16.017	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	13.188Kilo litre	@185.72/Kilo litre	2449.28
16.018	100.41.34			
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame (low duty) charges including all cost, labour charges etc., complete.			
	Net Total	1.000no	@2815.71/no	2815.71
16.019	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having			

Sl No	Specification	Quantity	Rate	Amount
	manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	12.000each	@548.45/each	6581.40
			Heading Total(Rs)	587122.91
17	**SLUDGE THICKNER**			
17.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	41.470cum	@215.37/cum	8931.39
17.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	5.975cum	@7413.74/cum	44297.10
17.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	29.161cum	@9947.98/cum	290093.04
17.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	22.551cum	@11610.44/cum	261827.03

Sl No	Specification	Quantity	Rate	Amount
17.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	51.712cum	@82.60/cum	4271.41
17.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	17582.080kg	@1.35/kg	23735.81
17.007	OD235097/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	51.712cum	@1899.46/cum	98224.88
17.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	6205.440kilogram	@98.92/kilogram	613842.12
17.009	OD235098/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	6205.440kg	@2.32/kg	14396.62
17.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	60.695sqm	@337.42/sqm	20479.71
17.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	150.343sqm	@721.70/sqm	108502.54
17.012	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	174.576sqm	@403.74/sqm	70483.31
17.013	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	84.497sqm	@224.33/sqm	18955.21
17.014	22.23.1			

Sl No	Specification	Quantity	Rate	Amount
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	71.215sqm	@573.84/sqm	40866.02
17.015	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	22.891sqm	@442.30/sqm	10124.69
17.016	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	96.141Kilo litre	@185.72/Kilo litre	17855.31
17.017	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with			

Sl No	Specification	Quantity	Rate	Amount
	stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	12.000each	@548.45/each	6581.40
			Heading Total(Rs)	1653467.59
18	**FILTER FEED TANK**			
18.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	40.052cum	@215.37/cum	8626.00
18.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	4.147cum	@7413.74/cum	30744.78
18.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	15.812cum	@9947.98/cum	157297.46
18.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	15.400cum	@11610.44/cum	178800.78

Sl No	Specification	Quantity	Rate	Amount
18.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	31.212cum	@82.60/cum	2578.11
18.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	10299.960kg	@1.35/kg	13904.95
18.007	OD235101/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	31.212cum	@1899.46/cum	59285.95
18.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	3745.440kilogram	@98.92/kilogram	370498.92
18.009	OD235102/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	3745.440kg	@2.32/kg	8689.42
18.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	32.020sqm	@337.42/sqm	10804.19
18.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	123.200sqm	@721.70/sqm	88913.44
18.012	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	138.480sqm	@403.74/sqm	55909.92
18.013	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	69.450sqm	@224.33/sqm	15579.72
18.014	22.23.1			

Sl No	Specification	Quantity	Rate	Amount
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	57.750sqm	@573.84/sqm	33139.26
18.015	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	14.063sqm	@442.30/sqm	6220.06
18.016	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	54.141Kilo litre	@185.72/Kilo litre	10055.07
18.017	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with			

Sl No	Specification	Quantity	Rate	Amount
	stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	11.000each	@548.45/each	6032.95
			Heading Total(Rs)	1057080.98
19	**PSF/ACF FOUNDATION**			
19.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	40.176cum	@215.37/cum	8652.71
19.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	13.392cum	@7413.74/cum	99284.81
19.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	24.300cum	@9947.98/cum	241735.91
19.004	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	2916.000kilogram	@98.92/kilogram	288450.72
19.005	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	16.200sqm	@337.42/sqm	5466.20
			Heading Total(Rs)	643590.35

Sl No	Specification	Quantity	Rate	Amount
20	**CHLORIN CONTACT TANK**			
20.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	18.298cum	@215.37/cum	3940.84
20.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	5.796cum	@7413.74/cum	42970.04
20.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	30.408cum	@9947.98/cum	302498.18
20.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	21.306cum	@11610.44/cum	247372.03
20.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	51.714cum	@82.60/cum	4271.58

Sl No	Specification	Quantity	Rate	Amount
20.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	17065.620kg	@1.35/kg	23038.59
20.007	OD243546/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	51.714cum	@1899.46/cum	98228.67
20.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	6205.680kilogram	@98.92/kilogram	613865.87
20.009	OD246779/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	6205.680kg	@2.32/kg	14397.18
20.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	42.800sqm	@337.42/sqm	14441.58
20.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	142.040sqm	@721.70/sqm	102510.27
20.012	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	15.760sqm	@820.86/sqm	12936.75
20.013	5.9.5			
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers			
	Net Total	46.640sqm	@653.88/sqm	30496.96
20.014	5.9.6			
	Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts			
	Net Total	2.160sqm	@869.03/sqm	1877.10
20.015	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	191.620sqm	@403.74/sqm	77364.66

Sl No	Specification	Quantity	Rate	Amount
20.016	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	191.890sqm	@224.33/sqm	43046.68
20.017	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	67.000sqm	@573.84/sqm	38447.28
20.018	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	25.000sqm	@442.30/sqm	11057.50
20.019	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	83.750Kilo litre	@185.72/Kilo litre	15554.05
20.020	2.25			
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.			
	Net Total	22.346cum	@260.18/cum	5813.98
20.021	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	9.000each	@548.45/each	4936.05
			Heading Total(Rs)	1709065.84
21	**TREATED WATER TANK**			
21.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	59.660cum	@215.37/cum	12848.97
21.002	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	9.634cum	@7413.74/cum	71423.97
21.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	39.214cum	@9947.98/cum	390100.09
21.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	35.100cum	@11610.44/cum	407526.44
21.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	74.314cum	@82.60/cum	6138.34
21.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	24523.620kg	@1.35/kg	33106.89
21.007	OD235081/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	74.314cum	@1899.46/cum	141156.47
21.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	8917.680kilogram	@98.92/kilogram	882136.91
21.009	OD235082/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	8917.680kg	@2.32/kg	20689.02
21.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	89.720sqm	@337.42/sqm	30273.32
21.011	5.9.2			

Sl No	Specification	Quantity	Rate	Amount
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	234.000sqm	@721.70/sqm	168877.80
21.012	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	260.680sqm	@403.74/sqm	105246.94
21.013	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	130.200sqm	@224.33/sqm	29207.77
21.014	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	111.600sqm	@573.84/sqm	64040.54
21.015	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	38.440sqm	@442.30/sqm	17002.01
21.016	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	172.980Kilo litre	@185.72/Kilo litre	32125.85
21.017	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	13.000each	@548.45/each	7129.85
			Heading Total(Rs)	2419031.18
22	**PILE FOUNDATION**			
22.001	20.2.3			
	Boring, providing and installing bored cast-in-situ reinforced cement concrete piles of grade M-25 of specified diameter and length below the pile cap to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring, with bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. all complete, including removal of excavated earth with all lifts and leads (Length of pile for payment shall be measured upto bottom of pile cap).450 mm dia piles			
	Net Total	1800.000metre	@2139.32/metre	3850776.00
22.002	20.2.5			
	Boring, providing and installing bored cast-in-situ reinforced cement concrete piles of grade M-25 of specified diameter and length below the pile cap to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring, with bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. all complete, including removal of excavated earth with all lifts and leads (Length of pile for payment shall be measured upto bottom of pile cap).600 mm dia piles			
	Net Total	666.000metre	@3448.10/metre	2296434.60
22.003	20.6.1.1			
	Vertical load testing of piles in accordance with IS 2911(Part IV) including			

Sl No	Specification	Quantity	Rate	Amount
	installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Single pile upto 50 tonne capacityInitial test			
	Net Total	2.000per test	@63390.02/per test	126780.04
22.004	20.6.2.1			
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Single pile above 50 tonne and upto 100 tonne capacityInitial test			
	Net Total	2.000per test	@71313.78/per test	142627.56
22.005	20.6.2.2			
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Single pile above 50 tonne and upto 100 tonne capacityRoutine test			
	Net Total	5.000per test	@36449.26/per test	182246.30
22.006	OD246261/2022-2023			
	Extra over charges for core cutting of 30cm depth in the rock strata while doing the piling works			
	Net Total	41.100metre	@6737.51/metre	276911.66
22.007	OD252171/2022-2023			
	Epoxy coated steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level. Thermo Mechanically Treated bars of grade Fe-500D or more (5.22.6+OD 16)			
	Net Total	59293.013kg	@100.00/kg	5929301.30
			Heading Total(Rs)	12805077.46
23	**ADMINISTRATIVE/LABORATORY/CHEMICAL HOUSE / CONTROL ROOM BUILDING**			
23.001	OD251949/2022-2023			
	Administrative / Laboratory / Chemical House / Control Room Building			
	Net Total	1.000no	@4700000.22/no	4700000.22
			Heading Total(Rs)	4700000.22
24	**SECURITY CABIN**			
24.001	OD251957/2022-2023			
	Security Cabin			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	1.000no	@320000.01/no	320000.01
			Heading Total(Rs)	320000.01
25	**AIR BLOWER ROOM AND CONTROL PANEL ROOM**			
25.001	OD251962/2022-2023			
	Air Blower room and control panel room			
	Net Total	1.000no	@2700000.12/no	2700000.12
			Heading Total(Rs)	2700000.12
26	**CHLORINATION BUILDING**			
26.001	OD251969/2022-2023			
	Chlorination Building			
	Net Total	1.000no	@2500000.11/no	2500000.11
			Heading Total(Rs)	2500000.11
27	**COMPOUND WALL**			
27.001	2.8.1			
	Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil			
	Net Total	77.000cum	@298.84/cum	23010.68
27.002	4.1.8			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)			
	Net Total	38.500cum	@6857.60/cum	264017.60
27.003	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	53.625cum	@9947.98/cum	533460.43
27.004	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated			

Sl No	Specification	Quantity	Rate	Amount
	bars of grade Fe-500D or more			
	Net Total	5362.500kilogram	@98.92/kilogram	530458.50
27.005	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	275.000sqm	@337.42/sqm	92790.50
27.006	50.6.7.2			
	Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for super structure above plinth level up to floor two level including all cost of materials, labour charges etc.			
	Net Total	155.900cum	@7968.73/cum	1242325.01
27.007	10.25.2			
	Item Shifted to Sub head 14 as item 14.73 Item Shifted to head 14 as item 14.74 Steel work welded in built up sections/framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works			
	Net Total	480.000kg	@155.15/kg	74472.00
27.008	13.83.2			
	Wall painting with premium acrylic emulsion paint of interior grade, having VOC (Volatile including applying additional coats wherever required to achieve even shade and colour.Two coats			
	Net Total	12.000sqm	@134.94/sqm	1619.28
27.009	13.1.1			
	12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)			
	Net Total	1529.360sqm	@316.08/sqm	483400.11
27.010	13.48.1			
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Two or more coats applied on walls @ 1.25 ltr/10 sqm over and including one coat of special primer applied @ 0.75 ltr /10 sqm			
	Net Total	1529.360sqm	@168.41/sqm	257559.52
			Heading Total(Rs)	3503113.63
28	**INTERNAL ROADS**			
28.001	16.91.2			
	Providing and laying factory made chamfered edge Cement Concrete paver blocks in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength, thickness & size/ shape, made by table vibratory method using PU mould, laid in required colour & pattern over 50mm thick compacted bed of sand, compacting and			

Sl No	Specification	Quantity	Rate	Amount
	proper embedding/laying of inter locking paver blocks into the sand bedding layer through vibratory compaction by using plate vibrator, filling the joints with sand and cutting of paver blocks as per required size and pattern, finishing and sweeping extra sand. complete all as per direction of Engineer-in-Charge.80 mm thick C.C. paver block of M-30 grade with approved color design and pattern.			
	Net Total	1350.000sqm	@1128.81/sqm	1523893.50
28.002	16.59.1			
	Manufacturing, supplying and fixing retro reflective sign boards made up of 2 mm thick aluminium sheet, face to be fully covered with high intensity encapsulated type heat activated retro reflective sheeting conforming to type - IV of ASTM-D 4956-01 in blue and silver white or other colour combination including subject matter, message (bi-lingual), symbols and borders etc. as per IRC: 67- 2001, pasted on substrate by an adhesive backing which shall be activated by applying heat and pressure conforming to class-2 of ASTM-D-4956-01 and fixing the same with suitable sized aluminium alloy rivets @ 20 cm c/c to back support frame of M.S. angle iron of size 25x25x3 mm along with theft resistant measures, mounted and fixed with 2 Nos M.S. angles of size 35x35x5 mm to a vertical post made up to M.S. Tee section ISMT 50x50x6 mm welded with base plate of size 100x100x 5 mm at the bottom end and including making holes in pipes, angles flats, providing & fixing M.S. message plate of required size, steel work to be painted with two or more coats of synthetic enamel paint of required shade and of approved brand & manufacture over priming coat of zinc chromate yellow primer (vertical MS-Tee support to be painted in black and white colours). Backside of aluminium sheet to be painted with two or more coats of epoxy paint over and including appropriate priming coat including all leads and lifts etc. complete as per drawing , specification and direction of Engineer-in-Charge.Mandatory / Regulatory sign boards of 900 mm diametre with support length of 3750 mm			
	Net Total	2.000each	@7103.90/each	14207.80
28.003	16.59.2			
	Manufacturing, supplying and fixing retro reflective sign boards made up of 2 mm thick aluminium sheet, face to be fully covered with high intensity encapsulated type heat activated retro reflective sheeting conforming to type - IV of ASTM-D 4956-01 in blue and silver white or other colour combination including subject matter, message (bi-lingual), symbols and borders etc. as per IRC: 67- 2001, pasted on substrate by an adhesive backing which shall be activated by applying heat and pressure conforming to class-2 of ASTM-D-4956-01 and fixing the same with suitable sized aluminium alloy rivets @ 20 cm c/c to back support frame of M.S. angle iron of size 25x25x3 mm along with theft resistant measures, mounted and fixed with 2 Nos M.S. angles of size 35x35x5 mm to a vertical post made up to M.S. Tee section ISMT 50x50x6 mm welded with base plate of size 100x100x 5 mm at the bottom end and including making holes in pipes, angles flats, providing & fixing M.S. message plate of required size, steel work to be painted with two or more coats of synthetic enamel paint of required shade and of approved brand & manufacture over priming coat of zinc chromate yellow primer (vertical MS-Tee support to be painted in black and white colours). Backside of aluminium sheet to be painted with two or more coats of epoxy paint over and including appropriate priming coat including all leads and lifts etc. complete as per drawing , specification and direction of Engineer-in-Charge.Cautionary / warning sign boards of equilateral triangular shape having each side of 900 mm with support length of 3650 mm			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	2.000each	@5370.85/each	10741.70
28.004	16.63			
	Providing, laying and making kerb channel 30 cm wide and 50 mm thick with cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) over 75 mm bed of dry brick ballast 40 mm nominal size, well rammed and consolidated and grouted with fine sand, including finishing the top smooth etc. complete and as per direction Engineer - in-Charge.			
	Net Total	162.000sqm	@572.09/sqm	92678.58
28.005	16.69			
	Providing and laying at or near ground level factory made kerb stone of M-25 grade cement concrete in position to the required line, level and curvature jointed with cement mortar 1:3 (1 cement : 3 coarse sand) , including making joints with or without grooves (thickness of joints except at sharp curve shall not to more than 5 mm), including making drainage opening wherever required complete etc. as per direction of Engineer-in-charge (length of finished kerb edging shall be measured for payment). (Precast C.C. kerb stone shall be approved by Engineer-in-Charge)			
	Net Total	32.400cum	@9921.30/cum	321450.12
			Heading Total(Rs)	1962971.70
29	**STORM WATER DRAINS**			
29.001	2.8.1			
	Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil			
	Net Total	120.000cum	@298.84/cum	35860.80
29.002	4.1.8			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)			
	Net Total	20.000cum	@6857.60/cum	137152.00
29.003	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	37.500cum	@7413.74/cum	278015.25
29.004	4.1.3			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand (zone-III) : 4 graded stone aggregate 20 mm nominal size)			
	Net Total	6.250cum	@8040.94/cum	50255.88
29.005	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any			

Sl No	Specification	Quantity	Rate	Amount
	thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	500.000sqm	@721.70/sqm	360850.00
			Heading Total(Rs)	862133.93
30	**TRANSFORMER BUILDING**			
30.001	OD251973/2022-2023			
	Transformer Building			
	Net Total	1.000no	@630000.03/no	630000.03
			Heading Total(Rs)	630000.03
31	**DG ROOM**			
31.001	OD251974/2022-2023			
	DG Room			
	Net Total	1.000no	@540000.03/no	540000.03
			Heading Total(Rs)	540000.03
32	**CENTRIFUGE BUILDING**			
32.001	OD251983/2022-2023			
	Centrifuge Building			
	Net Total	1.000no	@3300000.15/no	3300000.15
			Heading Total(Rs)	3300000.15
33	**SLUDGE SHED**			
33.001	OD251991/2022-2023			
	Sludge Shed			
	Net Total	1.000no	@660000.03/no	660000.03
			Heading Total(Rs)	660000.03
34	**LANDSCAPING AND GREEN BELT FORMATION**			
34.001	OD252102/2022-2023			
	Landscaping and green belt formation			
	Net Total	1.000no	@1500000.07/no	1500000.07
			Heading Total(Rs)	1500000.07
35	**PROVISION FOR PROVIDING AUTOMATED SYSTEM TO THE ENTIRE PLANT BY SCADA**			
35.001	OD252007/2022-2023			
	Provision for providing automated system to the entire plant by SCADA			
	Net Total	1.000no	@2500000.11/no	2500000.11
			Heading Total(Rs)	2500000.11
36	**STAIR & WALK WAY**			
36.001	5.9.3			

Sl No	Specification	Quantity	Rate	Amount
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	409.035sqm	@820.86/sqm	335760.47
36.002	5.9.5			
	Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers			
	Net Total	78.000sqm	@653.88/sqm	51002.64
36.003	5.9.7			
	Centering and shuttering including strutting, etc. and removal of form for:Stairs, (excluding landings) except spiral - staircases)			
	Net Total	190.947sqm	@737.13/sqm	140752.76
36.004	5.37.2			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level			
	Net Total	60.240cum	@11610.44/cum	699412.91
36.005	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	7228.800kilogram	@98.92/kilogram	715072.90
36.006	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	60.240cum	@82.60/cum	4975.82
36.007	OD254074/2022-2023			
	Extra for providing epoxy coating for reinforcement bars.			
	Net Total	7228.800kg	@2.32/kg	16770.82
36.008	OD254073/2022-2023			
	Extra for providing sulphate resistant cement for the structures above plinth level.			
	Net Total	60.240cum	@1899.46/cum	114423.47

Sl No	Specification	Quantity	Rate	Amount
36.009	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	19879.200kg	@1.35/kg	26836.92
36.010	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			
	Net Total	677.982sqm	@224.33/sqm	152091.70
36.011	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	677.982sqm	@403.74/sqm	273728.45
36.012	50.10.1			
	Steel work in built up G I tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting,fixing in position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete			
	Net Total	6426.500kg	@191.08/kg	1227975.62
			Heading Total(Rs)	3758804.48
			Total Estimation PAC	93902781.68
38	**Extra Charges**			
37.001	Provision for GST			
		93902781.68	18.00%	16902500.70
			Grand Total	0.00
			Round off	0.00
			Rounded Total(Rs)	110805282.38
	Rupees Eleven Crore Eight Lakh Five Thousand Two Hundred and Eighty Two			

Assistant Engineer
Sewerage Camp Office
Kerala Water Authority
Malappuram-676 505

Assistant Executive Engineer
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Executive Engineer (i/c)
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Superintending Engineer
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Office of the Superintending Engineer
Kerala Water Authority
Kochi - 682011
PPD Regional Office

GENERAL ABSTRACT

Others-SEWERAGE SCHEME TO HARBOUR AREA IN PONNANI MUNICIPALITY-CONSTRUCTION OF 3.5 MLD CAPACITY SEWERAGE TREATMENT PLANT AND LAYING

SEWERAGE NETWORK-ELECTRO MECHANICAL WORKS-Sewerage Work

Sl No	Head Description		Amount
1	MECHANICAL WORKS		51714155.53
2	ELECTRICAL WORKS		9258000.44
3	CHARGES FOR POWER ALLOCATION TO KSEB AND POWER EXTENSION BY CABLE		8000000.00
4	TOOLS AND PLANTS		200000.00
	Total Estimation PAC		69172155.97
C	**Extra Charges**		
C.001	Provision for GST		
	69172155.97	18.00%	12450988.07
	Grand Total		0.00
	Round off		0.00
	Rounded Total(Rs)		81623144.04
	Rupees Eight Crore Sixteen Lakh Twenty Three Thousand One Hundred and Forty Four		

DETAILED ESTIMATE

Others-SEWERAGE SCHEME TO HARBOUR AREA IN PONNANI MUNICIPALITY-CONSTRUCTION OF 3.5 MLD CAPACITY SEWERAGE TREATMENT PLANT AND LAYING

SEWERAGE NETWORK-ELECTRO MECHANICAL WORKS-Sewerage Work

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
1	MECHANICAL WORKS						
1.001	OD252953/2022-2023						
	Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards), CI construction, bronze impeller,complete with 3 phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Three phase Motor with IP 68 protection (1W 1S)"- 11 Hp to 100 HP						
	Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump 11 Hp to 100 HP						
	Raw Sewage Pump	4	15.000				60.000
	Sewage pump EQ to MBBR tank	3	15.000				45.000
	Total						**105.000**
						Total Quantity in HP (Horse power)	**105.000**
1.002	OD252954/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards), CI construction, bronze impeller,complete with 3 phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Three phase Motor with IP 68 protection (1W 1S)" - Upto 10 HP						
	Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump Up to 10 HP						
	Sludge Transfer to Thickner Pump	2	2.000				4.000
	Sludge Transfer to Centrifuge Pump	2	1.000				2.000
	Septage pump	4	2.000				8.000
	Filtrate cum dilution pump to EQ tank	2	2.000				4.000
	Total						**18.000**
						Total Quantity in HP (Horse power)	**18.000**
1.003	OD235301/2022-2023						
	Supply,erection, testing and commissioning of direct driven floating mixers of approximately 4HP or as required with the rotating arm for rated continuous duty mixing and efficiency, complete set with 3 phase motor, including rotary paddles, gear box, cables, wall mooring and anchoring system with all electro mechancial equipments etc complete for the equalization tank . Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ or as directed by the Engineer in Charge						
	Supply,erection, testing and commissioning of direct driven floating mixers of approximately 4HP or as required with the rotating arm						
	Dilution tank	2					2.000
	EQ tank	1					1.000
	MBBR 1	1					1.000
	MBBR 2	1					1.000
	MBBR 3	1					1.000
	MBBR 4	1					1.000
	Total						**7.000**
						Total Quantity in no	**7.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
1.004	OD249818/2022-2023						
	Supplying and fixing of mono block centrifugal pump, for rated continuous duty and best efficiency CI construction, CI impeller, complete with 3 phase motor,FRP motor cover, pressure gauge, operation on 415 /-10% volts, 50 HZ, AC power supply etc including sluice valves, Pressure gauges, NRVs with DI/I/Pipes connecting common delivery suitable for complete in all respects as required by the standard specifications and shall suit following capacities complete with all accessories as per technical specification.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Motor : three phase motor with IP 68 Protection - Upto 5 HP						
	Supplying and fixing of mono block centrifugal pump						
	High Pressure Jet Pump	1	1.000				1.000
	Recycled water transfer pump for Dilution Tank	3	1.000				3.000
	Filter feed pump (Clarified water to ASF/PSF)	3	20.000				60.000
	Total						**64.000**
						Total Quantity in HP (Horse power)	**64.000**
1.005	OD235307/2022-2023						
	"Air Blower Supply,erection, testing and commissioning of twin lobe air blower for indoor application complete with acoustic canopy, air filter, motor of 1500 rpm , pulleys, pressure gauges, pressure relief valve, acoustic hood, suction silencer with suitable flanges, common motor and compressor base frame with motor belt tightening arrangement interconnecting line with flanges including all accessories complete as per technical specification or as Directed by Engineer in Charge Capacity: 2763 m3/hr. Pressure: 0.6 kg/sqcm Motor : three phase motor with IP 68 Protection - 60 HP						
	"Air Blower Supply,erection, testing and commissioning of twin lobe air blower						
	Air Blower - 60 HP	5					5.000
	Total						**5.000**
						Total Quantity in no	**5.000**
1.006	OD235308/2022-2023						
	"Bubble Diffuser for MBBR Tank Supplying at site, erection, testing & commissioning of Fine Bubble Diffuser (retrievable type using rope and pulley arrangement) for the aeration system of the MBBR Tansk (3 Nos) with diffusers of sufficient size and length made of EPDM make with SS tee 1"" x 1 "", SS lifting hook 8 mm, SS foundation bolt 6 mm, SS C clamp suitable for 1"" O.D, hose, PP Rope, PP swivel nut, PP sleeve, Silicone Washer, SS hose clamp, RCC block complete at a minimum rating of 95m?/hr as per technical specification or as directed by the Engineer in Charge"						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	"Bubble Diffuser for MBBR Tank Supplying at site,						
	Bubble Diffuser for MBBR Tanks	3					3.000
	Total						**3.000**
						Total Quantity in no	**3.000**
1.007	OD235309/2022-2023						
	"Bubble Diffuser for Equalisation Tank Supplying at site, erection, testing & commissioning of Coarse Bubble Diffuser (retrievable type using rope and pulley arrangement) for the aeration system of the Equalization Tank with diffusers of sufficient size and length made of EPDM make with SS tee 1"" x 1 "", SS lifting hook 8 mm, SS foundation bolt 6 mm, SS C clamp suitable for 1"" O.D, hose, PP Rope, PP swivel nut, PP sleeve, Silicone Washer, SS hose clamp, RCC block complete at a minimum rating of 95m?/hr as per technical specification or as directed by the Engineer in Charge"						
	Bubble Diffuser for Equalisation Tank Supplying at site, erection, testing & commissioning of Coarse Bub						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
1.008	OD235310/2022-2023						
	"Air Grid Pipe Supply and installation of air pipes (HDPE) aly into valves and other acessories as required for the blowers to various tanks as a complete unit"						
	"Air Grid Pipe Supply and installation of air pipes (HDPE) aly into valves and oth						
	Air Grid	4					4.000
	Total						**4.000**
						Total Quantity in set	**4.000**
1.009	OD235312/2022-2023						
	"MBBR Media Supplying and fixing of non- clogging freely moving biomass media of polypropylene construction Sp.Gravity 0.93 for MBBR reactor with surface area not less than 450m/m, length 16-20 mm, dia 22 mm complete as per technical specification or as directed by Engineer in Charge"						
	"MBBR Media Supplying and fixing of non- clogging freely moving biomass media of polypropylene construction						
		1	623.980				623.980
	Total						**623.980**
						Total Quantity in cum	**623.980**
1.010	OD235313/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	"Gas Chlorinator system Supply at site, erection, testing and commissioning of electronic chlorine dosing system (gas filled Chlorine) with all wetted parts in PP construction suitable for pumping Chlorine gas including booster pumps, valves, suctions and delivery lines using heavy duty PVC tubes, gas line diffusers, emergency repair kit, FRP motor cover etc.complete with all accessories. Capacity : 500gm to 1kg/hr with 2nos of chlorine tonners"						
	"Gas Chlorinator system Supply at site, erection,						
		1					1.000
	Total						**1.000**
						Total Quantity in set	**1.000**
1.011	OD235314/2022-2023						
	"Electromagnetic flow meter Supply, installation, testing and commissioning of electro magnetic/ Ultra Sonic D/F permanent conduit flow meter with flow recorder, digital flow indicator, flow integrator with sensors, 7digit totaliser, transmittal and digital display arrangements and all accessories including housing arrangements, internal data logger, to save upto 2000 linesof data etc. complete to fix as per the specifications . Flow range of 10 to 600LPS, One display shall be installed at the main control centre"						
	"Electromagnetic flow meter Supply, installation, testing						
		2					2.000
	Total						**2.000**
						Total Quantity in no	**2.000**
1.012	OD235315/2022-2023						
	"Lifting Mechanism for Air Grid Supply , installation & commissioning of the manually operating chain pulley mechanism to lift the equipments from a height not less than 5m including all equipments , foundation etc"						
	"Lifting Mechanism for Air Grid Supply , installation & commissioning of						
		4					4.000
	Total						**4.000**
						Total Quantity in no	**4.000**
1.013	OD235316/2022-2023						
	SS Gates Supplying at site, installation testing and commissioning of all materials, fabricating, fixing and commissioning of spindle operated open channel sluice gates/shutter of DI make with a peak flow of 145LPS and velocity less than 1m/s at the inleta and outlet of the screen channel to suit the channel sizes as per drawings, tender specifications and as directed by Engineer in Charge"						
	"SS Gates Supplying at site, installation testing and commissioning of all materials, fab						
		8					8.000
	Total						**8.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in set	**8.000**
1.014	OD235318/2022-2023						
	Mechanical Fine Screen Supplying all materials, fabricating, fixing and commissioning of mechanical SS Screen Bar of following or nearest suitable size made of flats having 50mm x 10mm and 6mm clear space across the screen chamber channel (fixed type) at 70? inclination including cost of mechanical screen grab bucket and arrangement for automated scrapping clogged materials suitable for operation on 415+/-10% volts, 50 HZ, AC power supply etc. complete in all respects as required by the standard specifications complete with all accessories as per technical specification"						
	"Manual Fine Screen Supplying all materials, fabricating, fixing and commissioning of mechanical SS Screen Bar of following or nearest suitable size made of flats having 50mm x 10mm and 6mm clear space across the						
		2					2.000
	Total						**2.000**
						Total Quantity in set	**2.000**
1.015	OD235319/2022-2023						
	Mechanical Fine Screen Supplying all materials, fabricating, fixing and commissioning of mechanical SS Screen Bar of following or nearest suitable size made of flats having 50mm x 10mm and 6mm clear space across the screen chamber channel (fixed type) at 70 inclination including cost of mechanical screen grab bucket and arrangement for automated scrapping clogged materials suitable for operation on 415+/-10% volts, 50 HZ, AC power supply etc. complete in all respects as required by the standard specifications complete with all accessories as per technical specification"						
	"Manual Coarse Screen						
		2					2.000
	Total						**2.000**
						Total Quantity in set	**2.000**
1.016	OD235320/2022-2023						
	"Griting Mechanism Supplying at site all electro-mechanical equipments, fabricating, fixing and commissioning of the griting mechanism to suit gritting chamber sizes as per drawings, tender specifications or as directed by Engineer in Charge."						
	"Griting Mechanism Supplying at site all electro-mech						
		2					2.000
	Total						**2.000**
						Total Quantity in no	**2.000**
1.017	OD235321/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	"Sludge Thickener Mechanism Supplying all materials, fabricating, fixing and commissioning of Bridge mounted central driven type sludge thickening mechanism for the full diameter of the Sludge Thickener tank as per drawings including all feed well, drive and rake mechanism with removable scrappers with sufficient 3phase motor and gears etc complete as per tender specifications and as directed by Engineer in Charge"						
	Sludge Thickener Mechanism Supplying all materials, fabricating, fixing and						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
1.018	OD235322/2022-2023						
	Poly Electrolyte dosing system Supplying and fixing of electronic dosing pump with all wetted parts in PP construction suitable for pumping Poly Electrolyte solution including cost of suitable agitators, control gears, valve, suction and delivery lines using heavy duty PVC tubes, HD, FRP motor cover etc. and complete with all accessories to prepare 5% solution of 0.2kg/hr"						
	"Poly Electrolyte dosing system Supplying and fixing of electronic dosing pump with all wetted parts in PP construction suitable for pumping Poly Electrolyte solution including cost of suitable agita						
		2					2.000
	Total						**2.000**
						Total Quantity in no	**2.000**
1.019	OD235324/2022-2023						
	"Portable Hoist - 500kg Supply and commissioning of portable Monkey type Hoist with capacity upto 500kg, with lifting height of 6m, 5HP Motor, 415V 50Hz all mounted on a suitable medium vehicle patform for easy shifting of equipments and materials whenever required with complete set as per standards"						
	"Portable Hoist - 500kg Supply and commissioning of portable M						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
1.020	OD235325/2022-2023						
	"Wheel Barrow Supply of three wheel type wheel barrow of capcity 200ltrs"						
	"Wheel Barrow						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
1.021	OD235326/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	"Aluminium Ladder Supply, Installation of aluminium ladders with caging on each elevated structures of required height as per the drawings or as directed by the Engineer in Charges"						
	"Aluminium Ladder Supply, Installation o						
		4					4.000
	Total						**4.000**
						Total Quantity in no	**4.000**
1.022	OD235327/2022-2023						
	"FRP Ladder Supply, Installation of FRP ladders with caging on each elevated structures of required height as per the drawings or as directed by the Engineer in Charges"						
	FRP Ladder						
		4					4.000
	Total						**4.000**
						Total Quantity in no	**4.000**
1.023	OD235328/2022-2023						
	"Monorail Crane Supply, Installation and commissioning in position mechanically operated mono rail crane of load bearing capacity of 2tonnes suitable for operation on 415+/-10% volts, 50 HZ, AC power supply etc. with 6m lift & span upto 20m complete in all respects as required by the standard specifications complete with all accessories as per technical specification"						
	"Monorail Crane Supply, Installation and commissioning in position						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
1.024	OD235329/2022-2023						
	"Pressure sand filter Supply at site, erection and commissioning of pressure sand filter vertical type pressure vessel fabricated with MS construction with epoxy coating inside and anti corrosive treatment outside, two coats of paint outside (pain quality as instructed by Engineer) withstand a minimum test pressure of 7.0Kg/cm? with as operating pressure of 3.5 Kg/cm?, complete with valves and dual filter media including graded pebble and sand and antracite , frontal piping, butteryfly valves, internals, pressure gauges, strainers, supporting structure, back wash arrangement, etc and all other accessories tested twice the working pressure supported over pebble/gravel with inspection manholes etc complete as per specification or as directed by Engineer in Charge. The scope shall include complete piping with MS fabricated pipes and specials including valves Flow Rate:52 m3/hour Diameter - 2.4m. Height - 2.5m"						
	"Pressure sand filter Supply at site, erection and commissioning of pressure sand filter vertical type pressure vessel fabricated with MS constru						
		2					2.000
	Total						**2.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in no	**2.000**
1.025	OD235330/2022-2023						
	Activated Carbon filter Supply at site, erection and commissioning of Activated Carbon filter vertical type pressure vessel fabricated with MS construction with epoxy coating inside and anti corrosive treatment outside, two coats of paint outside (pain quality as instructed by Engineer) withstand a minimum test pressure of 7.0Kg/cm? with as operating pressure of 3.5 Kg/cm?, complete with valves and filter media including activated carbon of approved grade and quality , frontal piping, butteryfly valves, internals, pressure gauges, strainers, supporting structure, back wash arrangement, etc and all other accessories tested twice the working pressure supported over pebble/gravel with inspection manholes etc complete as per specification or as directed by Engineer in Charge. The scope shall include complete piping with MS fabricated pipes and specials including valves Flow rate - 52 m?/hr. Diameter - 2.6m. Height - 2.5m						
	Activated Carbon filter Supply at site, erection and commissioning of Activated Carbon filter vertical type pressure vessel fabricated with M						
		2					2.000
	Total						**2.000**
						Total Quantity in no	**2.000**
1.026	OD235331/2022-2023						
	"Centrifuge System Supply at site, installation and commissioning of filter press /centrifuge system. Filter Press shall be automated, recessed type press with SS fabricated structure pipe button surface and SS flat parallel bar, with PP cloth. Filter operations to be mechanical. Outlet cake consistency should not be more than 35% moisture. The capacity of the filter press shall be 1cum/hr. The Filter Press Unit shall be mounted on a platform and all around drain system to be provided to prevent the filtrate water from contaminating the entire surroundings as per the specifications or as directed by the engineer in charge"						
	Supply at site, installation and commissioning of filter press /centrifuge syste						
		2					2.000
	Total						**2.000**
						Total Quantity in no	**2.000**
1.027	OD235332/2022-2023						
	SLUDGE DEWATERING and Packing UNIT -Volute is a dewatering unit for convenient sludge dewatering.Machine is available for dry sludge (DS) output of 1.0kg/hr to 750kg/hr the Sludge to be dried from 70% moisture content to 10%.The similar type can be suggested.The Packing of the dried sludge to be packed in the packing machine.The necessary electrification civil works,cost of packing machine,cost of gunny bags for 6months.The machines suggested should be cost effective						
	SLUDGE DEWATERING and Packing UNIT -Volute is a dewatering unit for convenient sludge dewatering.Machine is available for dry sludge (DS) output of 1.0kg/hr to 750kg/hr the Sludge to be dried from 70% mo						
		2					2.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**2.000**
						Total Quantity in L.S	**2.000**
1.028	10.28						
	Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc., of required size on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.)						
	Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc						
		1				8.000000	8.000
	Total						**8.000**
						Total Quantity in kg	**8.000**
1.029	OD255523/2022-2023						
	Piping, bypass arrangements, steel ladder, framework and fire fighting arrangements						
	Piping, bypass arrangements, steel ladder, framework and fire fighting arrangements						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
1.030	OD235333/2022-2023						
	Plate settler media- Media to be of UV stabilized stianless steel, 750 mm height and about 1.0 mm thick. The plan settling area should be between 10 – 12 m2/m3 /day minimum at 60 degree slope. The media is to be provided along with lock nuts as required.						
	Plate settler media- Media to be of UV stabilized stianless steel, 750 mm height and about 1.0 mm thick.						
		1	302.400				302.400
	Total						**302.400**
						Total Quantity in no	**302.400**
1.031	OD255524/2022-2023						
	Supply of GPS fitted vacuum truck of capacity 3000 litres for septage management including de-sludging equipment and cleaning devices						
	Supply of GPS fitted vacuum truck of capacity 3000 litres for septage management including de-sludging equipment and cleaning devices						
		2					2.000
	Total						**2.000**
						Total Quantity in no	**2.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
1.032	OD255533/2022-2023						
	Odour control unit for co-treatment unit and STP						
	Odour control unit for co-treatment unit and STP						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
1.033	OD255534/2022-2023						
	Hypo Dosing System - Supply, installation, commitioning and testing of Hypo dosing tank having capacity 50lit in LLDPE/ FRP/PP material and hypo dosing electronic metering type pump of 1-3lph range with 2 bar working pressure						
	Hypo Dosing System - Supply, installation, commitioning and testing of Hypo dosing tank having capacity 50lit in LLDPE/ FRP/PP material and hypo dosing electronic						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
1.034	OD255535/2022-2023						
	Alum and Lime Dosing System- Supply, installation, commitioning and testing of Alum dosing tank having capacity 50 litre in LLDPE/ FRP/PP material and alum dosing electronic metering type pump of 1-3 LPH range with 2.5 bar working pressure						
	Alum and Lime Dosing System- Supply, installation, commitioning and testing of Alum dosing tank having capacity 50 litre in LLDPE/ FRP/PP material and alum dosing						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
1.035	OD256582/2022-2023						
	Steel trussed support for steel brackets, channels, and other elements to hold plates and clarified water channels including supplying, fixing and testing etc. with high quality steel elements coated with non-corrosive layers as per design and modifications as per performance						
	Steel trussed support for steel brackets, channels, and other elements to hold plates and clarified water channels including supplying, fixing and testing etc. with high quality steel						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
1.036	OD256653/2022-2023						
	Supply, installation and commissioning of solar units for STP						
	Supply, installation and commissioning of solar units for STP						
		1					1.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**1.000**
						Total Quantity in no	**1.000**
2	ELECTRICAL WORKS						
2.001	OD235336/2022-2023						
	: "500kVA Indoor Transformer and 11 kv indoor free standing cubcle type vcb switch gear panel of suitable capacity Supplying, installation, testing and commissioning of 500KVA, 11KV/433V, 3 Phase, 50 Hz, Dyn 11, indoor ONAN type, copper wound transformer with OFF load tap changing arrangement on HV and LV side complete with all accessories i/c first filling of filtered dehydrated oil and confirming to IS 2026 (Part 1 to Part 5) & as per specification attached complete in all respects as required at site or as directed by the Engineer In Charge including suuply installation commissioning of suitable rated 11kv cubicle type vcb panel and suitable rated 11kv cable and termination						
	250kVA Indoor Transformer and 11 kv indoor free standing cubcle						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
2.002	OD235337/2022-2023						
	CT - PT Unit and TOD meter Supplying, installation, testing and commissioning of Indoor type 11KV CT-PT Unit 3Phase Dry type confirming to IS 2026 (Part 1 to Part 5) & as per KSEB specification complete in all respects as required at site or as directed by the Engineer In Charge"						
	"CT - PT Unit and TOD meter Supplying, installation, testing and commissioning of Indoor						
		1					1.000
	Total						**1.000**
						Total Quantity in set	**1.000**
2.003	OD235338/2022-2023						
	"10kA Surge (Lightining Arrester) Supply & Installation of Heavy Duty hot dipped galvanized 10kA lightining arrester suitable for the 11kV incoming line complying IS: 3070 (Part - III) &IEC 60099 - 4 (2009) 50Hz, rated voltage of 12kV with a operating load of 10kV with terminals made of MS/Aluminium with Zinc plating full set or as directed by the Engineer in Charge"						
	0kA Surge (Lightining Arrester) Supply & Installation of Heavy Duty hot dipped galvanized 10kA						
		2					2.000
	Total						**2.000**
						Total Quantity in no	**2.000**
2.004	OD235339/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Main LT panel Supplying, installation, testing and commissioning of S3phase 415V, 50Hz, floor mounted MS Cubicle type panel board suitable for connecting 350 kva transformer and all motors including all inter connections, wiring in all etc using 14 gauge CRCA sheet painted with 2coats of superior quality enamel paint of approved color over a coat of superior quality iron primer of approved quality as per specification complete in all respects as required at site conforming to relevant BIS standards and KSEB standards or as directed by the Engineer In Charge.						
	Main LT panel Supplying, installation, testing and commissioning of S3phase 415V, 50Hz						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
2.005	OD235340/2022-2023						
	"Earthing Equipments for Transformer Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 meter long etc. with charcoal/ coke and salt as required."						
	"Earthing Equipments for Transformer Earthing with copper earth plate 600 mm X 600 mm X 3 mm						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
2.006	OD235341/2022-2023						
	"500KVA Diesel Generator Providing, Installing, Testing and Commissioning of ?Silent Type? Diesel Generating set alongwith having Prime Power Rating of 250 KVA, 415 volts at 1500 RPM, 0.8 lagging power factor at 415 V suitable for 50 Hz, 3 phase system& for 0.85 Load Factor .						
	"250KVA Diesel Generator Providing, Installing, Testing and Commissioning						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
2.007	OD235342/2022-2023						
	"Auto Mains Failure Unit (AMF Panel) Fabricating, Installing, Testing & Commissioning of automatic mains failure control including auto by- pass panel, suitable for 250 KVA silent type DG set complete with relays, timers, set of CTs for metering & protection and energy analyser to indicate currents, phase and line voltages, frequency, power factor, KWH, KVARH & provision for overload, short circuit, restricted earth fault, under frequency, control cabling from AMF panel to diesel engine and elsewhere if required, all complete .						
	"Auto Mains Failure Unit (AMF Panel) Fabricating, Installing, Testing & Commissioning						
		1					1.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**1.000**
						Total Quantity in no	**1.000**
2.008	OD235343/2022-2023						
	"Earthing Equipments for DG Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 meter long etc. with charcoal/ coke and salt as required."						
	"Earthing Equipments for DG Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
2.009	OD235344/2022-2023						
	"Main Control Centre Design, Fabrication, Supply, Installation and commissioning of Electrical Control Panel of cubical construction with fully automated feature (indoor type) preferably floor mounted fabricated of 2mm thick CRCA Sheets compartmenatised with hinge lock doors with Dust, vermi proof and powder coated with approved shade. The panel shall have enough size to accomadate the individual control centres of each equipment set with individual MCCB's/MCB of appropriate capacity and also to have provision for Busbars, ACBs & RCCB's as specified below with cable alley, interconnections having all accessories mounting and internal wiring, earth terminals, numbering etc, complete in all respect suitable for operation on 415V, 3 phase 50Hz AC supply with enclosure protection class IP 54 as required. Including supply, installation, termination testing & Commissioning of the all power and control cables as per specifications or as directed by the Engineer In Charge."						
	Main Control Centre Design, Fabrication, Supply, Installation and commissioning of Electrical						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
2.010	OD235345/2022-2023						
	Wiring for Each equipment Supplying and Laying of PVC insulated and PVC sheathed / XLPE power cable of Aluminium conductor XLPE power cables as per IS:7098/Part-I/88 with latest ammendments 1.1 kv grad of required size direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc. as required in the specifications or as directed by the Engineer in Charge.						
	Wiring for Each equipment Supplying and Laying of PVC insulated						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
2.011	OD235346/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Brass Glands & Aluminium Lugs Supplying and making end termination with brass compression gland and aluminium lugs for required size of PVC insulated and PVC sheathed I XLPE aluminium conductor cable of 1.1 kV grade as required.						
	Brass Glands & Aluminium Lugs Supplying and making end termination with brass compression						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
2.012	OD235347/2022-2023						
	"Power Distribution Board (Control Room & Centrifuge Building) Supplying and fixing of following ways surface/ recess mounting, vertical type, 415 V, TPN MCB distribution board of sheet steel, dust protected, duly powder painted, inclusive of 200 A, tinned copper bus bar, common neutral link, earth bar, din bar for mounting MCBs (but without MCBs and incomer) as required. (Note : Vertical type MCB TPDB is normally used where 3 phase outlets are required.) 12 way (4 + 36), Double door (i) Incoming - 63A MCCB & 63A , 100mA RCCB ii) Outgoing Feeders - 4Nos of 25A MCCB with 25A, 30mA RCCBs iii) Outgoing Feeders - 1Nos of 6A MCB iv) Outgoing Feeders - 2Nos Spares"						
	"Power Distribution Board (Control Room & Centrifuge Building)						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
2.013	OD235348/2022-2023						
	"Wiring & Lighting accessories :- Wiring for circuit/submain wiring along with earthwire with required sizes of FRLS PVC insulated copper conductor,supply and fitting of GI boxes along with modular base and cover plates,supplying and fixing following modular switch/ sockets,supply,installation,testing and commissioning of all accessories and fixtures as approved by dept.						
	"Wiring & Lighting accessories :- Wiring for circuit/submain wiring along with earthwire with required sizes						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
2.014	OD235349/2022-2023						
	"EXTERNAL LIGHTING Providing external lighting arrangements by supplying and laying of PVC insulated and PVC sheathed / XLPE power cable of Copper conductor XLPE control cables as per is:7098/Part-I/88 with latest amendments 1.1 kv grade of required size direct in ground including MCCB/MCB/RCCB,supply and erection of mettalic poles,strret light poles,earthing and safety equipments ,fire extinguishers ,etc . complete including necessary excavation, sand cushioning, protective covering and refilling the trench etc. as required in the specifications or as directed by the Engineer in Charge."						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	"EXTERNAL LIGHTING Providing external lighting arrangements						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
3	CHARGES FOR POWER ALLOCATION TO KSEB AND POWER EXTENSION BY CABLE						
3.001	OD235350/2022-2023						
	Charges for Power allocation to KSEB and power extension by cable						
	Charges for Power allocation to KSEB and power extension by cable						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
4	TOOLS AND PLANTS						
4.001	OD235335/2022-2023						
	Tools and Plants						
	Tools and Plants						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**

ABSTRACT ESTIMATE

Others-SEWERAGE SCHEME TO HARBOUR AREA IN PONNANI MUNICIPALITY-CONSTRUCTION OF 3.5 MLD CAPACITY SEWERAGE TREATMENT PLANT AND LAYING

SEWERAGE NETWORK-ELECTRO MECHANICAL WORKS-Sewerage Work

Sl No	Specification	Quantity	Rate	Amount
1	**MECHANICAL WORKS**			
1.001	OD252953/2022-2023			
	Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards), CI construction, bronze impeller,complete with 3 phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Three phase Motor with IP 68 protection (1W 1S)"- 11 Hp to 100 HP			
	Net Total	105.000HP (Horse power)	@32000.00/HP (Horse power)	3360000.00
1.002	OD252954/2022-2023			
	Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards), CI construction, bronze impeller,complete with 3 phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Three phase Motor with IP 68 protection (1W 1S)" - Upto 10 HP			
	Net Total	18.000HP (Horse	@35000.00/HP (Horse power)	630000.00

Sl No	Specification	Quantity	Rate	Amount
		power)		
1.003	OD235301/2022-2023			
	Supply,erection, testing and commissioning of direct driven floating mixers of approximately 4HP or as required with the rotating arm for rated continuous duty mixing and efficiency, complete set with 3 phase motor, including rotary paddles, gear box, cables, wall mooring and anchoring system with all electro mechancial equipments etc complete for the equalization tank . Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ or as directed by the Engineer in Charge			
	Net Total	7.000no	@125000.00/no	875000.00
1.004	OD249818/2022-2023			
	Supplying and fixing of mono block centrifugal pump, for rated continuous duty and best efficiency CI construction, CI impeller, complete with 3 phase motor,FRP motor cover, pressure gauge, operation on 415 /-10% volts, 50 HZ, AC power supply etc including sluice valves, Pressure gauges, NRVs with DI/I/Pipes connecting common delivery suitable for complete in all respects as required by the standard specifications and shall suit following capacities complete with all accessories as per technical specification.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Motor : three phase motor with IP 68 Protection - Upto 5 HP			
	Net Total	64.000HP (Horse power)	@25000.00/HP (Horse power)	1600000.00
1.005	OD235307/2022-2023			
	"Air Blower Supply,erection, testing and commissioning of twin lobe air blower for indoor application complete with acoustic canopy, air filter, motor of 1500 rpm , pulleys, pressure gauges, pressure relief valve, acoustic hood, suction silencer with suitable flanges, common motor and compressor base frame with motor belt tightening arrangement interconnecting line with flanges including all accessories complete as per technical specification or as Directed by Engineer in Charge Capacity: 2763 m3/hr. Pressure: 0.6 kg/sqcm Motor : three phase motor with IP 68 Protection - 60 HP			
	Net Total	5.000no	@1000000.00/no	5000000.00
1.006	OD235308/2022-2023			
	"Bubble Diffuser for MBBR Tank Supplying at site, erection, testing & commissioning of Fine Bubble Diffuser (retrievable type using rope and pulley arrangement) for the aeration system of the MBBR Tansk (3 Nos) with diffusers of sufficient size and length made of EPDM make with SS tee 1"" x 1 "", SS lifting hook 8 mm, SS foundation bolt 6 mm, SS C clamp suitable for 1"" O.D, hose, PP Rope, PP swivel nut, PP sleeve, Silicone Washer, SS hose clamp, RCC block complete at a minimum rating of 95m?/hr as per technical specification or as directed by the Engineer in Charge"			
	Net Total	3.000no	@200000.00/no	600000.00
1.007	OD235309/2022-2023			
	"Bubble Diffuser for Equalisation Tank			

Sl No	Specification	Quantity	Rate	Amount
	Supplying at site, erection, testing & commissioning of Coarse Bubble Diffuser (retrievable type using rope and pulley arrangement) for the aeration system of the Equalization Tank with diffusers of sufficient size and length made of EPDM make with SS tee 1"" x 1 "", SS lifting hook 8 mm, SS foundation bolt 6 mm, SS C clamp suitable for 1"" O.D, hose, PP Rope, PP swivel nut, PP sleeve, Silicone Washer, SS hose clamp, RCC block complete at a minimum rating of 95m?/hr as per technical specification or as directed by the Engineer in Charge"			
	Net Total	1.000no	@200000.00/no	200000.00
1.008	OD235310/2022-2023			
	"Air Grid Pipe Supply and installation of air pipes (HDPE) aly into valves and other acessories as required for the blowers to various tanks as a complete unit"			
	Net Total	4.000set	@250000.01/set	1000000.04
1.009	OD235312/2022-2023			
	"MBBR Media Supplying and fixing of non- clogging freely moving biomass media of polypropylene construction Sp.Gravity 0.93 for MBBR reactor with surface area not less than 450m/m, length 16-20 mm, dia 22 mm complete as per technical specification or as directed by Engineer in Charge"			
	Net Total	623.980cum	@15000.01/cum	9359706.24
1.010	OD235313/2022-2023			
	"Gas Chlorinator system Supply at site, erection, testing and commissioning of electronic chlorine dosing system (gas filled Chlorine) with all wetted parts in PP construction suitable for pumping Chlorine gas including booster pumps, valves, suctions and delivery lines using heavy duty PVC tubes, gas line diffusers, emergency repair kit, FRP motor cover etc.complete with all accessories. Capacity : 500gm to 1kg/hr with 2nos of chlorine tonners"			
	Net Total	1.000set	@400000.02/set	400000.02
1.011	OD235314/2022-2023			
	"Electromagnetic flow meter Supply, installation, testing and commissioning of electro magnetic/ Ultra Sonic D/F permanent conduit flow meter with flow recorder, digital flow indicator, flow integrator with sensors, 7digit totaliser, transmittal and digital display arrangements and all accessories including housing arrangements, internal data logger, to save upto 2000 linesof data etc. complete to fix as per the specifications . Flow range of 10 to 600LPS, One display shall be installed at the main control centre"			
	Net Total	2.000no	@75000.00/no	150000.00
1.012	OD235315/2022-2023			
	"Lifting Mechanism for Air Grid Supply , installation & commissioning of the manually operating chain pulley mechanism to lift the equipments from a height not less than 5m including all equipments , foundation etc"			
	Net Total	4.000no	@10000.01/no	40000.04

Sl No	Specification	Quantity	Rate	Amount
1.013	OD235316/2022-2023			
	SS Gates Supplying at site, installation testing and commissioning of all materials, fabricating, fixing and commissioning of spindle operated open channel sluice gates/shutter of DI make with a peak flow of 145LPS and velocity less than 1m/s at the inleta and outlet of the screen channel to suit the channel sizes as per drawings, tender specifications and as directed by Engineer in Charge"			
	Net Total	8.000set	@15000.00/set	120000.00
1.014	OD235318/2022-2023			
	Mechanical Fine Screen Supplying all materials, fabricating, fixing and commissioning of mechanical SS Screen Bar of following or nearest suitable size made of flats having 50mm x 10mm and 6mm clear space across the screen chamber channel (fixed type) at 70? inclination including cost of mechanical screen grab bucket and arrangement for automated scrapping clogged materials suitable for operation on 415+/-10% volts, 50 HZ, AC power supply etc. complete in all respects as required by the standard specifications complete with all accessories as per technical specification"			
	Net Total	2.000set	@60000.00/set	120000.00
1.015	OD235319/2022-2023			
	Mechanical Fine Screen Supplying all materials, fabricating, fixing and commissioning of mechanical SS Screen Bar of following or nearest suitable size made of flats having 50mm x 10mm and 6mm clear space across the screen chamber channel (fixed type) at 70 inclination including cost of mechanical screen grab bucket and arrangement for automated scrapping clogged materials suitable for operation on 415+/-10% volts, 50 HZ, AC power supply etc. complete in all respects as required by the standard specifications complete with all accessories as per technical specification"			
	Net Total	2.000set	@100000.01/set	200000.02
1.016	OD235320/2022-2023			
	"Griting Mechanism Supplying at site all electro-mechanical equipments, fabricating, fixing and commissioning of the griting mechanism to suit gritting chamber sizes as per drawings, tender specifications or as directed by Engineer in Charge."			
	Net Total	2.000no	@470000.02/no	940000.04
1.017	OD235321/2022-2023			
	"Sludge Thickener Mechanism Supplying all materials, fabricating, fixing and commissioning of Bridge mounted central driven type sludge thickening mechanism for the full diameter of the Sludge Thickener tank as per drawings including all feed well, drive and rake mechanism with removable scrappers with sufficient 3phase motor and gears etc complete as per tender specifications and as directed by Engineer in Charge"			
	Net Total	1.000no	@270000.01/no	270000.01
1.018	OD235322/2022-2023			
	Poly Electrolyte dosing system Supplying and fixing of electronic dosing pump with all wetted parts in PP			

Sl No	Specification	Quantity	Rate	Amount
	construction suitable for pumping Poly Electrolyte solution including cost of suitable agitators, control gears, valve, suction and delivery lines using heavy duty PVC tubes, HD, FRP motor cover etc. and complete with all accessories to prepare 5% solution of 0.2kg/hr"			
	Net Total	2.000no	@80000.00/no	160000.00
1.019	OD235324/2022-2023			
	"Portable Hoist - 500kg Supply and commissioning of portable Monkey type Hoist with capacity upto 500kg, with lifting height of 6m, 5HP Motor, 415V 50Hz all mounted on a suitable medium vehicle patform for easy shifting of equipments and materials whenever required with complete set as per standards"			
	Net Total	1.000no	@90000.01/no	90000.01
1.020	OD235325/2022-2023			
	"Wheel Barrow Supply of three wheel type wheel barrow of capcity 200ltrs"			
	Net Total	1.000no	@25000.00/no	25000.00
1.021	OD235326/2022-2023			
	"Aluminium Ladder Supply, Installation of aluminium ladders with caging on each elevated structures of required height as per the drawings or as directed by the Engineer in Charges"			
	Net Total	4.000no	@10000.01/no	40000.04
1.022	OD235327/2022-2023			
	"FRP Ladder Supply, Installation of FRP ladders with caging on each elevated structures of required height as per the drawings or as directed by the Engineer in Charges"			
	Net Total	4.000no	@30000.00/no	120000.00
1.023	OD235328/2022-2023			
	"Monorail Crane Supply, Installation and commissioning in position mechanically operated mono rail crane of load bearing capacity of 2tonnes suitable for operation on 415+/-10% volts, 50 HZ, AC power supply etc. with 6m lift & span upto 20m complete in all respects as required by the standard specifications complete with all accessories as per technical specification"			
	Net Total	1.000no	@350000.03/no	350000.03
1.024	OD235329/2022-2023			
	"Pressure sand filter Supply at site, erection and commissioning of pressure sand filter vertical type pressure vessel fabricated with MS construction with epoxy coating inside and anti corrosive treatment outside, two coats of paint outside (pain quality as instructed by Engineer) withstand a minimum test pressure of 7.0Kg/cm? with as operating pressure of 3.5 Kg/cm?, complete with valves and dual filter media including graded pebble and sand and antracite , frontal piping, butteryfly valves, internals, pressure gauges, strainers, supporting structure, back wash arrangement, etc and all other accessories tested twice the working pressure supported over pebble/gravel with inspection manholes etc complete as per specification or as directed by Engineer in Charge. The scope shall include complete piping with MS			

Sl No	Specification	Quantity	Rate	Amount
	fabricated pipes and specials including valves Flow Rate:52 m3/hour Diameter - 2.4m. Height - 2.5m"			
	Net Total	2.000no	@2000000.09/no	4000000.18
1.025	OD235330/2022-2023			
	Activated Carbon filter Supply at site, erection and commissioning of Activated Carbon filter vertical type pressure vessel fabricated with MS construction with epoxy coating inside and anti corrosive treatment outside, two coats of paint outside (pain quality as instructed by Engineer) withstand a minimum test pressure of 7.0Kg/cm? with as operating pressure of 3.5 Kg/cm?, complete with valves and filter media including activated carbon of approved grade and quality , frontal piping, butteryfly valves, internals, pressure gauges, strainers, supporting structure, back wash arrangement, etc and all other accessories tested twice the working pressure supported over pebble/gravel with inspection manholes etc complete as per specification or as directed by Engineer in Charge. The scope shall include complete piping with MS fabricated pipes and specials including valves Flow rate - 52 m?/hr. Diameter - 2.6m. Height - 2.5m			
	Net Total	2.000no	@2250000.10/no	4500000.20
1.026	OD235331/2022-2023			
	"Centrifuge System Supply at site, installation and commissioning of filter press /centrifuge system. Filter Press shall be automated, recessed type press with SS fabricated structure pipe button surface and SS flat parallel bar, with PP cloth. Filter operations to be mechanical. Outlet cake consistency should not be more than 35% moisture. The capacity of the filter press shall be 1cum/hr. The Filter Press Unit shall be mounted on a platform and all around drain system to be provided to prevent the filtrate water from contaminating the entire surroundings as per the specifications or as directed by the engineer in charge"			
	Net Total	2.000no	@400000.02/no	800000.04
1.027	OD235332/2022-2023			
	SLUDGE DEWATERING and Packing UNIT -Volute is a dewatering unit for convenient sludge dewatering.Machine is available for dry sludge (DS) output of 1.0kg/hr to 750kg/hr the Sludge to be dried from 70% moisture content to 10%.The similar type can be suggested.The Packing of the dried sludge to be packed in the packing machine.The necessary electrification civil works,cost of packing machine,cost of gunny bags for 6months.The machines suggested should be cost effective			
	Net Total	2.000L.S	@1200000.06/L.S	2400000.12
1.028	10.28			
	Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc., of required size on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.)			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	8.000kg	@681.61/kg	5452.88
1.029	OD255523/2022-2023			
	Piping, bypass arrangements, steel ladder, framework and fire fighting arrangements			
	Net Total	1.000no	@500000.02/no	500000.02
1.030	OD235333/2022-2023			
	Plate settler media- Media to be of UV stabilized stianless steel, 750 mm height and about 1.0 mm thick. The plan settling area should be between 10 – 12 m2/m3 /day minimum at 60 degree slope. The media is to be provided along with lock nuts as required.			
	Net Total	302.400no	@3250.00/no	982800.00
1.031	OD255524/2022-2023			
	Supply of GPS fitted vacuum truck of capacity 3000 litres for septage management including de-sludging equipment and cleaning devices			
	Net Total	2.000no	@4500000.21/no	9000000.42
1.032	OD255533/2022-2023			
	Odour control unit for co-treatment unit and STP			
	Net Total	1.000no	@1500000.07/no	1500000.07
1.033	OD255534/2022-2023			
	Hypo Dosing System - Supply, installation, commitioning and testing of Hypo dosing tank having capacity 50lit in LLDPE/ FRP/PP material and hypo dosing electronic metering type pump of 1-3lph range with 2 bar working pressure			
	Net Total	1.000no	@70000.01/no	70000.01
1.034	OD255535/2022-2023			
	Alum and Lime Dosing System- Supply, installation, commitioning and testing of Alum dosing tank having capacity 50 litre in LLDPE/ FRP/PP material and alum dosing electronic metering type pump of 1-3 LPH range with 2.5 bar working pressure			
	Net Total	1.000no	@80000.00/no	80000.00
1.035	OD256582/2022-2023			
	Steel trussed support for steel brackets, channels, and other elements to hold plates and clarified water channels including supplying, fixing and testing etc. with high quality steel elements coated with non-corrosive layers as per design and modifications as per performance			
	Net Total	1.000no	@226195.01/no	226195.01
1.036	OD256653/2022-2023			
	Supply, installation and commissioning of solar units for STP			
	Net Total	1.000no	@2000000.09/no	2000000.09
	Heading Total(Rs)			51714155.53
2	**ELECTRICAL WORKS**			

Sl No	Specification	Quantity	Rate	Amount
2.001	OD235336/2022-2023			
	: "500kVA Indoor Transformer and 11 kv indoor free standing cubcle type vcb switch gear panel of suitable capacity Supplying, installation, testing and commissioning of 500KVA, 11KV/433V, 3 Phase, 50 Hz, Dyn 11, indoor ONAN type, copper wound transformer with OFF load tap changing arrangement on HV and LV side complete with all accessories i/c first filling of filtered dehydrated oil and confirming to IS 2026 (Part 1 to Part 5) & as per specification attached complete in all respects as required at site or as directed by the Engineer In Charge including suuply installation commissioning of suitable rated 11kv cubicle type vcb panel and suitable rated 11kv cable and termination			
	Net Total	1.000no	@1500000.07/no	1500000.07
2.002	OD235337/2022-2023			
	CT - PT Unit and TOD meter Supplying, installation, testing and commissioning of Indoor type 11KV CT-PT Unit 3Phase Dry type confirming to IS 2026 (Part 1 to Part 5) & as per KSEB specification complete in all respects as required at site or as directed by the Engineer In Charge"			
	Net Total	1.000set	@200000.01/set	200000.01
2.003	OD235338/2022-2023			
	"10kA Surge (Lightining Arrester) Supply & Installation of Heavy Duty hot dipped galvanized 10kA lightining arrester suitable for the 11kV incoming line complying IS: 3070 (Part - III) &IEC 60099 - 4 (2009) 50Hz, rated voltage of 12kV with a operating load of 10kV with terminals made of MS/Aluminium with Zinc plating full set or as directed by the Engineer in Charge"			
	Net Total	2.000no	@4000.00/no	8000.00
2.004	OD235339/2022-2023			
	Main LT panel Supplying, installation, testing and commissioning of S3phase 415V, 50Hz, floor mounted MS Cubicle type panel board suitable for connecting 350 kva transformer and all motors including all inter connections, wiring in all etc using 14 gauge CRCA sheet painted with 2coats of superior quality enamel paint of approved color over a coat of superior quality iron primer of approved quality as per specification complete in all respects as required at site conforming to relevant BIS standards and KSEB standards or as directed by the Engineer In Charge.			
	Net Total	1.000no	@350000.03/no	350000.03
2.005	OD235340/2022-2023			
	"Earthing Equipments for Transformer Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 meter long etc. with charcoal/ coke and salt as required."			
	Net Total	1.000L.S	@250000.02/L.S	250000.02
2.006	OD235341/2022-2023			
	"500KVA Diesel Generator Providing, Installing, Testing and Commissioning of ?Silent Type? Diesel Generating set alongwith having Prime Power Rating of 250 KVA, 415 volts at 1500 RPM, 0.8 lagging power factor at 415 V suitable for 50 Hz, 3 phase system& for 0.85 Load Factor .			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	1.000no	@1300000.05/no	1300000.05
2.007	OD235342/2022-2023			
	"Auto Mains Failure Unit (AMF Panel) Fabricating, Installing, Testing & Commissioning of automatic mains failure control including auto by- pass panel, suitable for 250 KVA silent type DG set complete with relays, timers, set of CTs for metering & protection and energy analyser to indicate currents, phase and line voltages, frequency, power factor, KWH, KVARH & provision for overload, short circuit, restricted earth fault, under frequency, control cabling from AMF panel to diesel engine and elsewhere if required, all complete .			
	Net Total	1.000no	@200000.01/no	200000.01
2.008	OD235343/2022-2023			
	"Earthing Equipments for DG Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 meter long etc. with charcoal/ coke and salt as required."			
	Net Total	1.000L.S	@90000.00/L.S	90000.00
2.009	OD235344/2022-2023			
	"Main Control Centre Design, Fabrication, Supply, Installation and commissioning of Electrical Control Panel of cubical construction with fully automated feature (indoor type) preferably floor mounted fabricated of 2mm thick CRCA Sheets compartmenatised with hinge lock doors with Dust, vermi proof and powder coated with approved shade. The panel shall have enough size to accomadate the individual control centres of each equipment set with individual MCCB's/MCB of appropriate capacity and also to have provision for Busbars, ACBs & RCCB's as specified below with cable alley, interconnections having all accessories mounting and internal wiring, earth terminals, numbering etc, complete in all respect suitable for operation on 415V, 3 phase 50Hz AC supply with enclosure protection class IP 54 as required. Including supply, installation, termination testing & Commissioning of the all power and control cables as per specifications or as directed by the Engineer In Charge."			
	Net Total	1.000L.S	@2000000.09/L.S	2000000.09
2.010	OD235345/2022-2023			
	Wiring for Each equipment Supplying and Laying of PVC insulated and PVC sheathed / XLPE power cable of Aluminium conductor XLPE power cables as per IS:7098/Part-I/88 with latest ammendments 1.1 kv grad of required size direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc. as required in the specifications or as directed by the Engineer in Charge.			
	Net Total	1.000L.S	@1400000.06/L.S	1400000.06
2.011	OD235346/2022-2023			
	Brass Glands & Aluminium Lugs Supplying and making end termination with brass compression gland and aluminium lugs for required size of PVC insulated and PVC sheathed I XLPE aluminium conductor cable of 1.1 kV grade as required.			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	1.000L.S	@250000.02/L.S	250000.02
2.012	OD235347/2022-2023			
	"Power Distribution Board (Control Room & Centrifuge Building) Supplying and fixing of following ways surface/ recess mounting, vertical type, 415 V, TPN MCB distribution board of sheet steel, dust protected, duly powder painted, inclusive of 200 A, tinned copper bus bar, common neutral link, earth bar, din bar for mounting MCBs (but without MCBs and incomer) as required. (Note : Vertical type MCB TPDB is normally used where 3 phase outlets are required.) 12 way (4 + 36), Double door (i) Incoming - 63A MCCB & 63A , 100mA RCCB ii) Outgoing Feeders - 4Nos of 25A MCCB with 25A, 30mA RCCBs iii) Outgoing Feeders - 1Nos of 6A MCB iv) Outgoing Feeders - 2Nos Spares"			
	Net Total	1.000L.S	@60000.00/L.S	60000.00
2.013	OD235348/2022-2023			
	"Wiring & Lighting accessories :- Wiring for circuit/submain wiring along with earthwire with required sizes of FRLS PVC insulated copper conductor,supply and fitting of GI boxes along with modular base and cover plates,supplying and fixing following modular switch/ sockets,supply,installation,testing and commissioning of all accessories and fixtures as approved by dept.			
	Net Total	1.000L.S	@250000.02/L.S	250000.02
2.014	OD235349/2022-2023			
	"EXTERNAL LIGHTING Providing external lighting arrangements by supplying and laying of PVC insulated and PVC sheathed / XLPE power cable of Copper conductor XLPE control cables as per is:7098/Part-I/88 with latest amendments 1.1 kv grade of required size direct in ground including MCCB/MCB/RCCB,supply and erection of mettalic poles,strret light poles,earthing and safety equipments ,fire extinguishers ,etc . complete including necessary excavation, sand cushioning, protective covering and refilling the trench etc. as required in the specifications or as directed by the Engineer in Charge."			
	Net Total	1.000L.S	@1400000.06/L.S	1400000.06
			Heading Total(Rs)	9258000.44
3	**CHARGES FOR POWER ALLOCATION TO KSEB AND POWER EXTENSION BY CABLE**			
3.001	OD235350/2022-2023			
	Charges for Power allocation to KSEB and power extension by cable			
	Net Total	1.000L.S	@8000000.00/L.S	8000000.00
			Heading Total(Rs)	8000000.00
4	**TOOLS AND PLANTS**			
4.001	OD235335/2022-2023			
	Tools and Plants			
	Net Total	1.000L.S	@200000.00/L.S	200000.00

Sl No	Specification	Quantity	Rate	Amount
			Heading Total(Rs)	200000.00
			Total Estimation PAC	69172155.97
6	**Extra Charges**			
5.001	Provision for GST			
		69172155.97	18.00%	12450988.07
			Grand Total	0.00
			Round off	0.00
			Rounded Total(Rs)	81623144.04
	Rupees Eight Crore Sixteen Lakh Twenty Three Thousand One Hundred and Forty Four			

Assistant Engineer
Sewerage Camp Office
Kerala Water Authority
Malappuram-676 505

Assistant Executive Engineer
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Executive Engineer (i/c)
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Superintending Engineer
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Office of the Superintending Engineer
Kerala Water Authority
Kochi - 682011
PPD Regional Office

GENERAL ABSTRACT

Others-SEWERAGE SCHEME TO HARBOUR AREA IN PONNANI MUNICIPALITY-CONSTRUCTION OF 3.5 MLD CAPACITY SEWERAGE TREATMENT PLANT AND LAYING

SEWERAGE NETWORK-SEWERAGE NETWORK-Sewerage Work

Sl No	Head Description		Amount
1	LAYING OF SEWER NETWORK		107182083.83
2	CONSTRUCTION OF MANHOLES		99551310.90
3	COLLECTION WELLS, LIFTING STATIONS AND ALLIED WORKS		7181683.75
4	PUMPING MAINS		8451039.51
5	WATER SUPPLY AND SANATORY ARRANGEMENTS, ELECTRICAL WIRING IN PUMPING STATIONS		800000.00
6	MECHANICAL, ELECTRICAL-PUMPSETS, GRIT CHAMBER SCREEN, GENERATOR, TRANSFORMER & ALLIED WORKS COMPLETE		13885500.75
7	LINE EXTENSION, DEPOSIT TO KSEB, ETC		400000.00
8	SEWERAGE SERVICE CONNECTION CHARGES		27600000.00
9	PWD & NH - BM&BC ROAD REFORMATION WORK WITH MORTH SPECIFICATION		17900612.15
10	PWD - BT ROAD REFORMATION WORK WITH MORTH SPECIFICATION		2815816.99
11	MUNICIPALITY (BT) ROAD REFORMATION WORK WITH MoRD SPECIFICATION		15235618.71
12	HARBOUR DEPT ROAD REFORMATION WORK WITH MoRD SPECIFICATION		2823952.21
13	INTERCEPTION AND DIVERSION WORK		1047487.03
	Total Estimation PAC		304875105.83
C	**Extra Charges**		
C.001	Provision for GST		
	304875105.83	18.00%	54877519.05
	Grand Total		0.00
	Round off		0.00
	Rounded Total(Rs)		359752624.88
	Rupees Thirty Five Crore Ninety Seven Lakh Fifty Two Thousand Six Hundred and Twenty Four		

DETAILED ESTIMATE

Others-SEWERAGE SCHEME TO HARBOUR AREA IN PONNANI MUNICIPALITY-CONSTRUCTION OF 3.5 MLD CAPACITY SEWERAGE TREATMENT PLANT AND LAYING

SEWERAGE NETWORK-SEWERAGE NETWORK-Sewerage Work

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
1	LAYING OF SEWER NETWORK						
1.001	100.59.1						
	Cutting the bituminous / concrete roads with cutting machine for a minimum depth of 200mm along the sides of proposed alignment of the pipe to be laid without causing any damage to other utilities, including the charges for hire and conveyance of tools and plant, cost of consumables and charges for lighting, watching, ribbon fencing, caution boards, traffic diversion, and as per the direction of departmental officers etc. complete, before carrying out the demolition of bituminous / concrete road by mechanical means and carrying out the excavation.						
	Cutting the bituminous / concrete roads						
	Sewer lines from 225mm to 630 mm(PWD BT)	2	586.700				1173.400
	Deduction for HDD -Sewer lines from 225mm to 630 mm(PWD BT)	-2	80.400				-160.800
	Sewer lines from 225mm to 630 mm(NH BMBC)	2	3437.500				6875.000
	Deduction for HDD-Sewer lines from 225mm to 630 mm(NH BMBC)	-2	1129.800				-2259.600
	Sewer lines from 225mm to 630 mm(MT BT)	2	4655.200				9310.400
	Deduction for HDD-Sewer lines from 225mm to 630 mm(MT-BT)	-2	1534.800				-3069.600
	Sewer lines from 225mm to 630 mm(HARBOUR Dept. ROAD)	2	990.900				1981.800

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Deduction for HDD-Sewer lines from 225mm to 630 mm(HARBOUR Dept. ROAD)	-2	320.000				-640.000
	MH to IC- PWD BT	2	176.000				352.000
	MH to IC- NH BMBC	2	1016.000				2032.000
	MH to IC- MT BT	2	1328.000				2656.000
	MH to IC- HARBOUR Dept. ROAD	2	256.000				512.000
	Total						**18762.600**
						Total Quantity in metre	**18762.600**
1.002	15.43.2						
	Dismantling manually / by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer -in-Charge:Bituminous road						
	Bituminus road						
	Sewer lines from 225mm to 630 mm(PWD BT)	1	586.700	1.500			880.050
	Deduction for HDD -Sewer lines from 225mm to 630 mm(PWD BT)	-1	80.400	1.500			-120.600
	Sewer lines from 225mm to 630 mm(NH BMBC)	1	3437.500	1.500			5156.250
	Deduction for HDD-Sewer lines from 225mm to 630 mm(NH-BMBC)	-1	1129.800	1.500			-1694.700
	Sewer lines from 225mm to 630 mm(MT BT)	1	4655.200	1.500			6982.800

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Deduction for HDD-Sewer lines from 225mm to 630 mm(MT-BT)	-1	1534.800	1.500			-2302.200
	Sewer lines from 225mm to 630 mm(HARBOUR Dept. ROAD)	1	990.900	1.500			1486.350
	Deduction for HDD-Sewer lines from 225mm to 630 mm(HARBOUR Dept. ROAD)	-1	320.000	1.500			-480.000
	MH to IC- PWD BT	1	176.000	0.700			123.200
	MH to IC- NH BMBC	1	1016.000	0.700			711.200
	MH to IC- MT BT	1	1328.000	0.700			929.600
	MH to IC- HARBOUR Dept. ROAD	1	256.000	0.700			179.200
	Total						**11851.150**
						Total Quantity in sqm	**11851.150**
1.003	100.8.2						
	Fencing 1.50m high with two rows of casuarina poles (girth 15cm to 24cm) tied with coir yarn on vertical casuarina pole (girth 15cm to 24cm) fixed at 1.5m intervals.						
	Fencing 1.50m high with two rows of casuarina poles (girth 15cm to 24cm) tied with coir yarn on vertical casuarina pole (girth 15cm to 24cm) fixed at 1.5m intervals.						
	Sewer lines from 225mm to 630 mm	1	6605.300			0.300000	1981.590
	Inspection chamber to manhole - 160mm pvc	1	2776.000			0.300000	832.800
	Total						**2814.390**
						Total Quantity in metre	**2814.390**
1.004	100.8.1						
	Fencing one side of trenches, 1.50m height with two rows of 10cm plastic caution tape in vertical casuarina pole (girth 15cm to 24cm) fixed at 2m intervals.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Fencing one side of trenches, 1.50 m height with two rows of 10 cm plastic caution tape in vertical casuarina pole (girth 15cm to 24cm) fixed at 2 m intervals.						
	Sewer lines from 225mm to 630 mm	1	6605.300			0.700000	4623.710
	Inspection chamber to manhole - 160mm pvc	1	2776.000			0.700000	1943.200
	Total						**6566.910**
						Total Quantity in metre	**6566.910**
1.005	100.1.1						
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50m, in all kinds of soil.						
	Excavating trenches of required width for pipes, cables, etc including excavation for sockets,						
	Quantity from calculation sheet	1	9692.720			0.800000	7754.176
	Inspection chamber to manhole - 160mm pvc	1	2776.000	0.700	1.000	0.800000	1554.560
	Deducting BT demolishing QTY	-1	11851.150		0.300		-3555.345
	Total						**5753.391**
						Total Quantity in cum	**5753.391**
1.006	100.1.5						
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50 m, in Ordinary Rock.						
	Excavating trenches of required width for pipes, cables, etc including excavation for sockets,						
	Quantity from calculation sheet	1	9692.720			0.200000	1938.544
	Inspection chamber to manhole - 160mm pvc	1	2776.000	0.700	1.000	0.200000	388.640

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**2327.184**
						Total Quantity in cum	**2327.184**
1.007	100.1.2						
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth exceeding 1.5m but not exceeding 3m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50m, in all kinds of soil.						
	Excavating trenches of required width for pipes, cables, etc including excavation for sockets						
	Quantity from calculation sheet	1	3042.760			0.750000	2282.070
	Total						**2282.070**
						Total Quantity in cum	**2282.070**
1.008	100.2.8						
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth exceeding 1.5m but not exceeding 3m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50m, in Medium Rock where Blasting is Prohibited.						
	Excavating trenches of required width for pipes, cables, etc including excavation for sockets,						
	Quantity from calculation sheet	1	3042.760			0.250000	760.690
	Total						**760.690**
						Total Quantity in cum	**760.690**
1.009	2.17.3						
	Close timbering in case of shafts, wells, cesspits, manholes and the like including strutting, shoring and packing cavities (wherever required) etc. complete (Measurements to be taken of the face area timbered).Depth exceeding 3 m but not exceeding 4.5 m						
	Close timbering in case of shafts, wells, cesspits, manholes and the like including strutting, shoring						
		2	4170.800		3.000	0.300000	7507.440
	Total						**7507.440**
						Total Quantity in sqm	**7507.440**
1.010	2.23						
	Extra for planking and strutting in open timbering if required to be left permanently in position (Face area of the timber permanently left to be measured).						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Extra for planking and strutting in open timbering if required to be left permanently in position						
		2	6605.300	3.000		0.030000	1188.954
	Total						**1188.954**
						Total Quantity in sqm	**1188.954**
1.011	OD235696/2022-2023						
	Supplying, Providing bedding with m sand for sewer lines as per specifications to be laid wherever necessary with all lead and lift.						
	Supplying, Providing bedding with m sand for sewer lines as per specifications to be laid wherever necessary with all lead and lift.						
	beding for lines	1	6605.300	0.600	0.100	0.250000	99.080
	Total						**99.080**
						Total Quantity in cum	**99.080**
1.012	4.1.3						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand (zone-III) : 4 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level: 1:2:4						
	beding for lines	1	6605.300	0.600	0.100	0.250000	99.080
	Total						**99.080**
						Total Quantity in cum	**99.080**
1.013	100.7.2						
	Bailing out water with engine and pump set above 5HP up to 10HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water using pump above 5 HP and Up to 10 HP-Bailing out water with engine and pump set above 5HP						
	Bailing out water using pump above 5 HP and Up to 10 HP	20	8.000	5.000*0.746			596.800
	Total						**596.800**
						Total Quantity in Kwh	**596.800**
1.014	100.7.3						
	Bailing out water with engine and pump set above 10HP up to 20HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Bailing out water using pump above 10 HP and Up to 20 HP - Bailing out water with engine and pump set above 10HP and up to 20HP						
	Bailing out water using pump above 10 HP and Up to 20 HP	20	8.000	15*0.746			1790.400
	Total						**1790.400**
						Total Quantity in Kwh	**1790.400**
1.015	100.7.4						
	Bailing out water with engine and pump set above 20HP up to 30HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water using pump above 20 HP and Up to 30 HP -Bailing out water with engine and pump set above 25HP and up to 30HP						
	Bailing out water using pump above 20 HP and Up to 30 HP	20	8.000	25*0.746			2984.000
	Total						**2984.000**
						Total Quantity in Kwh	**2984.000**
1.016	100.98.226						
	Supply of PVC Pipe, 8kg/cm2, 160mm Dia.						
	Supply of uPVC Pipe, IS 4985: 2000 , 8kg/cm2, 160mm Dia.						
	MH to IC	1	2776.000				2776.000
	Total						**2776.000**
						Total Quantity in metre	**2776.000**
1.017	OD235697/2022-2023						
	Conveying to site, lowering into trenches, laying to correct line and grade using CC holding clamps, 160mm PVC SN 8 (8 Kg/Cm2) S & S Sewerage pipes conforming to I.S.15328, including jointing the pipes using rubber rings as per approved methods with rubber gasket for flexible joints as per specification including cost of gasket, to correct line , de watering with all rates of recuperation etc, providing bedding for pipe line trenches with available earth, hydraulic testing the line to the required test pressure as per IS, CPHEEO specifications, lighting, watching, providing caution boards etc. wherever required, during laying and jointing the pipes including hire for all tools etc complete including commissioning for the following diamters						
	Conveying to site, lowering into trenches, laying to correct line and grade using CC holding clamps, 160mm PVC						
	MH to IC	1	2776.000				2776.000
	Total						**2776.000**
						Total Quantity in metre	**2776.000**
1.018	OD235698/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 225mm Outer Dia.						
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 225mm Outer Dia.						
	PE Pipe - 225 mm	1	5612.700				5612.700
	Total						**5612.700**
						Total Quantity in metre	**5612.700**
1.019	OD235699/2022-2023						
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 280mm Outer Dia.						
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 280 mm Outer Dia						
	PE Pipe - 280 mm	1	279.000				279.000
	Total						**279.000**
						Total Quantity in metre	**279.000**
1.020	OD235700/2022-2023						
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 355 mm Outer Dia.						
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 355 mm Outer Dia						
	PE Pipe - 355 mm	1	1048.600				1048.600
	Total						**1048.600**
						Total Quantity in metre	**1048.600**
1.021	OD235701/2022-2023						
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 450 mm Outer Dia.						
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 450 mm Outer Dia.						
	PE Pipe - 450 mm	1	405.300				405.300
	Total						**405.300**
						Total Quantity in metre	**405.300**
1.022	OD239661/2022-2023						
	Supply of PE Pipe PE 100 (IS 4984/1995), 8kg, 560mm Outer Dia.						
	Supply of PE Pipe PE 100 (IS 4984/1995), 8kg, 560mm Outer Dia.						
	PE Pipe - 560 mm	1	558.100				558.100
	Total						**558.100**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in metre	**558.100**
1.023	OD239660/2022-2023						
	Supply of PE Pipe 100 (IS 4984/1995), 8kg, 630mm Outer Dia.						
	Supply of PE Pipe 100 (IS 4984/1995), 8kg, 630mm Outer Dia.						
	PE Pipe - 630 mm	1	1766.600				1766.600
	Total						**1766.600**
						Total Quantity in metre	**1766.600**
1.024	100.10.8						
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 225mm Nominal Outside Diameter Pipes.						
	Laying HDPE pipes (IS : 4984)on land portion including conveying within initial lead and aligning the pipes						
	PE Pipe - 225 mm	1	4963.400				4963.400
	Total						**4963.400**
						Total Quantity in metre	**4963.400**
1.025	100.10.10						
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 280mm Nominal Outside Diameter Pipes.						
	Laying 280mm OD PE pipe						
	PE Pipe - 280 mm	1	69.000				69.000
	Total						**69.000**
						Total Quantity in metre	**69.000**
1.026	100.10.12						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 355mm Nominal Outside Diameter Pipes.						
	Laying 355mm OD PE pipe						
		1	740.500				740.500
	Total						**740.500**
						Total Quantity in metre	**740.500**
1.027	100.10.14						
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 450mm Nominal Outside Diameter Pipes.						
	Laying 450mm OD PE pipe						
	PE Pipe - 450 mm	1	371.900				371.900
	Total						**371.900**
						Total Quantity in metre	**371.900**
1.028	100.10.16						
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 560mm Nominal Outside Diameter Pipes.						
	Laying 560mm OD PE pipe						
	PE Pipe - 560 mm	1	331.600				331.600
	Total						**331.600**
						Total Quantity in metre	**331.600**
1.029	100.10.17						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 630mm Nominal Outside Diameter Pipes.						
	Laying 630 mm ODPE pipes						
	630 mm	1	128.900				128.900
	Total						**128.900**
						Total Quantity in metre	**128.900**
1.030	OD235702/2022-2023						
	Constructing inspection chambers of size 0.45x0.45m (inside) and 0.45m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, , plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber						
	Constructing inspection chambers of size 0.45x0.45m (inside) and 0.45m deep with RCC M20						
	inspection chambers	1	174.000				174.000
	Total						**174.000**
						Total Quantity in no	**174.000**
1.031	OD235703/2022-2023						
	Constructing inspection chambers of size 0.45x0.45m (inside) and 0.60m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for levelling course below foundation including earth work excavation in all classes of soil,, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber						
	Constructing inspection chambers of size 0.45x0.45m (inside) and 0.60m deep with RCC M20						
	inspection chambers	1	104.000				104.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**104.000**
						Total Quantity in no	**104.000**
1.032	OD235704/2022-2023						
	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.60m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber						
	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.60m deep with RCC M20						
	inspection chambers	1	139.000				139.000
	Total						**139.000**
						Total Quantity in no	**139.000**
1.033	OD235705/2022-2023						
	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.75m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber						
	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.75m deep with RCC M20						
	inspection chambers	1	139.000				139.000
	Total						**139.000**
						Total Quantity in no	**139.000**
1.034	OD235706/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.90m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber						
	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.90m deep with RCC M20						
	inspection chambers	1	138.000				138.000
	Total						**138.000**
						Total Quantity in no	**138.000**
1.035	OD235707/2022-2023						
	Installation of PE pipe between 110mm & 225mm outer dia by HDD method for on grade gravity sewer including preparing and setting up the plant and equipment,preparing new pipe work material making of entry pit and exit pit up to required depth installing new pipe work and commissioning system or making the system or making the system ready for commissioning by HDD operating including all related civil and mechanical works like excavation shoring/strutting etc drilling stringing reaming and pulling back the new pipe work on the designed borne path alignment proper disposal of drilling fluid and back fill of site after completion all inclusive as per Conditions PE pipes also using Ground penetrating radar survey in corridor with to detect buried utilities on the map of corridor with information of locations and depths to the top of various utilities detected .work to be conducted using 500MHZ and 300MHZ antenna or latest forthe best possible resolution and penetration						
	Installation of PE pipe between 110mm & 225mm outer dia by HDD method for on grade						
	225mm outer dia by HDD method	1	649.300				649.300
	Total						**649.300**
						Total Quantity in metre	**649.300**
1.036	OD235708/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Installation of PE -250mm-315mm mm dia PE pipe by horizontal directional drilling method in all types of soil above /below water table for pumping /gravity /distribution main including preparing and setting up the plat and equipment, installing new pipe work, testing and commissioning excluding cost of pipe (6 m line pipe with butt joint all related civil /mechanical works like entry /exits pit as necessary. De watering ,drilling stringing, reaming, pulling back the new pipe on the designed alignment and monitoring by approved guidance system. wastage of pipes, proper disposal of drilling fluid /bentonite slurry. Proper back filling og pit and holes by approved borrow material as per specification approved method statement or as directed by engineer in charge. also using Ground penetrating radar survey in corridor with to detect buried utilities on the map of corridor with information of locations and depths to the top of various utilities detected .work to be conducted using 500MHZ and 300MHZ antenna or latest for the best possible resolution and penetration including hydrolic testing						
	Installation of PE -250mm-315mm mm dia PE pipe by horizontal directional drilling method						
	Laying 280mm OD PE pipe-HDD	1	210.000				210.000
	Total						**210.000**
						Total Quantity in metre	**210.000**
1.037	OD235709/2022-2023						
	Installation of PE -355mm-500mm mm dia PE pipe by horizontal directional drilling method in all types of soil above /below water table for pumping /gravity /distribution main including preparing and setting up the plant and equipment, installing new pipe work, testing and commissioning excluding cost of pipe (6 m line pipe with butt joint all related civil /mechanical works like entry /exits pit as necessary. Dewatering, drilling stringing, reaming, pulling back the new pipe on the designed alignment and monitoring by approved guidance system. wastage of pipes, proper disposal of drilling fluid /bentonite slurry. Proper back filling pit and holes by approved borrow material as per specification approved method statement or as directed by engineer in charge. Also using Ground penetrating radar survey in corridor with to detect buried utilities on the map of corridor with information of locations and depths to the top of various utilities detected. Work to be conducted using 500MHZ and 300MHZ antenna or latest for the best possible resolution and penetration including hydraulic testing						
	Installation of PE -355mm-500mm mm dia PE pipe by horizontal directional drilling method						
	Laying 355mm OD PE pipe-HDD	1	308.100				308.100
	Laying 450mm OD PE pipe-HDD	1	33.400				33.400
	Total						**341.500**
						Total Quantity in metre	**341.500**
1.038	OD235710/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Installation of PE -550mm-610mm mm dia PE pipe by horizontal directional drilling method Installation of HDPE -550mm-610mm mm dia PE pipe by horizontal directional drilling method -Add 20% increase to the Installation of HDPE -355mm-500mm mm dia PE pipe by horizontal directional drilling method						
	Installation of PE -550mm-610mm mm dia PE pipe by horizontal directional drilling method						
	Laying 560mm OD PE pipe-HDD	1	226.500				226.500
	Total						**226.500**
						Total Quantity in metre	**226.500**
1.039	OD239701/2022-2023						
	Installation of PE -630 mm-710 mm mm dia PE pipe by horizontal directional drilling method Installation of HDPE -630 mm-710mm mm dia PE pipe by horizontal directional drilling method -Add 20% increase to the Installation of HDPE -550 mm-610 mm mm dia PE pipe by horizontal directional drilling method						
	Installation of PE -630 mm-710 mm mm dia PE pipe by horizontal directional drilling method						
	Laying 630 mm OD PE pipe-HDD	1	1637.700				1637.700
	Total						**1637.700**
						Total Quantity in metre	**1637.700**
2	CONSTRUCTION OF MANHOLES						
2.001	100.3.1.1						
	Earthwork in open well excavation (above water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift up to 1.5m including neat banking.						
	Earthwork in open well excavation						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.2*1.2	1.500		617.198
	MH 1.2Dia ,2.5M Depth	112	3.140	1.3*1.3	1.500		891.509
	MH 1.5Dia ,3.5M Depth	93	3.140	1.55*1.55	1.500		1052.367
	MH 1.5Dia ,4.5M Depth	48	3.140	1.55*1.55	1.500		543.157
	MH 1.8Dia ,5.5M Depth	3	3.140	1.7*1.7	1.500		40.836
	Total						**3145.067**
						Total Quantity in cum	**3145.067**
2.002	100.3.1.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Earthwork in open well excavation (above water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 1.5m to 3.0m including neat banking.						
	Earthwork in open well excavation						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.2*1.2	0.700		288.026
	MH 1.2Dia ,2.5M Depth	112	3.140	1.3*1.3	1.500		891.509
	MH 1.5Dia ,3.5M Depth	93	3.140	1.55*1.55	1.500		1052.367
	MH 1.5Dia ,4.5M Depth	48	3.140	1.55*1.55	1.500		543.157
	MH 1.8Dia ,5.5M Depth	3	3.140	1.7*1.7	1.500		40.836
	Total						**2815.895**
						Total Quantity in cum	**2815.895**
2.003	100.3.1.13						
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.5m including neat banking.						
	Earthwork in open well excavation						
	MH 1.2Dia ,2.5M Depth	112	3.140	1.3*1.3	0.250		148.585
	MH 1.5Dia ,3.5M Depth	93	3.140	1.55*1.55	1.200		841.894
	MH 1.5Dia ,4.5M Depth	48	3.140	1.55*1.55	1.500		543.157
	MH 1.8Dia ,5.5M Depth	3	3.140	1.7*1.7	1.500		40.836
	Total						**1574.472**
						Total Quantity in cum	**1574.472**
2.004	100.3.1.14						
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.0m including neat banking.						
	Earthwork in open well excavation						
	MH 1.5Dia ,4.5M Depth	48	3.140	1.55*1.55	0.800		289.684
	MH 1.8Dia ,5.5M Depth	3	3.140	1.7*1.7	1.500		40.836
	Total						**330.520**
						Total Quantity in cum	**330.520**
2.005	100.3.1.15						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 6.0m to 7.5m including neat banking.						
	Earthwork in open well excavation						
	MH 1.8Dia ,5.5M Depth	3	3.140	1.7*1.7	0.300		8.167
	Total						**8.167**
						Total Quantity in cum	**8.167**
2.006	100.6.1						
	Providing steel sheet shoring to the sides of the trenches to depths of above 4.00 m but not exceeding 6.00m using 6 mm M.S. sheet 0.50 M wide stiffen on edges with 50 mm x 50mm x 6 mm M.S. angles driving down vertically on either side one after another in lines and levels with suitable pile driving equipments and accessories to a maximum depth of 0.50 M below the bottom of the proposed excavation 0.5 M above ground level suitably braced by horizontal walling pieces at 75 x 150 mm x 8 mm angles on either side at intervals not exceeding 1.50M and horizontal screw jack type struts at 1.50M intervals and maintaining the shoring till the pipes are laid and works are completed, dismantling, cleaning and restacking for reuse including all labour, hire charges and conveyance for equipments, tools and plants and sundries etc. complete.						
	Providing steel sheet shoring						
	MH 1.2Dia ,1.5M Depth	91	3.140	2.400	2.200		1508.707
	MH 1.2Dia ,2.5M Depth	112	3.140	2.600	3.250		2971.696
	MH 1.5Dia ,3.5M Depth	93	3.140	3.100	4.300		3892.627
	MH 1.5Dia ,4.5M Depth	48	3.140	3.100	5.300		2476.330
	MH 1.8Dia ,5.5M Depth	3	3.140	3.400	6.000		192.168
	Total						**11041.528**
						Total Quantity in sqm	**11041.528**
2.007	100.6.S.1						
	Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete. (excluding cost of materials)						
	Structural steel work in single section,						
	MH 1.2Dia ,1.5M Depth	91	3.140	2.400	2.200	0.300000	452.612
	MH 1.2Dia ,2.5M Depth	112	3.140	2.600	3.250	0.300000	891.509
	MH 1.5Dia ,3.5M Depth	93	3.140	3.100	4.300	0.300000	1167.788

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	MH 1.5Dia ,4.5M Depth	48	3.140	3.100	5.300	0.300000	742.899
	MH 1.8Dia ,5.5M Depth	3	3.140	3.400	6.000	0.300000	57.650
	Total						**3312.458**
						Total Quantity in kilogram	**3312.458**
2.008	100.7.1						
	Bailing out water with 5HP engine and pump set including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water						
	MH 1.2Dia ,1.5M Depth	91	1.000	8.000	5*.746		2715.440
	MH 1.2Dia ,2.5M Depth	112	1.000	8.000	5*.746		3342.080
	MH 1.5Dia ,3.5M Depth	93	1.000	8.000	5*.746		2775.120
	MH 1.5Dia ,4.5M Depth	48	2.000	8.000	5*.746		2864.640
	MH 1.8Dia ,5.5M Depth	3	2.000	8.000	5*.746		179.040
	Total						**11876.320**
						Total Quantity in Kwh	**11876.320**
2.009	100.7.4						
	Bailing out water with engine and pump set above 20HP up to 30HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water						
	MH 1.2Dia ,2.5M Depth	112	1.000	6.000	5*.746		2506.560
	MH 1.5Dia ,3.5M Depth	93	1.000	6.000	5*.746		2081.340
	MH 1.5Dia ,4.5M Depth	48	1.000	6.000	5*.746		1074.240
	MH 1.8Dia ,5.5M Depth	3	1.000	6.000	5*.746		67.140
	Total						**5729.280**
						Total Quantity in Kwh	**5729.280**
2.010	4.1.6						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	Providing and laying in position cement concrete						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.2*1.2	0.150		61.720
	MH 1.2Dia ,2.5M Depth	112	3.140	1.3*1.3	0.150		89.151
	MH 1.5Dia ,3.5M Depth	93	3.140	1.55*1.55	0.150		105.237
	MH 1.5Dia ,4.5M Depth	48	3.140	1.55*1.55	0.150		54.316
	MH 1.8Dia ,5.5M Depth	3	3.140	1.7*1.7	0.150		4.084
	Total						**314.508**
						Total Quantity in cum	**314.508**
2.011	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Base Slab						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.2*1.2	0.350		144.013
	MH 1.2Dia ,2.5M Depth	112	3.140	1.3*1.3	0.400		237.736
	MH 1.5Dia ,3.5M Depth	93	3.140	1.55*1.55	0.450		315.710
	MH 1.5Dia ,4.5M Depth	48	3.140	1.55*1.55	0.450		162.947
	MH 1.8Dia ,5.5M Depth	3	3.140	1.7*1.7	0.450		12.251
	Total						**872.657**
	Top slab						
	MH 1.2Dia ,1.5M Depth	91	3.140	.85*.85	0.200		41.289
	MH 1.2Dia ,2.5M Depth	112	3.140	.9*.9	0.200		56.972

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	MH 1.5Dia ,3.5M Depth	93	3.140	1.1*1.1	0.200		70.669
	MH 1.5Dia ,4.5M Depth	48	3.140	1.1*1.1	0.200		36.474
	MH 1.8Dia ,5.5M Depth	3	3.140	1.25*1.25	0.200		2.944
	Deduction	-347	3.140	.28*.28	0.200		-17.085
	Total						**191.263**
	Wall						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.450	0.250	1.500000	155.371
	MH 1.2Dia ,2.5M Depth	112	3.140	1.550	0.300	2.500000	408.828
	MH 1.5Dia ,3.5M Depth	93	3.140	1.850	0.350	3.500000	661.790
	MH 1.5Dia ,4.5M Depth	48	3.140	1.850	0.350	4.500000	439.160
	MH 1.8Dia ,5.5M Depth	3	3.140	2.150	0.350	5.500000	38.987
	Total						**1704.136**
						Total Quantity in cum	**2768.056**
2.012	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes						
	Quantity as per item No.11	1	2768.056				2768.056
	Total						**2768.056**
						Total Quantity in cum	**2768.056**
2.013	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material						
	Quantity as per item No.11	1	2768.056		340.000		941139.040
	Total						**941139.040**
						Total Quantity in kg	**941139.040**
2.014	5.22.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelMild steel and Medium Tensile steel bars						
	Steel reinforcement for R.C.C work						
	Quantity as per item No.11	1	2761.513		120.000		331381.560
	Total						**331381.560**
						Total Quantity in kg	**331381.560**
2.015	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Base Slab						
	MH 1.2Dia ,1.5M Depth	91	3.140	2.400	0.350		240.022
	MH 1.2Dia ,2.5M Depth	112	3.140	2.600	0.400		365.747
	MH 1.5Dia ,3.5M Depth	93	3.140	3.100	0.450		407.368
	MH 1.5Dia ,4.5M Depth	48	3.140	3.100	0.450		210.254
	MH 1.8Dia ,5.5M Depth	3	3.140	3.400	0.450		14.413
	Total						**1237.804**
	Wall inside						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.200		1.500000	514.332
	MH 1.2Dia ,2.5M Depth	112	3.140	1.200		2.500000	1055.040
	MH 1.5Dia ,3.5M Depth	93	3.140	1.500		3.500000	1533.105
	MH 1.5Dia ,4.5M Depth	48	3.140	1.500		4.500000	1017.360
	MH 1.8Dia ,5.5M Depth	3	3.140	1.800		5.500000	93.258
	Total						**4213.095**
	Wall outside						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.700		1.500000	728.637
	MH 1.2Dia ,2.5M Depth	112	3.140	1.800		2.500000	1582.560

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	MH 1.5Dia ,3.5M Depth	93	3.140	2.200		3.500000	2248.554
	MH 1.5Dia ,4.5M Depth	48	3.140	2.200		4.500000	1492.128
	MH 1.8Dia ,5.5M Depth	3	3.140	2.500		5.500000	129.525
	Total						**6181.404**
						Total Quantity in sqm	**11632.303**
2.016	5.9.20						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform with water proof ply 12 mm thick						
	Top slab						
	MH 1.2Dia ,1.5M Depth	91	3.140	.6*.6			102.866
	MH 1.2Dia ,2.5M Depth	112	3.140	.6*.6			126.605
	MH 1.5Dia ,3.5M Depth	93	3.140	.75*.75			164.261
	MH 1.5Dia ,4.5M Depth	48	3.140	.75*.75			84.780
	MH 1.8Dia ,5.5M Depth	3	3.140	.9*.9			7.630
	Total						**486.142**
						Total Quantity in sqm	**486.142**
2.017	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Inside of wall						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	MH 1.2Dia ,1.5M Depth	91	3.140	1.200		1.500000	514.332
	MH 1.2Dia ,2.5M Depth	112	3.140	1.200		2.500000	1055.040
	MH 1.5Dia ,3.5M Depth	93	3.140	1.500		3.500000	1533.105
	MH 1.5Dia ,4.5M Depth	48	3.140	1.500		4.500000	1017.360
	MH 1.8Dia ,5.5M Depth	3	3.140	1.800		5.500000	93.258
	Total						**4213.095**
						Total Quantity in sqm	**4213.095**
2.018	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Base slab Top						
	MH 1.2Dia ,1.5M Depth	91	3.140	.6*.6			102.866
	MH 1.2Dia ,2.5M Depth	112	3.140	.6*.6			126.605
	MH 1.5Dia ,3.5M Depth	93	3.140	.75*.75			164.261
	MH 1.5Dia ,4.5M Depth	48	3.140	.75*.75			84.780
	MH 1.8Dia ,5.5M Depth	3	3.140	.9*.9			7.630
	Total						**486.142**
						Total Quantity in sqm	**486.142**
2.019	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Outside of wall						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.700		1.500000	728.637
	MH 1.2Dia ,2.5M Depth	112	3.140	1.800		2.500000	1582.560
	MH 1.5Dia ,3.5M Depth	93	3.140	2.200		3.500000	2248.554
	MH 1.5Dia ,4.5M Depth	48	3.140	2.200		4.500000	1492.128
	MH 1.8Dia ,5.5M Depth	3	3.140	2.500		5.500000	129.525
	Total						**6181.404**
	Inside of wall						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.200		1.500000	514.332
	MH 1.2Dia ,2.5M Depth	112	3.140	1.200		2.500000	1055.040
	MH 1.5Dia ,3.5M Depth	93	3.140	1.500		3.500000	1533.105
	MH 1.5Dia ,4.5M Depth	48	3.140	1.500		4.500000	1017.360
	MH 1.8Dia ,5.5M Depth	3	3.140	1.800		5.500000	93.258
	Total						**4213.095**
	Base slab Top and Cover slab bottom						
	MH 1.2Dia ,1.5M Depth	91	3.140	.6*.6	2.000		205.733
	MH 1.2Dia ,2.5M Depth	112	3.140	.6*.6	2.000		253.210
	MH 1.5Dia ,3.5M Depth	93	3.140	.75*.75	2.000		328.523
	MH 1.5Dia ,4.5M Depth	48	3.140	.75*.75	2.000		169.560
	MH 1.8Dia ,5.5M Depth	3	3.140	.9*.9	2.000		15.260
	Total						**972.286**
	Cover slab top						
	MH 1.2Dia ,1.5M Depth	91	3.140	.85*.85			206.447
	MH 1.2Dia ,2.5M Depth	112	3.140	.9*.9			284.861
	MH 1.5Dia ,3.5M Depth	93	3.140	1.*1.1			321.222

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	MH 1.5Dia ,4.5M Depth	48	3.140	1.1*1.1			182.371
	MH 1.8Dia ,5.5M Depth	3	3.140	1.2*1.25			14.130
	Total						**1009.031**
	Cover slab side						
	MH 1.2Dia ,1.5M Depth	91	3.140	2.400	0.200		137.155
	MH 1.2Dia ,2.5M Depth	112	3.140	2.600	0.200		182.874
	MH 1.5Dia ,3.5M Depth	93	3.140	3.100	0.200		181.052
	MH 1.5Dia ,4.5M Depth	48	3.140	3.100	0.200		93.446
	MH 1.8Dia ,5.5M Depth	3	3.140	3.400	0.200		6.406
	Total						**600.933**
						Total Quantity in sqm	**12976.749**
2.020	13.65.1						
	Painting with black anti- corrosive bitumastic paint of approved brand and manufacture to give an even shade:Two or more coats on new work						
	Inside of wall						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.200		1.500000	514.332
	MH 1.2Dia ,2.5M Depth	112	3.140	1.200		2.500000	1055.040
	MH 1.5Dia ,3.5M Depth	93	3.140	1.500		3.500000	1533.105
	MH 1.5Dia ,4.5M Depth	48	3.140	1.500		4.500000	1017.360
	MH 1.8Dia ,5.5M Depth	3	3.140	1.800		5.500000	93.258
	Total						**4213.095**
	Cover slab side						
	MH 1.2Dia ,1.5M Depth	91	3.140	2.400	0.200		137.155
	MH 1.2Dia ,2.5M Depth	112	3.140	2.600	0.200		182.874
	MH 1.5Dia ,3.5M Depth	93	3.140	3.100	0.200		181.052
	MH 1.5Dia ,4.5M Depth	48	3.140	3.100	0.200		93.446

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	MH 1.8Dia ,5.5M Depth	3	3.140	3.400	0.200		6.406
	Total						**600.933**
	Base slab Top and Cover slab bottom						
	MH 1.2Dia ,1.5M Depth	91	3.140	.6*.6	2.000		205.733
	MH 1.2Dia ,2.5M Depth	112	3.140	.6*.6	2.000		253.210
	MH 1.5Dia ,3.5M Depth	93	3.140	.75*.75	2.000		328.523
	MH 1.5Dia ,4.5M Depth	48	3.140	.75*.75	2.000		169.560
	MH 1.8Dia ,5.5M Depth	3	3.140	.9*.9	2.000		15.260
	Total						**972.286**
	Cover slab top						
	MH 1.2Dia ,1.5M Depth	91	3.140	.85*.85			206.447
	MH 1.2Dia ,2.5M Depth	112	3.140	.9*.9			284.861
	MH 1.5Dia ,3.5M Depth	93	3.140	1.*1.1			321.222
	MH 1.5Dia ,4.5M Depth	48	3.140	1.1*1.1			182.371
	MH 1.8Dia ,5.5M Depth	3	3.140	1.2*1.25			14.130
	Total						**1009.031**
	Outside of wall						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.700		1.500000	728.637
	MH 1.2Dia ,2.5M Depth	112	3.140	1.800		2.500000	1582.560
	MH 1.5Dia ,3.5M Depth	93	3.140	2.200		3.500000	2248.554
	MH 1.5Dia ,4.5M Depth	48	3.140	2.200		4.500000	1492.128
	MH 1.8Dia ,5.5M Depth	3	3.140	2.500		5.500000	129.525
	Total						**6181.404**
						Total Quantity in sqm	**12976.749**
2.021	100.36.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water						
	MH 1.2Dia ,1.5M Depth	91	3.140	.6*.6	1.500		154.300
	MH 1.2Dia ,2.5M Depth	112	3.140	.6*.6	2.500		316.512
	MH 1.5Dia ,3.5M Depth	93	3.140	.75*.75	3.500		574.914
	MH 1.5Dia ,4.5M Depth	48	3.140	.75*.75	4.500		381.510
	MH 1.8Dia ,5.5M Depth	3	3.140	.9*.9	5.500		41.966
	Total						**1469.202**
						Total Quantity in Kilo litre	**1469.202**
2.022	2.25						
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.						
	Filling available excavated earth						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.2*1.2	1.500		617.198
	MH 1.2Dia ,2.5M Depth	112	3.140	1.3*1.3	2.500		1485.848
	MH 1.5Dia ,3.5M Depth	93	3.140	1.55*1.55	3.500		2455.523
	MH 1.5Dia ,4.5M Depth	48	3.140	1.55*1.55	4.500		1629.472
	MH 1.8Dia ,5.5M Depth	3	3.140	1.7*1.7	5.500		149.731
	Deduction	-91	3.140	.85*.85	1.500		-309.671
	Deduction	-112	3.140	.9*.9	2.500		-712.152
	Deduction	-93	3.140	1.*1.1	3.500		-1124.277
	Deduction	-48	3.140	1.1*1.1	4.500		-820.670
	Deduction	-3	3.140	1.25*1.25	5.500		-80.953
	Total						**3290.049**
						Total Quantity in cum	**3290.049**
2.023	19.18.3						
	Supplying and fixing C.I with out frame for manholes:560 mm diameter (heavy duty) the weight of the cover to be not less than 108 kg						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Supplying and fixing 560 mm dia C.I. manhole cover						
	Total	347					347.000
	Total						**347.000**
						Total Quantity in each	**347.000**
3	COLLECTION WELLS, LIFTING STATIONS AND ALLIED WORKS						
3.001	100.3.1.1						
	Earthwork in open well excavation (above water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift up to 1.5m including neat banking.						
	Earthwork in open well excavation						
	LS2	1	3.140	2.15*2.15	1.500		21.772
	LS6	1	3.140	2.15*2.15	1.500		21.772
	OF 1,2,3,4	4	3.140	2.05*2.05	1.500		79.175
	Total						**122.719**
						Total Quantity in cum	**122.719**
3.002	100.3.1.2						
	Earthwork in open well excavation (above water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 1.5m to 3.0m including neat banking.						
	Earthwork in open well excavation						
	LS2	1	3.140	2.15*2.15	1.500		21.772
	LS6	1	3.140	2.15*2.15	1.500		21.772
	OF 1,2,3,4	4	3.140	2.05*2.05	1.500		79.175
	Total						**122.719**
						Total Quantity in cum	**122.719**
3.003	100.3.1.13						
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.5m including neat banking.						
	Earthwork in open well excavation						
	LS2	1	3.140	2.15*2.15	1.500		21.772
	LS6	1	3.140	2.15*2.15	1.500		21.772
	OF 1,2,3,4	4	3.140	2.05*2.05	0.600		31.670
	Total						**75.214**
						Total Quantity in cum	**75.214**
3.004	100.3.1.14						
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.0m including neat banking.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Earthwork in open well excavation						
	LS2	1	3.140	2.15*2.15	1.500		21.772
	LS6	1	3.140	2.15*2.15	1.500		21.772
	Total						**43.544**
						Total Quantity in cum	**43.544**
3.005	100.3.1.15						
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 6.0m to 7.5m including neat banking.						
	Earthwork in open well excavation						
	LS2	1	3.140	2.15*2.15	1.500		21.772
	LS6	1	3.140	2.15*2.15	1.500		21.772
	Total						**43.544**
						Total Quantity in cum	**43.544**
3.006	100.3.3.1						
	Earthwork in open well excavation (above water) for wells of diameter above 2.5m and up to 3.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift up to 1.5m including neat banking.						
	Earthwork open well excavation (above water) for wells of dia. above 2.5m and upto 3.50 m in all kinds of soil						
	CW 1 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336
	CW 2 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336
	Total						**68.672**
						Total Quantity in cum	**68.672**
3.007	100.3.3.2						
	Earthwork in open well excavation (above water) for wells of diameter above 2.5m and up to 3.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 1.5m to 3.0m including neat banking.						
	Earthwork open well excavation (above water) for wells of dia. above 2.5m and upto 3.50 m in all kinds						
	CW 1 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336
	CW 2 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336
	Total						**68.672**
						Total Quantity in cum	**68.672**
3.008	100.3.3.13						
	Earthwork in open well excavation (in or under water) for wells of diameter above 2.5m and up to 3.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.5m including neat banking.						
	Earthwork open well excavation (in or under water) for wells of dia. above 2.5m and upto 3.50 m in all kinds of soil						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	CW 1 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336
	CW 2 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336
	Total						**68.672**
						Total Quantity in cum	**68.672**
3.009	100.3.4.14						
	Earthwork in open well excavation (in or under water) for wells of diameter above 2.5m and up to 3.50m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.0m including neat banking.						
	Earthwork in open well excavation (in or under water) for wells of diameter above 2.5m and up to 3.50m in ordinary rock						
	CW 1 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336
	CW 2 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336
	Total						**68.672**
						Total Quantity in cum	**68.672**
3.010	100.3.4.15						
	Earthwork in open well excavation (in or under water) for wells of diameter above 2.5m and up to 3.50m in ordinary rock in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 6.0m to 7.5m including neat banking.						
	Earthwork in open well excavation						
	CW 1 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336
	CW 2 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336
	Total						**68.672**
						Total Quantity in cum	**68.672**
3.011	100.3.4.16						
	Earthwork in open well excavation (in or under water) for wells of diameter above 2.5m and up to 3.50m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 7.5m to 9.0m including neat banking.						
	Earthwork in open well excavation						
	CW 1 @ 3M Dia	1	3.140	2.7*2.7	1.100		25.180
	CW 2 @ 3M Dia	1	3.140	2.7*2.7	0.100		2.289
	Total						**27.469**
						Total Quantity in cum	**27.469**
3.012	2.17.2						
	Close timbering in case of shafts, wells, cesspits, manholes and the like including strutting, shoring and packing cavities (wherever required) etc. complete (Measurements to be taken of the face area timbered).Depth exceeding 1.5 m but not exceeding 3 m						
	Close timbering in case of shafts, wells, cesspits, manholes and the like including strutting, shoring and packing cavities (wherever required) etc.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	OF 1,2,3,4 2m Dia well depth up to 3m	4	3.140	4.100	3.000		154.488
	LS2& LS6 2m Dia well depth up to 6m	2	3.140	4.300	3.000		81.012
	CW1-3m Dia well depth up to 8m	1	3.140	5.400	3.000		50.868
	CW2-3m Dia well depth up to 7M	1	3.140	6.400	3.000		60.288
	Total						**346.656**
						Total Quantity in sqm	**346.656**
3.013	100.6.1						
	Providing steel sheet shoring to the sides of the trenches to depths of above 4.00 m but not exceeding 6.00m using 6 mm M.S. sheet 0.50 M wide stiffen on edges with 50 mm x 50mm x 6 mm M.S. angles driving down vertically on either side one after another in lines and levels with suitable pile driving equipments and accessories to a maximum depth of 0.50 M below the bottom of the proposed excavation 0.5 M above ground level suitably braced by horizontal walling pieces at 75 x 150 mm x 8 mm angles on either side at intervals not exceeding 1.50M and horizontal screw jack type struts at 1.50M intervals and maintaining the shoring till the pipes are laid and works are completed, dismantling, cleaning and restacking for reuse including all labour, hire charges and conveyance for equipments, tools and plants and sundries etc. complete.						
	Providing steel sheet shoring to the sides of the trenches						
	LS2 & LS 6	2	3.140	4.300	3.600		97.214
	CW 1	1	3.140	5.400	5.600		94.954
	CW 2	1	3.140	6.400	4.600		92.442
	Total						**284.610**
						Total Quantity in sqm	**284.610**
3.014	100.6.S.1						
	Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete. (excluding cost of materials)						
	Structural steel work in single section,						
	LS2 & LS 6	2	3.140	4.300	3.600	0.300000	29.164
	CW 1	1	3.140	5.400	5.600	0.300000	28.486
	CW 2	1	3.140	6.400	4.600	0.300000	27.732
	Total						**85.382**
						Total Quantity in kilogram	**85.382**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
3.015	100.7.1						
	Bailing out water with 5HP engine and pump set including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water with 5 HP engine and pumpset including conveyance to the site, erection, dismantling and taking						
	OF 1,2,3,4 2m Dia well depth up to 3m	4	2.000	8.000	5*.746		238.720
	LS2& LS6 2m Dia well depth up to 6m	2	2.000	8.000	5*.746		119.360
	CW1-3m Dia well depth up to 8m	1	2.000	8.000	5*.746		59.680
	CW2-3m Dia well depth up to 7M	1	2.000	8.000	5*.746		59.680
	Total						**477.440**
						Total Quantity in Kwh	**477.440**
3.016	100.7.2						
	Bailing out water with engine and pump set above 5HP up to 10HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water with engine and pump set above 5HP up to 10H						
	OF 1,2,3,4 2m Dia well depth up to 3m	4	2.000	6.000	10*.746		358.080
	LS2& LS6 2m Dia well depth up to 6m	2	2.000	6.000	10*.746		179.040
	CW1-3m Dia well depth up to 8m	1	2.000	6.000	10*.746		89.520
	CW2-3m Dia well depth up to 7M	1	2.000	6.000	10*.746		89.520
	Total						**716.160**
						Total Quantity in Kwh	**716.160**
3.017	100.7.3						
	Bailing out water with engine and pump set above 10HP up to 20HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water with engine and pump set above 10HP up to 20HP						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	OF 1,2,3,4 2m Dia well depth up to 3m	4	1.000	6.000	20*.746		358.080
	LS2& LS6 2m Dia well depth up to 6m	2	1.000	6.000	20*.746		179.040
	CW1-3m Dia well depth up to 8m	1	2.000	6.000	20*.746		179.040
	CW2-3m Dia well depth up to 7M	1	2.000	6.000	20*.746		179.040
	Total						**895.200**
						Total Quantity in Kwh	**895.200**
3.018	100.7.4						
	Bailing out water with engine and pump set above 20HP up to 30HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water with engine and pump set above 20HP up to 30HP						
	OF 1,2,3,4 2m Dia well depth up to 3m	4	1.000	6.000	30*.746		537.120
	LS2& LS6 2m Dia well depth up to 6m	2	1.000	6.000	30*.746		268.560
	CW1-3m Dia well depth up to 8m	1	2.000	6.000	30*.746		268.560
	CW2-3m Dia well depth up to 7M	1	2.000	6.000	30*.746		268.560
	Total						**1342.800**
						Total Quantity in Kwh	**1342.800**
3.019	100.7.5						
	Bailing out water with engine and pump set above 30HP up to 40HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	Bailing out water with engine and pump set above 30HP up to 40HP						
	CW1-3m Dia well depth up to 8m	1	2.000	6.000	40*.746		358.080
	CW2-3m Dia well depth up to 7M	1	2.000	6.000	40*.746		358.080
	Total						**716.160**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in Kwh	**716.160**
3.020	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	PCC 1:3:6						
	OF 1,2,3,4 2m Dia well depth up to 3m	4	3.140	2.05*2.05	0.150		7.918
	LS 2 & LS 6 2m Dia well depth up to 6m	2	3.140	2.2*2.2	0.150		4.559
	CW1-3m Dia well depth up to 8m	1	3.140	2.7*2.7	0.150		3.434
	CW2-3m Dia well depth up to 7M	1	3.140	2.7*2.7	0.150		3.434
	Total						**19.345**
						Total Quantity in cum	**19.345**
3.021	5.37.1						
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work						
	OF 1,2,3,4 2m Dia well depth up to 3m- Base concrete	4	1.900	1.900	0.450	3.140000	20.404
	side wall	4	2.300	0.300	3.000	3.140000	25.999
	cover slab	4	1.300	1.300	0.250	3.140000	5.307
	LS 2 & LS 6 2m Dia well depth up to 6m-base concrete	2	2.000	2.000	0.450	3.140000	11.304

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	side wall	2	2.400	0.400	6.000	3.140000	36.173
	cover slab	2	1.400	1.400	0.250	3.140000	3.077
	CW1-3m Dia well depth up to 8m-Base concrete	1	2.550	2.550	0.450	3.140000	9.188
	side wall	1	3.450	0.450	8.000	3.140000	38.999
	cover slab	1	1.950	1.950	0.250	3.140000	2.985
	CW2-3m Dia well depth up to 7M-Base concrete	1	2.550	2.550	0.450	3.140000	9.188
	side wall	1	3.450	0.450	7.000	3.140000	34.124
	cover slab	1	1.950	1.950	0.250	3.140000	2.985
	Total						**199.733**
						Total Quantity in cum	**199.733**
3.022	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content						
	Qty taken from item no-21	1	199.733				199.733
	Total						**199.733**
						Total Quantity in cum	**199.733**
3.023	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement						
	Qty taken from item no-21	1	199.733			340.000000	67909.220
	Total						**67909.220**
						Total Quantity in kg	**67909.220**
3.024	5.9.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering including strutting, etc. and removal of form for: Walls (any thickness) including attached pilasters,						
	OF 1.2.3.4 2m Dia well depth up to 3m-inside wall	4	3.140	2.000	3.000		75.360
	OF 1.2.3.4 2m Dia well depth up to 3m-outside wall	4	3.140	2.600	3.000		97.968
	OF 1.2.3.4 2m Dia well depth up to 3m-Base slab side wall	4	3.140	3.800	0.450		21.478
	OF 1.2.3.4 2m Dia well depth up to 3m-cover slab side wall	4	3.140	2.600	0.250		8.164
	LS 2 & LS 6 2m Dia well depth up to 6m-inside wall	2	3.140	2.000	6.000		75.360
	LS 2 & LS 6 2m Dia well depth up to 6m-outside wall	2	3.140	2.800	6.000		105.504
	LS 2 & LS 6 2m Dia well depth up to 6m-Base slab side wall	2	3.140	4.000	0.450		11.304
	LS 2 & LS 6 2m Dia well depth up to 6m-cover slab side wall	2	3.140	2.800	0.250		4.396
	3m Dia well depth up to 8m-inside wall	1	3.140	3.000	8.000		75.360
	3m Dia well depth up to 8m-outside wall	1	3.140	3.900	8.000		97.968
	3m Dia well depth up to 8m-Base slab side wall	1	3.140	5.100	0.450		7.206
	3m Dia well depth up to 8m-cover slab side wall	1	3.140	3.900	0.250		3.062

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	3m Dia well depth up to 7m-inside wall	1	3.140	3.000	7.000		65.940
	3m Dia well depth up to 7m-outside wall	1	3.140	3.900	7.000		85.722
	3m Dia well depth up to 7m-base slab side wall	1	3.140	5.100	0.450		7.206
	3m Dia well depth up to 7m-cover slab side wall	1	3.140	3.900	0.250		3.062
	Total						**745.060**
						Total Quantity in sqm	**745.060**
3.025	5.9.20						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform with water proof ply 12 mm thick						
	Centering and shuttering including strutting, etc. and removal of form for: Suspended floors, roofs, landings, balconies						
	OF 1 2m Dia well depth up to 3m-cover slab	4	3.140	1*1			12.560
	LS2 & LS 6 2m Dia well depth up to 6m-cover slab	2	3.140	1*1			6.280
	CW1-3m Dia well depth up to 8m-cover slab	1	3.140	1.5*1.5			7.065
	CW2-3m Dia well depth up to 7m-cover slab	1	3.140	1.5*1.5			7.065
	Total						**32.970**
						Total Quantity in sqm	**32.970**
3.026	5.22.1						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelMild steel and Medium Tensile steel bars						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding						
	Qty taken from item no-21 @120kg/m3	1	199.733			120.000000	23967.960

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**23967.960**
						Total Quantity in kg	**23967.960**
3.027	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls -Veertical wall						
	OF 1.2.3.4 2m Dia well depth up to 3m	10	3.140	2.000	3.000		188.400
	LS 2 & LS 6 2m Dia well depth up to 6m	5	3.140	2.000	6.000		188.400
	CW1-4m Dia well depth up to 8m	1	3.140	3.000	8.000		75.360
	CW2-4m Dia well depth up to 7m	1	3.140	3.000	7.000		65.940
	Total						**518.100**
						Total Quantity in sqm	**518.100**
3.028	22.23.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures- BASE SLAB						
	OF 1.2.3.4 2m Dia well depth up to 3m	10	3.140	1*1			31.400
	LS 2 & LS 6 2m Dia well depth up to 6m	5	3.140	1*1			15.700
	CW 1 3m Dia well depth up to 8m	1	3.140	1.5*1.5			7.065
	CW 2 3m Dia well depth up to 7m	1	3.140	1.5*1.5			7.065
	Total						**61.230**
						Total Quantity in sqm	**61.230**
3.029	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	12 mm cement plaster finished with a floating coat of neat cement of mix:						
	OF 1.2.3.4 2m Dia well depth up to 3m-inside wall	4	3.140	2.000	3.000		75.360
	OF 1.2.3.4 2m Dia well depth up to 3m-outside wall	4	3.140	2.600	3.000		97.968
	OF 1.2.3.4 Base slab&cover slab bottom-2m Dia well depth up to 3m-	8	3.140	1*1			25.120

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	OF 1.2.3.4 Cover slab top- 2m Dia well depth up to 3m-	4	3.140	1.3*1.3			21.226
	OF 1.2.3.4 2m Dia well depth up to 3m-cover slab side	4	3.140	2.600	0.250		8.164
	LS 2 & LS 6 2m Dia well depth up to 6m-inside wall	2	3.140	2.000	6.000		75.360
	LS 2 & LS 6 2m Dia well depth up to 6m-outside wall	2	3.140	2.800	6.000		105.504
	LS 2 & LS 6 Cover slab top- 2m Dia well depth up to 6m-	4	3.140	1.3*1.3			21.226
	LS 2 & LS 6Base slab&cover slab bottom-2m Dia well depth up to 6m-	4	3.140	1*1			12.560
	LS 2 & LS 6 2m Dia well depth up to 6m-cover slab side wall	2	3.140	2.800	0.250		4.396
	CW 1 3m Dia well depth up to 8m-inside wall	1	3.140	3.000	8.000		75.360
	CW 1 3m Dia well depth up to 8m-outside wall	1	3.140	3.900	8.000		97.968
	CW 1 Base slab&cover slab bottom-2m Dia well depth up to 8m-	2	3.140	1.5*1.5			14.130
	CW 1 3m Dia well depth up to 8m-cover slab side wall	1	3.140	3.900	0.250		3.062
	CW 1 3m Dia well depth up to 8m-cover slab top	1	3.140	1.95*1.95			11.940
	CW 2 3m Dia well depth up to 7m-inside wall	1	3.140	3.000	7.000		65.940

DRAFT
PRICE
e-PLATFORM FOR THE MANAGEMENT OF PUBLIC WORKS

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	CW 2 3m Dia well depth up to 7m-outside wall	1	3.140	3.900	7.000		85.722
	CW 2 Base slab&cover slab bottom-2m Dia well depth up to 7m-	2	3.140	1.5*1.5			14.130
	CW 2 3m Dia well depth up to 7m-cover slab side wall	1	3.140	3.900	0.250		3.062
	CW 1 3m Dia well depth up to 7m-cover slab top	1	3.140	1.95*1.95			11.940
	Total						**830.138**
						Total Quantity in sqm	**830.138**
3.030	13.65.1						
	Painting with black anti- corrosive bitumastic paint of approved brand and manufacture to give an even shade:Two or more coats on new work						
	Painting with black anti- corrosive bitumastic paint of approved brand and manufacture to give an even shade:						
	OF 1,2,3,4 2m Dia well depth up to 3m-inside wall	4	3.140	2.000	3.000		75.360
	OF 1,2,3,4 2m Dia well depth up to 3m-outside wall	4	3.140	2.600	3.000		97.968
	OF 1,2,3,4 Base slab&cover slab bottom-2m Dia well depth up to 3m-	8	3.140	1*1			25.120
	OF 1,2,3,4 Cover slab top- 2m Dia well depth up to 3m-	4	3.140	1.3*1.3			21.226
	OF 1,2,3,4 2m Dia well depth up to 3m-cover slab side	4	3.140	2.600	0.250		8.164
	LS 2 & LS 6 2m Dia well depth up to 6m-inside wall	2	3.140	2.000	6.000		75.360

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	LS 2 & LS 6 2m Dia well depth up to 6m-outside wall	2	3.140	2.800	6.000		105.504
	LS 2 & LS 6 Cover slab top-2m Dia well depth up to 6m-	4	3.140	1.3*1.3			21.226
	LS 2 & LS 6Base slab&cover slab bottom-2m Dia well depth up to 6m-	4	3.140	1*1			12.560
	LS 2 & LS 6 2m Dia well depth up to 6m-cover slab side wall	2	3.140	2.800	0.250		4.396
	CW 1 3m Dia well depth up to 8m-inside wall	1	3.140	3.000	8.000		75.360
	CW 1 3m Dia well depth up to 8m-outside wall	1	3.140	3.900	8.000		97.968
	CW 1 Base slab&cover slab bottom-2m Dia well depth up to 8m-	2	3.140	1.5*1.5			14.130
	CW 1 3m Dia well depth up to 8m-cover slab side wall	1	3.140	3.900	0.250		3.062
	CW 1 3m Dia well depth up to 8m-cover slab top	1	3.140	1.95*1.95			11.940
	CW 2 3m Dia well depth up to 7m-inside wall	1	3.140	3.000	7.000		65.940
	CW 2 3m Dia well depth up to 7m-outside wall	1	3.140	3.900	7.000		85.722
	CW 2 Base slab&cover slab bottom-2m Dia well depth up to 7m-	2	3.140	1.5*1.5			14.130

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	CW 2 3m Dia well depth up to 7m-cover slab side wall	1	3.140	3.900	0.250		3.062
	CW 1 3m Dia well depth up to 7m-cover slab top	1	3.140	1.95*1.95			11.940
	Total						**830.138**
						Total Quantity in sqm	**830.138**
3.031	100.41.34						
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame (low duty) charges including all cost, labour charges etc., complete.						
	Supplying and fixing Rectangular CI manhole cover 455x610 mm with frame (low duty) charges including all cost,						
	OF 1 2m Dia well depth up to 3m	4					4.000
	LS 2 & LS 6 2m Dia well depth up to 6m	2					2.000
	CW1-3m Dia well depth up to 8m	1					1.000
	CW2-3m Dia well depth up to 7M	1					1.000
	Total						**8.000**
						Total Quantity in no	**8.000**
3.032	100.36.1						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.						
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site						
	OF 1 2m Dia well depth up to 3m	4	3.140	1*1	3.000		37.680
	LS 2 & LS 6 2m Dia well depth up to 6m	2	3.140	1*1	6.000		37.680
	CW1-3m Dia well depth up to 8m	1	3.140	1.5*1.5	8.000		56.520
	CW2-3m Dia well depth up to 7M	1	3.140	1.5*1.5	7.000		49.455

DRAFT
ePRICE
e-PLATFORM FOR THE MANAGEMENT OF PUBLIC WORKS

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**181.335**
						Total Quantity in Kilo litre	**181.335**
3.033	2.25						
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.						
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc.						
	OF 1 2m Dia well depth up to 3m	4	3.140	1.9*1.9	3.000		136.025
	Deduction	-4	3.140	1.3*1.3	3.000		-63.679
	CW2-3m Dia well depth up to 7m	1	3.140	2.55*2.55	7.000		142.925
	Deduction	-1	3.140	1.95*1.95	7.000		-83.579
	LS 2 & LS 6 2m Dia well depth up to 6m	2	3.140	2*2	6.000		150.720
	Deduction	-2	3.140	1.4*1.4	6.000		-73.853
	CW1-3m Dia well depth up to 8m	1	3.140	2.55*2.55	8.000		163.343
	Deduction	-1	3.140	1.95*1.95	8.000		-95.519
	Total						**276.383**
						Total Quantity in cum	**276.383**
3.034	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786						
	OF 1 2m Dia well depth up to 3m	4	8.000				32.000
	LS 2 & LS 6 2m Dia well depth up to 6m	2	18.000				36.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	CW1-3m Dia well depth up to 8m	1	24.000				24.000
	CW2-3m Dia well depth up to 7M	1	21.000				21.000
	Total						**113.000**
						Total Quantity in each	**113.000**
4	PUMPING MAINS						
4.001	100.59.1						
	Cutting the bituminous / concrete roads with cutting machine for a minimum depth of 200mm along the sides of proposed alignment of the pipe to be laid without causing any damage to other utilities, including the charges for hire and conveyance of tools and plant, cost of consumables and charges for lighting, watching, ribbon fencing, caution boards, traffic diversion, and as per the direction of departmental officers etc. complete, before carrying out the demolition of bituminous / concrete road by mechanical means and carrying out the excavation.						
	Cutting the bituminous / concrete roads with cutting machine for a minimum depth of 200mm along the sides						
	Municipality - BT LS2-MH40	1	85.000				85.000
	Municipality - BT CW1-MH290	1	150.000				150.000
	Municipality - BT OF1-MH127	1	200.000				200.000
	Municipality - BT OF2-MH24	1	700.000				700.000
	Municipality - BT OF3-MH271	1	275.000				275.000
	PWD- BT OF1-MH127	1	75.000				75.000
	NH BMBC LS6-MH26	1	50.000				50.000
	NH BMBC CW2-MH75	1	350.000				350.000
	NH BMBC OF4-MH433	1	75.000				75.000
	Total						**1960.000**
						Total Quantity in metre	**1960.000**
4.002	15.43.2						
	Dismantling manually / by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer -in-Charge:Bituminous road						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Dismantling manually / by mechanical means including stacking of serviceable material and disposal of unserviceable						
	Bituminous road - upto 225 mm PE	1	1375+85	0.800			1168.000
	Bituminous road - 250-400 mm PE	1	350.000	1.000			350.000
	Bituminous road - 560-630 mm PE	1	150+50	1.500			300.000
	Total						**1818.000**
						Total Quantity in sqm	**1818.000**
4.003	100.1.1						
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50m, in all kinds of soil.						
	Excavating trenches of required width for pipes, cables, etc.						
	Bituminous road - upto 225 mm PE	1	1375+85	0.800	1.000	0.800000	934.400
	Bituminous road - 250-400 mm PE	1	350.000	1.000	1.000	0.800000	280.000
	Bituminous road - 400-630 mm PE	1	150+50	1.500	1.000	0.800000	240.000
	Total						**1454.400**
						Total Quantity in cum	**1454.400**
4.004	100.1.5						
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50 m, in Ordinary Rock.						
	Excavating trenches of required width for pipes, cables, etc. Ordinary Rock						
	Bituminous road - upto 225 mm PE	1	1375+85	0.800	1.000	0.200000	233.600

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Bituminous road - 250-400 mm PE	1	350.000	1.000	1.000	0.200000	70.000
	Bituminous road - 450-630mm PE	1	150+50	1.500	1.000	0.200000	60.000
	Total						**363.600**
						Total Quantity in cum	**363.600**
4.005	100.8.1						
	Fencing one side of trenches, 1.50m height with two rows of 10cm plastic caution tape in vertical casuarina pole (girth 15cm to 24cm) fixed at 2m intervals.						
	Fencing one side of trenches, 1.50 m height with two rows of 10 cm plastic caution tape in vertical casuarina pole						
		1	1960.000			0.700000	1372.000
	Total						**1372.000**
						Total Quantity in metre	**1372.000**
4.006	OD243866/2022-2023						
	Supply of PE Pipe PE 100 (IS 14333), 10kg, 140mm Outer Dia.						
	Supply of PE Pipe PE 100 (IS 14333), 10kg, 140mm Outer Dia.						
	LS 6 TO MH 26	1	50.000				50.000
	OF 1 TO MH 127	1	275.000				275.000
	OF 2 TO MH 24	1	700.000				700.000
	OF 3 TO MH 271	1	275.000				275.000
	OF 4 TO MH 433	1	75.000				75.000
	Total						**1375.000**
						Total Quantity in metre	**1375.000**
4.007	OD243893/2022-2023						
	Supply of PE Pipe, PE100, PN10, 200mm dia, conforming to IS 14333.						
	Supply of PE Pipe, PE100, PN10, 200mm dia, conforming to IS 14333.						
	LS 2 TO MH 40	1	85.000				85.000
	Total						**85.000**
						Total Quantity in metre	**85.000**
4.008	OD243894/2022-2023						
	Supply of PE Pipe, PE100, PN10, 315mm dia, conforming to IS 14333.						
	Supply of PE Pipe, PE100, PN10, 315mm dia, conforming to IS 14333.						
	CW2- MH 75	1	350.000				350.000
	Total						**350.000**
						Total Quantity in metre	**350.000**
4.009	OD248629/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Supply of PE Pipe, PE100, PN10, 560mm dia, conforming to IS 4984/2016.						
	Supply of PE Pipe, PE100, PN10, 560mm dia, conforming to IS 4984/2016.						
		1	150.000				150.000
	Total						**150.000**
						Total Quantity in metre	**150.000**
4.010	OD248631/2022-2023						
	Supply of PE Pipe, PE100, PN10, 630mm dia, conforming to IS 4984/2016.						
	Supply of PE Pipe, PE100, PN10, 630mm dia, conforming to IS 4984/2016.						
		1	50.000				50.000
	Total						**50.000**
						Total Quantity in metre	**50.000**
4.011	100.10.4						
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 140mm Nominal Outside Diameter Pipes.						
	Laying HDPE pipes - Dia 140 PE						
		1	1375.000				1375.000
	Total						**1375.000**
						Total Quantity in metre	**1375.000**
4.012	100.10.7						
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 200mm Nominal Outside Diameter Pipes.						
	Laying 200 mm OD PE pipe						
	Laying 200 mm OD PE pipe	1	85.000				85.000
	Total						**85.000**
						Total Quantity in metre	**85.000**
4.013	100.10.11						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 315mm Nominal Outside Diameter Pipes.						
	Laying 315 mm OD PE pipe						
	Laying 315 mm OD PE pipe	1	350.000				350.000
	Total						**350.000**
						Total Quantity in metre	**350.000**
4.014	100.10.16						
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 560mm Nominal Outside Diameter Pipes.						
	Laying HDPE pipes - Dia 560 PE						
		1	150.000				150.000
	Total						**150.000**
						Total Quantity in metre	**150.000**
4.015	100.10.17						
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 630mm Nominal Outside Diameter Pipes.						
	Laying HDPE pipes - Dia 630 PE						
		1	50.000				50.000
	Total						**50.000**
						Total Quantity in metre	**50.000**
4.016	100.98.471						
	Supply of CI Double Flanged Sluice Valve Conforming to IS 14846 - 2000, Sluice Valve with Cap PN 1.0, Size 125mm.						
	Supply of CI Double Flanged Sluice Valve						
	Size 125 mm	5					5.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**5.000**
						Total Quantity in no	**5.000**
4.017	100.98.473						
	Supply of CI Double Flanged Sluice Valve Conforming to IS 14846 - 2000, Sluice Valve with Cap PN 1.0, Size 200mm.						
	Supply of CI Double Flanged Sluice Valve						
	Size 200 mm	1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
4.018	100.98.475						
	Supply of CI Double Flanged Sluice Valve Conforming to IS 14846 - 2000, Sluice Valve with Cap PN 1.0, Size 300mm.						
	Supply of CI Double Flanged Sluice Valve						
	Size 300 mm	1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
4.019	100.98.479						
	Supply of CI Double Flanged Sluice Valve Conforming to IS 14846 - 2000, Sluice Valve with Cap PN 1.0, Size 500mm.						
	Supply of CI Double Flanged Sluice Valve						
	Size 500 mm	1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
4.020	100.98.480						
	Supply of CI Double Flanged Sluice Valve Conforming to IS 14846 - 2000, Sluice Valve with Cap PN 1.0, Size 600mm.						
	Supply of CI Double Flanged Sluice Valve						
	Size 600mm	1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
4.021	100.31.2.3						
	Conveying and fixing C.I. sluice valves (with cap) by providing bolts, nuts, rubber insertions etc., complete, but excluding the cost of the valve (tail pieces, if required, will be paid separately): 125mm diameter, Class II.						
	Conveying and fixing C.I. sluice valves						
	Size 125 mm	5					5.000
	Total						**5.000**
						Total Quantity in no	**5.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
4.022	100.31.2.5						
	Conveying and fixing C.I. sluice valves (with cap) by providing bolts, nuts, rubber insertions etc., complete, but excluding the cost of the valve (tail pieces, if required, will be paid separately): 200mm diameter, Class II.						
	Conveying and fixing C.I. sluice valves						
	Size 200 mm	1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
4.023	100.31.2.7						
	Conveying and fixing C.I. sluice valves (with cap) by providing bolts, nuts, rubber insertions etc., complete, but excluding the cost of the valve (tail pieces, if required, will be paid separately): 300mm diameter, Class II.						
	Conveying and fixing C.I. sluice valves						
	Size 300 mm	1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
4.024	100.31.2.11						
	Conveying and fixing C.I. sluice valves (with cap) by providing bolts, nuts, rubber insertions etc., complete, but excluding the cost of the valve (tail pieces, if required, will be paid separately): 500mm diameter, Class II.						
	Supply of CI Double Flanged Sluice Valve						
	Size 500 mm	1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
4.025	100.31.2.12						
	Conveying and fixing C.I. sluice valves (with cap) by providing bolts, nuts, rubber insertions etc., complete, but excluding the cost of the valve (tail pieces, if required, will be paid separately): 600mm diameter, Class II.						
	Supply of CI Double Flanged Sluice Valve						
	Size 600 mm	1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
4.026	5.1.3						
	Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering						
	Pipe supports/ anchor blocks	25	1.000	1.000	1.000		25.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**25.000**
						Total Quantity in cum	**25.000**
4.027	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering including strutting, etc. and removal of form for: Foundations, footings, bases of columns, etc						
		25	4.000	1.000	1.000		100.000
	Total						**100.000**
						Total Quantity in sqm	**100.000**
4.028	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding						
	Qty taken from item no-26	25				80.000000	2000.000
	Total						**2000.000**
						Total Quantity in kilogram	**2000.000**
5	WATER SUPPLY AND SANATORY ARRANGEMENTS, ELECTRICAL WIRING IN PUMPING STATIONS						
5.001	OD235712/2022-2023						
	Water Supply and Sanatory arrangements, Electrical wiring in pumping stations						
	Water Supply and Sanatory arrangements, Electrical wiring in pumping stations						
		8					8.000
	Total						**8.000**
						Total Quantity in no	**8.000**
6	MECHANICAL, ELECTRICAL-PUMPSETS, GRIT CHAMBER SCREEN, GENERATOR, TRANSFORMER & ALLIED WORKS COMPLETE						
6.001	OD252058/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards), CI construction, bronze impeller,complete with 3 phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Three phase Motor with IP 68 protection (1W 1S)" - Upto 10 HP						
	Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump						
	LS 2	4	1.500				6.000
	LS 6	3	1.500				4.500
	OF 1	2	1.000				2.000
	OF 2	2	1.000				2.000
	OF 3	2	1.000				2.000
	OF 4	2	1.000				2.000
	CW 1	4	10.000				40.000
	CW 2	4	2.000				8.000
	Total						**66.500**
						Total Quantity in HP (Horse power)	**66.500**
6.002	OD235714/2022-2023						
	Supple and erection of Indoor Type Generator Capacity-1KVA to 5 KVA - 7 Nos. @ Rs 3 Lakhs/Nos. Capacity-25 KVA - 1 No. @ 10 Lakhs/No.						
	Supple and erection of Indoor Type Generator Capacity-1KVA to 5 KVA - 15 Nos. @ Rs 3 Lakhs/Nos. Capacity-5KVA to 10 KVA - 1 No. @ 5 Lakhs/No. Capacity-25 KVA - 1 No. @ 10 Lakhs/No.						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
6.003	OD235715/2022-2023						
	Control Room, Generator Room and Compound wall with gate						
	Control Room, Generator Room and Compound wall with gate						
		8					8.000
	Total						**8.000**
						Total Quantity in no	**8.000**
6.004	OD235716/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Automatic Control system						
	Automatic Control system						
	For LS and CW	8					8.000
	Total						**8.000**
						Total Quantity in no	**8.000**
6.005	OD235720/2022-2023						
	Supply, delivery and erection of Multistage force Pump 600LPM X 30M head suitable for cleaning the screen chamber,Pumpset during servicing with 16 m of 20 mm dia hose required for operating the pump .						
	Supply, delivery and erection of Multistage force Pump 600LPM X 30M head suitable for cleaning the screen chamber,Pumpset during servicing with 16 m						
	For CWs , LSs , OFs	8					8.000
	Total						**8.000**
						Total Quantity in set	**8.000**
6.006	OD235721/2022-2023						
	Supply and delivery of breathing apparatus with Oxygen cylinder mask etc complete .						
	Supply and delivery of breathing apparatus with Oxygen cylinder mask etc complete .						
	For CW	2					2.000
	Total						**2.000**
						Total Quantity in set	**2.000**
6.007	OD235722/2022-2023						
	Supply and delivery of Diaphragm type pressure gauge with necessary S.S tubes and isolating valves						
	Supply and delivery of Diaphragm type pressure gauge with necessary S.S tubes and isolating valves						
	For CWs , LSs , OFs	8					8.000
	Total						**8.000**
						Total Quantity in no	**8.000**
6.008	OD235723/2022-2023						
	Supply and delivery of spare parts for pumps,motors and starter for maintenance.						
	Supply and delivery of spare parts for pumps,motors and starter for maintenance.						
		8					8.000
	Total						**8.000**
						Total Quantity in no	**8.000**
6.009	OD256786/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Electromagnetic Flow meter,pressure and quality sensors- Supply and erection of electromagnetic flow meter, pressure and quality sensors compatible to IoT and central control system with flow recorder, digital flow/quality/pressure indicator, flow/quality/pressure integrator with sensors, totaliser, transmittal and display arrangements and all accessories including housing arrangements, etc. complete to fix in the incoming pipeline to STP or at the Screen channel as directed by the Engineer in Charge						
	Electromagnetic Flow meter,pressure and quality sensors- Supply and erection of electromagnetic flow meter, pressure and quality sensors compatible						
	CWs , LSs , OFs	8					8.000
	Total						**8.000**
						Total Quantity in no	**8.000**
6.010	OD235725/2022-2023						
	Supply, delivery and usage of tools required for maintenance works including double end spanners, ring spanners, screw drivers,electrical megger,Tong testers,hand gloves etc.						
	Supply, delivery and usage of tools required for maintenance works including double end spanners, ring spanners, screw drivers,electrical megger,Tong testers,hand gloves etc.						
	CWs , LSs , OFs	8					8.000
	Total						**8.000**
						Total Quantity in set	**8.000**
6.011	OD235726/2022-2023						
	Supply, delivery and erecting of following safety items ,including cost of same. I. Fire extinguisher of 5 Kg capacity (powder type 2 no’s) II. Fire buckets with stand 5no’s III. Electric quality Rubber mat to be laid in front of all the panel boards including starter panels						
	Supply, delivery and erecting of following safety items ,including cost of same						
	CWs , LSs , OFs	8					8.000
	Total						**8.000**
						Total Quantity in no	**8.000**
6.012	OD235730/2022-2023						
	Supply and fixing of stainless steel screen made of bars of size 50 mm x 10 mm for fixing across the screen chamber channel (fixed type) at 45 degree inclination for a clear passage of 40 mm solids and suitable for manual cleaning including cost of of screen ,Grab bucket and lifting arrangement material and fixing charges for 1.00m x 1.30m size.						
	Supply and fixing of stainless steel screen made of bars of size 50 mm x 10 mm for fixing across the screen chamber						
	For CWs , LSs , OFs	8					8.000
	Total						**8.000**
						Total Quantity in no	**8.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
6.013	OD235731/2022-2023						
	Supply , delivery , erecting and maintenance of 2 ton or suitable capacity hand operated pulley block hoist with mono rail traveling on single girder with over head traveling trolley for a clear lift according to site condition for a travel of 9 (well dia+3m) meters or suitable design for erection and easy loading and unloading of Pumps and specials from trucks.						
	Supply , delivery , erecting and maintenance of 2 ton or suitable capacity hand operated pulley block hoist with mono rail traveling on single girder with over head traveling trolley for a clear lift according to si						
	For CW1 and CW2	2					2.000
	Total						**2.000**
						Total Quantity in no	**2.000**
6.014	OD256787/2022-2023						
	Supply, installation and commissioning of solar power system low-capacity systems						
	Supply, installation and commissioning of solar power system low-capacity systems						
	For CWs , LSs , OFs	8					8.000
	Total						**8.000**
						Total Quantity in 1 nos	**8.000**
6.015	OD256926/2022-2023						
	Wiring & Lighting accessories :- Wiring for circuit/submain wiring along with earthwire with required sizes of FRLS PVC insulated copper conductor,supply and fitting of GI boxes along with modular base and cover plates,supplying and fixing following modular switch/ sockets,supply,installation,testing and commissioning of all accessories and fixtures as approved by dept.						
	Wiring & Lighting accessories :- Wiring for circuit/submain wiring along with earthwire with required sizes of FRLS PVC insulated copper conductor,supply and fitting						
	CWs , LSs , OFs	8					8.000
	Total						**8.000**
						Total Quantity in no	**8.000**
7	LINE EXTENSION, DEPOSIT TO KSEB, ETC						
7.001	OD235689/2022-2023						
	Line extension , Deposit to KSEB, etc						
	line extension , Deposit to KSEB, etc						
	CW and LS	8					8.000
	Total						**8.000**
						Total Quantity in no	**8.000**
8	SEWERAGE SERVICE CONNECTION CHARGES						
8.001	OD235711/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Sewer service connection charges including connection deposite fee and all materials and labour charges						
	Sewer service connection charges including connection deposite fee and all materials and labour charges						
	Sewer service connection including D/ND	690					690.000
	Total						**690.000**
						Total Quantity in no	**690.000**
9	PWD & NH - BM&BC ROAD REFORMATION WORK WITH MORTH SPECIFICATION						
9.001	4.2.A.1						
	Construction of granular sub-base by providing graded material, spreading in uniform layers with a motor grader on a prepared surface, mixing by mix in-place method with rotavator at OMC, and compacting with a vibratory roller to achieve the desired density, complete as per clause 401. Grading-III -For lower sub-base - Mix in Place Method						
	Granular Sub Base						
	NH BMBC - Open Cut - Sewer lines from 225 mm to 630 mm	1	2307.700	2.000	0.250		1153.850
	NH BMBC - HDD - Sewer lines from 225 mm to 630 mm@ 1129.8 m	38	2.000	2.000	0.250		38.000
	IC to MH - NH BMBC	1	1016.000	0.700	0.250		177.800
	PM - NH BMBC	1	475.000	0.700	0.250		83.125
	Total						**1452.775**
						Total Quantity in cum	**1452.775**
9.002	4.12						
	Providing, laying, spreading and compacting graded stone aggregate to Wet Mix Macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.						
	Providing, laying, spreading and compacting graded stone aggregate to Wet Mix Macadam						
	NH BMBC - Open Cut - Sewer lines from 225 mm to 630 mm	1	2307.700	2.000	0.250		1153.850

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	NH BMBC - HDD - Sewer lines from 225 mm to 710 mm@ 1129.8 m	38	2.000	2.000	0.250		38.000
	IC to MH - NH BMBC	1	1016.000	0.700	0.250		177.800
	PM - NH BMBC	1	475.000	0.700	0.250		83.125
	Total						**1452.775**
						Total Quantity in cum	**1452.775**
9.003	5.1.a						
	Providing and applying primer coat with bitumen emulsion (SS) on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.70 - 1.0 kg/sqm using mechanical means.						
	Providing and applying primer coat with bitumen emulsion (SS)						
	NH BMBC - Open Cut - Sewer lines from 225 mm to 630 mm	1	2307.700	2.000			4615.400
	NH BMBC - HDD - Sewer lines from 225 mm to 630 mm@ 1129.8 M	38	2.000	2.000			152.000
	IC to MH - NH BMBC	1	1016.000	0.700			711.200
	PM - NH BMBC	1	475.000	0.700			332.500
	Total						**5811.100**
						Total Quantity in sqm	**5811.100**
9.004	5.2.b						
	Providing and applying tack coat with bitumen emulsion (RS) using emulsion pressure distributor at the rate of 0.25 - 0.30 kg per sqm on the prepared Granular Surface cleaned with mechanical broom.						
	Providing and applying tack coat with bitumen emulsion (RS)						
	NH BMBC - Open Cut - Sewer lines from 225 mm to 630 mm	1	2307.700	3.000			6923.100
	NH BMBC - HDD - Sewer lines from 225 mm to 630 mm @ 1129.8 M	38	2.500	2.500			237.500
	IC to MH - NH BMBC	1	1016.000	1.500			1524.000

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Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	PM - NH BMBC	1	475.000	1.500			712.500
	Total						**9397.100**
						Total Quantity in sqm	**9397.100**
9.005	5.3.2.a						
	Providing and laying bituminous macadam with 80-100 TPH hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading premixed with a bituminous binder (VG 30), transported to the site, laid over a previously prepared surface with paver finisher to the required grade, level, and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction For Grading II - (19 mm nominal size)						
	Providing and laying bituminous macadam						
	NH BMBC - Open Cut - Sewer lines from 200 mm to 630 mm	1	2307.700	3.000	0.050		346.155
	NH BMBC - HDD - Sewer lines from 200 mm to 630 mm@ 1129.8 m	38	2.500	2.500	0.050		11.875
	IC to MH - NH BMBC	1	1016.000	1.500	0.050		76.200
	PM - NH BMBC	1	475.000	1.500	0.050		35.625
	Total						**469.855**
						Total Quantity in cum	**469.855**
9.006	5.2.a						
	Providing and applying tack coat with bitumen emulsion(RS) using emulsion pressure distributor at the rate of 0.20 - 0.30 kg per sqm on the prepared bituminous surface cleaned with mechanical broom.						
	Providing and applying tack coat with bitumen emulsion(RS)						
	NH BMBC - Open Cut - Sewer lines from 225 mm to 630 mm	1	2307.700	3.000			6923.100
	NH BMBC - HDD - Sewer lines from 225 mm to 630mm @ 1129.8 m	38	2.500	2.500			237.500
	IC to MH - NH BMBC	1	1016.000	1.500			1524.000
	PM - NH BMBC	1	475.000	1.500			712.500
	Total						**9397.100**
						Total Quantity in sqm	**9397.100**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
9.007	5.6.2.a						
	Providing and laying bituminous concrete with 80-100 TPH hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with a bituminous binder(NRMB) @ 5.4 percent of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level, and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects For Grading - II (13.2 mm Nominal Size)						
	Providing and laying bituminous concrete						
	NH BMBC - Open Cut - Sewer lines from 225 mm to 630 mm	1	2307.700	3.000	0.030		207.693
	NH BMBC - HDD - Sewer lines from 225 mm to 630 mm @1129.8 m	38	2.500	2.500	0.030		7.125
	IC to MH - NH BMBC	1	1016.000	1.500	0.030		45.720
	PM - NH BMBC	1	475.000	1.500	0.030		21.375
	Total						**281.913**
						Total Quantity in cum	**281.913**
9.008	8.13						
	Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads on Bituminous Surface @ 250 gms per sqm area, the thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35. The finished surface to be level, uniform, and free from streaks and holes.						
	Providing and laying of hot applied thermoplastic compound						
	NH BMBC - Open Cut - Sewer lines from 225 mm to 630 mm	1	2307.700	0.100			230.770
	NH BMBC - HDD - Sewer lines from 225 mm to 630 mm@ 1129.8 m	38	2.000	0.100			7.600
	IC to MH - NH BMBC	1	1016.000	0.100			101.600
	PM - NH BMBC	1	475.000	0.100			47.500
	Total						**387.470**
						Total Quantity in sqm	**387.470**
9.009	8.35						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and fixing reflective road studs (Raised Pavement Marker) of ' category A' made out of ASA/HIPS/ABS moulded body with shanks and conforming to ASTM D 4280, strong enough to support a load of more than 13.635 T when tested in accordance with ASTM D 4280, reflective panel confirming to ASTM D 788, and reflectivity conforming to clause 804.4. including installation, drilling, fixing with adhesive etc. with 2 years warranty for the road stud as well as for in field performance as per clause 804.7.3 Road Markers/Road Stud with Lense Reflector :-						
	Providing and fixing reflective road studs						
	NH BMBC - Open Cut - Sewer lines from 225 mm to 630 mm	769					769.000
	IC to MH - NH BMBC	339					339.000
	PM - NH BMBC	158					158.000
	Total						**1266.000**
						Total Quantity in no	**1266.000**
10	PWD - BT ROAD REFORMATION WORK WITH MORTH SPECIFICATION						
10.001	4.2.A.1						
	Construction of granular sub-base by providing graded material, spreading in uniform layers with a motor grader on a prepared surface, mixing by mix in-place method with rotavator at OMC, and compacting with a vibratory roller to achieve the desired density, complete as per clause 401. Grading-III -For lower sub-base - Mix in Place Method						
	Construction of granular sub-base						
	PWD BT- Open Cut - Sewer lines from 225 mm to 630 mm	1	506.300	2.000	0.250		253.150
	PWD BT- HDD- Sewer lines from 225 mm to 630 mm @ 80.4 m	4	2.000	2.000	0.250		4.000
	IC to MH - PWD BT	1	176.000	0.700	0.250		30.800
	PM PWD BT	1	75.000	2.000	0.250		37.500
	Total						**325.450**
						Total Quantity in cum	**325.450**
10.002	4.12						
	Providing, laying, spreading and compacting graded stone aggregate to Wet Mix Macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing, laying, spreading and compacting graded stone aggregate to Wet Mix Macadam						
	PWD BT- Open Cut - Sewer lines from 2225 mm to 630 mm	1	506.300	2.000	0.250		253.150
	PWD BT- HDD- Sewer lines from 225 mm to 630 mm @ 80.4 m	4	2.000	2.000	0.250		4.000
	IC to MH - PWD BT	1	176.000	0.700	0.250		30.800
	PM PWD BT	1	75.000	2.000	0.250		37.500
	Total						**325.450**
						Total Quantity in cum	**325.450**
10.003	5.1.a						
	Providing and applying primer coat with bitumen emulsion (SS) on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.70 - 1.0 kg/sqm using mechanical means.						
	Providing and applying primer coat with bitumen emulsion (SS)						
	PWD BT- Open Cut - Sewer lines from 225 mm to 630 mm	1	506.300	2.000			1012.600
	PWD BT- HDD- Sewer lines from 225 mm to 630 mm @ 80.4 m	4	2.000	2.000			16.000
	IC to MH - PWD BT	1	176.000	0.700			123.200
	PM PWD BT	1	75.000	2.000			150.000
	Total						**1301.800**
						Total Quantity in sqm	**1301.800**
10.004	5.2.b						
	Providing and applying tack coat with bitumen emulsion (RS) using emulsion pressure distributor at the rate of 0.25 - 0.30 kg per sqm on the prepared Granular Surface cleaned with mechanical broom.						
	Providing and applying tack coat with bitumen emulsion (RS)						
	PWD BT- Open Cut - Sewer lines from 225 mm to 630 mm	1	506.300	3.000			1518.900

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	PWD BT- HDD-Sewer lines from 225 mm to 630 mm @ 80.4 m	4	2.500	2.500			25.000
	IC to MH - PWD BT	1	176.000	1.500			264.000
	PM PWD BT	1	75.000	2.500			187.500
	Total						**1995.400**
						Total Quantity in sqm	**1995.400**
10.005	5.7.1						
	Providing, laying and rolling of close-graded premix surfacing material of 20 mm thickness composed of 11.2 mm to 0.09 mm (Type-A) aggregates using viscosity grade bitumen (VG - 30) to the required line, grade, and level to serve as wearing course on a previously prepared base, including mixing in a suitable HMP of appropriate capacity not less than 75 tonnes/hour., laying and rolling with a Smooth wheeled roller 8-10 tonne capacity, and finishing to the required level and grade.						
	Providing, laying and rolling of close-graded premix surfacing material of 20 mm thickness composed of 11.2 mm to 0.09 mm (Type-A)						
	PWD BT- Open Cut - Sewer lines from 225 mm to 630 mm	1	506.300	3.000			1518.900
	PWD BT- HDD-Sewer lines from 225 mm to 630 mm @ 80.4 m	4	2.500	2.500			25.000
	IC to MH - PWD BT	1	176.000	1.500			264.000
	PM PWD BT	1	75.000	2.500			187.500
	Total						**1995.400**
						Total Quantity in sqm	**1995.400**
10.006	5.8.a						
	Providing and laying surface dressing as wearing course in single coat using crushed stone aggregates of specified size on a layer of bituminous binder (VG 30) laid on the prepared surface and rolling with 8-10 tonne smooth wheeled steel roller. Grading I - 19 mm nominal chipping size						
	Providing and laying surface dressing as wearing course in single coat using crushed stone aggregates of specified size on a layer of bituminous binder (VG 30)						
	PWD BT- Open Cut - Sewer lines from 225 mm to 630 mm	1	506.300	3.000			1518.900

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	PWD BT- HDD- Sewer lines from 225 mm to 630 mm @ 80.4 m	4	2.500	2.500			25.000
	IC to MH - PWD BT	1	176.000	1.500			264.000
	PM PWD BT	1	75.000	2.500			187.500
	Total						**1995.400**
						Total Quantity in sqm	**1995.400**
11	MUNICIPALITY (BT) ROAD REFORMATION WORK WITH MoRD SPECIFICATION						
11.001	4.1.A.1						
	Granular Sub-base with Well Graded Material (Table 400.1) (A) By Mix in Place Method Construction of granular sub-base by providing well graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with smooth wheel roller to achieve the desired density, complete as per Technical Specification Clause 401. (i) For Grading I Material						
	Granular Sub-base						
	MT BT - Open Cut - Sewer lines from 225 mm to 630 mm	1	3120.400	2.000	0.200		1248.160
	MT BT - HDD - Sewer lines from225 mm to 630 mm @ 1534.8 m	52	2.000	2.000	0.200		41.600
	IC TO MH - MT BT	1	1328.000	0.700	0.200		185.920
	PM MT BT	1	1440.000	0.700	0.200		201.600
	Total						**1677.280**
						Total Quantity in cum	**1677.280**
11.002	4.9						
	Wet Mix Macadam Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the material with water at OMC in mechanical mixer (Pug Mill), carriage of mixed material by tipper to site, laying in uniform layers in sub-base/base course on a well prepared sub-base and compacting with smooth wheel roller of 80 to 100kN weight to achieve the desired density including lighting, barricading and maintenance of diversion, etc as per Tables 400.11 & 400.12 and Technical Specification Clause 406. By Mechanical Means with 1 km lead						
	Wet Mix Macadam						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	MT BT - Open Cut - Sewer lines from 225 mm to 630 mm	1	3120.400	2.000	0.200		1248.160
	MT BT - HDD - Sewer lines from 225 mm to 630 mm @1534.8 m	52	2.000	2.000	0.200		41.600
	IC TO MH - MT BT	1	1328.000	0.700	0.200		185.920
	PM MT BT	1	1440.000	0.700	0.200		201.600
	Total						**1677.280**
						Total Quantity in cum	**1677.280**
11.003	5.1.1a						
	Prime Coat :- Low porosity Providing and applying primer coat with bitumen emulsion (SS-1) on prepared surface of granular base including cleaning of road surface and spraying primer at the rate of 0.70-1.0 kg/sqm using mechanical means as per Technical Specification Clause 502						
	Prime Coat :- Low porosity Providing and applying primer coat with bitumen emulsion (SS-1)						
	MT BT - Open Cut - Sewer lines from 225 mm to 630 mm	1	3120.400	2.000			6240.800
	MT BT - HDD - Sewer lines from 225 mm to 630 mm @ 1534.8 m	52	2.000	2.000			208.000
	IC TO MH - MT BT	1	1328.000	0.700			929.600
	PM MT BT	1	1440.000	0.700			1008.000
	Total						**8386.400**
						Total Quantity in sqm	**8386.400**
11.004	5.2.3a						
	Tack Coat Providing and applying tack coat with Bitumen emulsion (RS-1) using emulsion distributor at the rate of 0.25 to 0.30 kg per sqm on the prepared granular surfaces treated with primer & cleaned with Hydraulic broom as per Technical Specification Clause 503.						
	Tack Coat Providing and applying tack coat with Bitumen emulsion (RS-1)						
	MT BT - Open Cut - Sewer lines from 225 mm to 630 mm	1	3120.400	3.000			9361.200

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	MT BT - HDD - Sewer lines from 225 mm to 630 mm @ 1534.8	52	2.500	2.500			325.000
	IC TO MH - MT BT	1	1328.000	1.500			1992.000
	PM MT BT	1	1440.000	1.500			2160.000
	Total						**13838.200**
						Total Quantity in sqm	**13838.200**
11.005	5.9.1.2a						
	20mm thick Open-Graded Premix Carpet using Bituminous (penetration grade/modified bitumen) Binder - Bitumen S-65 Providing, laying and rolling of open-graded premix carpet of 20 mm thickness composed of 13.2 mm to 5.6 mm aggregates either using penetration grade bitumen or emulsion to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a three wheel 80-100 kN static roller capacity, finished to required level and grades to be followed by seal coat of either Type A or Type B or Type C as per Technical Specification Clause 508. Case - I By Manual Means (II) Bitumen (S-65)						
	20mm thick Open-Graded Premix Carpet using Bituminous (penetration grade/modified bitumen) Binder - Bitumen S-65						
	MT BT - Open Cut - Sewer lines from 225 mm to 630 mm	1	3120.400	3.000			9361.200
	MT BT - HDD - Sewer lines from 225 mm to 630 mm @ 1534.8 m	52	2.500	2.500			325.000
	IC TO MH - MT BT	1	1328.000	1.500			1992.000
	PM MT BT	1	1440.000	1.500			2160.000
	Total						**13838.200**
						Total Quantity in sqm	**13838.200**
11.006	5.12.A.3.2a						
	Seal Coat - Manual Means - Type C - Bitumen S-65 Providing and laying seal coat sealing the voids in a bituminous surface laid to the specified levels, grade and cross fall using Type A, Type B and Type C as per Technical Specification Clause 510 A. By Manual Means :- Case - III : Type C (II) Bitumen (S-65)						
	Seal Coat - Manual Means - Type C - Bitumen S-65						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	MT BT - Open Cut - Sewer lines from 225 mm to 630 mm	1	2791.200	3.000			8373.600
	MT BT - HDD - Sewer lines from 225 mm to 630 mm @ 1534.8 m	52	2.500	2.500			325.000
	IC TO MH - MT BT	1	1328.000	1.500			1992.000
	PM MT BT	1	1440.000	1.500			2160.000
	Total						**12850.600**
						Total Quantity in sqm	**12850.600**
12	HARBOUR DEPT ROAD REFORMATION WORK WITH MoRD SPECIFICATION						
12.001	4.1.A.1						
	Granular Sub-base with Well Graded Material (Table 400.1) (A) By Mix in Place Method Construction of granular sub-base by providing well graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with smooth wheel roller to achieve the desired density, complete as per Technical Specification Clause 401. (i) For Grading I Material						
	Granular Sub-base with Well Graded Material						
	Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm	1	670.900	2.000	0.200		268.360
	Harbour Dept Road - HDD - Sewer lines from 225 mm to 630 mm @ 320 m	11	2.000	2.000	0.200		8.800
	IC TO MH	1	256.000	0.700	0.200		35.840
	Total						**313.000**
						Total Quantity in cum	**313.000**
12.002	4.9						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Wet Mix Macadam Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the material with water at OMC in mechanical mixer (Pug Mill), carriage of mixed material by tipper to site, laying in uniform layers in sub-base/base course on a well prepared sub-base and compacting with smooth wheel roller of 80 to 100kN weight to achieve the desired density including lighting, barricading and maintenance of diversion, etc as per Tables 400.11 & 400.12 and Technical Specification Clause 406. By Mechanical Means with 1 km lead						
	Wet Mix Macadam						
	Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm	1	670.900	2.000	0.200		268.360
	Harbour Dept Road - HDD - Sewer lines from 225 mm to 630 mm @ 320	11	2.000	2.000	0.200		8.800
	IC TO MH	1	256.000	0.700	0.200		35.840
	Total						**313.000**
						Total Quantity in cum	**313.000**
12.003	5.1.1a						
	Prime Coat :- Low porosity Providing and applying primer coat with bitumen emulsion (SS-1) on prepared surface of granular base including cleaning of road surface and spraying primer at the rate of 0.70-1.0 kg/sqm using mechanical means as per Technical Specification Clause 502						
	Prime Coat :- Low porosity Providing and applying primer coat with bitumen emulsion (SS-1)						
	Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm	1	670.900	2.000			1341.800
	Harbour Dept Road - HDD - Sewer lines from 225 mm to 630 mm @ 320m	11	2.000	2.000			44.000
	IC TO MH - Harbour Dept Road	1	256.000	0.700			179.200
	Total						**1565.000**
						Total Quantity in sqm	**1565.000**
12.004	5.2.3a						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Tack Coat Providing and applying tack coat with Bitumen emulsion (RS-1) using emulsion distributor at the rate of 0.25 to 0.30 kg per sqm on the prepared granular surfaces treated with primer & cleaned with Hydraulic broom as per Technical Specification Clause 503.						
	Tack Coat Providing and applying tack coat with Bitumen emulsion (RS-1)						
	Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm	1	670.900	3.000			2012.700
	Harbour Dept Road - HDD - Sewer lines from 225 mm to 630 mm @ 320m	11	2.500	2.500			68.750
	IC TO MH - Harbour Dept Road	1	256.000	1.500			384.000
	Total						**2465.450**
						Total Quantity in sqm	**2465.450**
12.005	5.9.1.2a						
	20mm thick Open-Graded Premix Carpet using Bituminous (penetration grade/modified bitumen) Binder - Bitumen S-65 Providing, laying and rolling of open-graded premix carpet of 20 mm thickness composed of 13.2 mm to 5.6 mm aggregates either using penetration grade bitumen or emulsion to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a three wheel 80-100 kN static roller capacity, finished to required level and grades to be followed by seal coat of either Type A or Type B or Type C as per Technical Specification Clause 508. Case - I By Manual Means (II) Bitumen (S-65)						
	20mm thick Open-Graded Premix Carpet using Bituminous (penetration grade/modified bitumen) Binder - Bitumen S-65						
	Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm	1	670.900	3.000			2012.700
	Harbour Dept Road - HDD - Sewer lines from 225 mm to 630 mm @ 320m	11	2.500	2.500			68.750
	IC TO MH - Harbour Dept Road	1	256.000	1.500			384.000
	Total						**2465.450**
						Total Quantity in sqm	**2465.450**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
12.006	5.12.A.3.2a						
	Seal Coat - Manual Means - Type C - Bitumen S-65 Providing and laying seal coat sealing the voids in a bituminous surface laid to the specified levels, grade and cross fall using Type A, Type B and Type C as per Technical Specification Clause 510 A. By Manual Means :- Case - III : Type C (II) Bitumen (S-65)						
	Seal Coat - Manual Means - Type C - Bitumen S-65						
	Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm	1	670.900	3.000			2012.700
	Harbour Dept Road - HDD - Sewer lines from 225 mm to 630 mm @ 320m	11	2.500	2.500			68.750
	IC TO MH - Harbour Dept Road	1	256.000	1.500			384.000
	Total						**2465.450**
						Total Quantity in sqm	**2465.450**
13	INTERCEPTION AND DIVERSION WORK						
13.001	2.8.1						
	Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil						
	Earth work in excavation by mechanical means						
	OF 1,2,3,4	4	5.000	1.500	1.300		39.000
	Total						**39.000**
						Total Quantity in cum	**39.000**
13.002	4.1.8						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)						
	Providing and laying in position cement concrete						
	OF 1,2,3,4 Drain Base	4	5.000	1.500	0.150		4.500
	Total						**4.500**
						Total Quantity in cum	**4.500**
13.003	4.1.5						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	OF 1,2,3,4 Drain wall	8	5.000	0.150	1.000		6.000
	Total						**6.000**
						Total Quantity in cum	**6.000**
13.004	4.1.3						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand (zone-III) : 4 graded stone aggregate 20 mm nominal size)						
	Providing and laying in position cement concrete						
	OF 1,2,3,4 Wearing coat	4	5.000	1.000	0.050		1.000
	Total						**1.000**
						Total Quantity in cum	**1.000**
13.005	5.1.2						
	Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:1:5:3 (1 cement 1.5 coarse sand :3 graded stone aggregate 20 mm nominal size						
	Providing and laying in position specified grade of reinforced cement concrete,						
	OF 1,2,3,4 Drain Slab	4	5.000	1.300	0.150		3.900
	Total						**3.900**
						Total Quantity in cum	**3.900**
13.006	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Centering and shuttering						
	OF 1,2,3,4 Drain wall	16	5.000		1.000		80.000
	Total						**80.000**
						Total Quantity in sqm	**80.000**
13.007	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Centering and shuttering						
	OF 1,2,3,4 Drain Slab	4	5.000	1.300			26.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	OF 1,2,3,4 Drain Slab side	8	5.000	0.150			6.000
	Total						**32.000**
						Total Quantity in sqm	**32.000**
13.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	Steel reinforcement for R.C.C						
	Quantity as per item No.5	1	3.900			85.000000	331.500
	Total						**331.500**
						Total Quantity in kilogram	**331.500**
13.009	OD264189/2022-2023						
	Supplying and fixing Mechanical gates						
	Supplying and fixing Mechanical gates						
	OF 1,2,3,4	2	4.000				8.000
	Total						**8.000**
						Total Quantity in no	**8.000**

DRAFT
e-PLATFORM FOR THE MANAGEMENT OF PUBLIC WORKS

ABSTRACT ESTIMATE

Others-SEWERAGE SCHEME TO HARBOUR AREA IN PONNANI MUNICIPALITY-CONSTRUCTION OF 3.5 MLD CAPACITY SEWERAGE TREATMENT PLANT AND LAYING

SEWERAGE NETWORK-SEWERAGE NETWORK-Sewerage Work

Sl No	Specification	Quantity	Rate	Amount
1	**LAYING OF SEWER NETWORK**			
1.001	100.59.1			
	Cutting the bituminous / concrete roads with cutting machine for a minimum depth of 200mm along the sides of proposed alignment of the pipe to be laid without causing any damage to other utilities, including the charges for hire and conveyance of tools and plant, cost of consumables and charges for lighting, watching, ribbon fencing, caution boards, traffic diversion, and as per the direction of departmental officers etc. complete, before carrying out the demolition of bituminous / concrete road by mechanical means and carrying out the excavation.			
	Net Total	18762.600metre	@30.63/metre	574698.44
1.002	15.43.2			
	Dismantling manually / by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer -in-Charge:Bituminous road			
	Net Total	11851.150sqm	@363.19/sqm	4304219.17
1.003	100.8.2			
	Fencing 1.50m high with two rows of casuarina poles (girth 15cm to 24cm) tied with coir yarn on vertical casuarina pole (girth 15cm to 24cm) fixed at 1.5m intervals.			
	Net Total	2814.390metre	@96.75/metre	272292.23
1.004	100.8.1			
	Fencing one side of trenches, 1.50m height with two rows of 10cm plastic caution tape in vertical casuarina pole (girth 15cm to 24cm) fixed at 2m intervals.			
	Net Total	6566.910metre	@28.15/metre	184858.52
1.005	100.1.1			
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50m, in all kinds of soil.			
	Net Total	5753.391cum	@559.02/cum	3216260.64

Sl No	Specification	Quantity	Rate	Amount
1.006	100.1.5			
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50 m, in Ordinary Rock.			
	Net Total	2327.184cum	@811.79/cum	1889184.70
1.007	100.1.2			
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth exceeding 1.5m but not exceeding 3m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50m, in all kinds of soil.			
	Net Total	2282.070cum	@666.07/cum	1520018.36
1.008	100.2.8			
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth exceeding 1.5m but not exceeding 3m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50m, in Medium Rock where Blasting is Prohibited.			
	Net Total	760.690cum	@1541.96/cum	1172953.55
1.009	2.17.3			
	Close timbering in case of shafts, wells, cesspits, manholes and the like including strutting, shoring and packing cavities (wherever required) etc. complete (Measurements to be taken of the face area timbered).Depth exceeding 3 m but not exceeding 4.5 m			
	Net Total	7507.440sqm	@222.59/sqm	1671081.07
1.010	2.23			
	Extra for planking and strutting in open timbering if required to be left permanently in position (Face area of the timber permanently left to be measured).			
	Net Total	1188.954sqm	@971.90/sqm	1155544.39
1.011	OD235696/2022-2023			
	Supplying, Providing bedding with m sand for sewer lines as per specifications to be laid wherever necessary with all lead and lift.			
	Net Total	99.080cum	@2303.87/cum	228267.44
1.012	4.1.3			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand (zone-III) : 4 graded stone aggregate 20 mm nominal size)			
	Net Total	99.080cum	@8040.94/cum	796696.34

Sl No	Specification	Quantity	Rate	Amount
1.013	100.7.2			
	Bailing out water with engine and pump set above 5HP up to 10HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	596.800Kwh	@18.60/Kwh	11100.48
1.014	100.7.3			
	Bailing out water with engine and pump set above 10HP up to 20HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	1790.400Kwh	@9.29/Kwh	16632.82
1.015	100.7.4			
	Bailing out water with engine and pump set above 20HP up to 30HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	2984.000Kwh	@6.19/Kwh	18470.96
1.016	100.98.226			
	Supply of PVC Pipe, 8kg/cm2, 160mm Dia.			
	Net Total	2776.000metre	@935.01/metre	2595587.76
1.017	OD235697/2022-2023			
	Conveying to site, lowering into trenches, laying to correct line and grade using CC holding clamps, 160mm PVC SN 8 (8 Kg/Cm2) S & S Sewerage pipes conforming to I.S.15328, including jointing the pipes using rubber rings as per approved methods with rubber gasket for flexible joints as per specification including cost of gasket, to correct line , de watering with all rates of recuperation etc, providing bedding for pipe line trenches with available earth, hydraulic testing the line to the required test pressure as per IS, CPHEEO specifications, lighting, watching, providing caution boards etc. wherever required, during laying and jointing the pipes including hire for all tools etc complete including commissioning for the following diamters			
	Net Total	2776.000metre	@214.39/metre	595146.64
1.018	OD235698/2022-2023			
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 225mm Outer Dia.			
	Net Total	5612.700metre	@1349.57/metre	7574731.54
1.019	OD235699/2022-2023			
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 280mm Outer Dia.			
	Net Total	279.000metre	@2087.37/metre	582376.23
1.020	OD235700/2022-2023			
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 355 mm			

Sl No	Specification	Quantity	Rate	Amount
	Outer Dia.			
	Net Total	1048.600metre	@3475.43/metre	3644335.90
1.021	OD235701/2022-2023			
	Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 450 mm Outer Dia.			
	Net Total	405.300metre	@6779.87/metre	2747881.31
1.022	OD239661/2022-2023			
	Supply of PE Pipe PE 100 (IS 4984/1995), 8kg, 560mm Outer Dia.			
	Net Total	558.100metre	@10812.75/metre	6034595.78
1.023	OD239660/2022-2023			
	Supply of PE Pipe 100 (IS 4984/1995), 8kg, 630mm Outer Dia.			
	Net Total	1766.600metre	@13672.04/metre	24153025.86
1.024	100.10.8			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 225mm Nominal Outside Diameter Pipes.			
	Net Total	4963.400metre	@379.69/metre	1884553.35
1.025	100.10.10			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 280mm Nominal Outside Diameter Pipes.			
	Net Total	69.000metre	@523.02/metre	36088.38
1.026	100.10.12			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 355mm Nominal Outside Diameter Pipes.			
	Net Total	740.500metre	@659.67/metre	488485.64

Sl No	Specification	Quantity	Rate	Amount
1.027	100.10.14			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 450mm Nominal Outside Diameter Pipes.			
	Net Total	371.900metre	@817.02/metre	303849.74
1.028	100.10.16			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 560mm Nominal Outside Diameter Pipes.			
	Net Total	331.600metre	@991.58/metre	328807.93
1.029	100.10.17			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 630mm Nominal Outside Diameter Pipes.			
	Net Total	128.900metre	@1102.31/metre	142087.76
1.030	OD235702/2022-2023			
	Constructing inspection chambers of size 0.45x0.45m (inside) and 0.45m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, , plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber			
	Net Total	174.000no	@3673.91/no	639260.34
1.031	OD235703/2022-2023			
	Constructing inspection chambers of size 0.45x0.45m (inside) and 0.60m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8			

Sl No	Specification	Quantity	Rate	Amount
	using 20mm broken stone for levelling course below foundation including earth work excavation in all classes of soil,, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber			
	Net Total	104.000no	@7276.80/no	756787.20
1.032	OD235704/2022-2023			
	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.60m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber			
	Net Total	139.000no	@7472.82/no	1038721.98
1.033	OD235705/2022-2023			
	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.75m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber			
	Net Total	139.000no	@7687.53/no	1068566.67
1.034	OD235706/2022-2023			
	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.90m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber			
	Net Total	138.000no	@7929.48/no	1094268.24

Sl No	Specification	Quantity	Rate	Amount
1.035	OD235707/2022-2023			
	Installation of PE pipe between 110mm & 225mm outer dia by HDD method for on grade gravity sewer including preparing and setting up the plant and equipment,preparing new pipe work material making of entry pit and exit pit up to required depth installing new pipe work and commissioning system or making the system or making the system ready for commissioning by HDD operating including all related civil and mechanical works like excavation shoring/strutting etc drilling stringing reaming and pulling back the new pipe work on the designed borne path alignment proper disposal of drilling fluid and back fill of site after completion all inclusive as per Conditions PE pipes also using Ground penetrating radar survey in corridor with to detect buried utilities on the map of corridor with information of locations and depths to the top of various utilities detected .work to be conducted using 500MHZ and 300MHZ antenna or latest forthe best possible resolution and penetration			
	Net Total	649.300metre	@4697.45/metre	3050054.29
1.036	OD235708/2022-2023			
	Installation of PE -250mm-315mm mm dia PE pipe by horizontal directional drilling method in all types of soil above /below water table for pumping /gravity /distribution main including preparing and setting up the plat and equipment, installing new pipe work, testing and commissioning excluding cost of pipe (6 m line pipe with butt joint all related civil /mechanical works like entry /exits pit as necessary. De watering ,drilling stringing, reaming, pulling back the new pipe on the designed alignment and monitoring by approved guidance system. wastage of pipes, proper disposal of drilling fluid /bentonite slurry. Proper back filling og pit and holes by approved borrow material as per specification approved method statement or as directed by engineer in charge. also using Ground penetrating radar survey in corridor with to detect buried utilities on the map of corridor with information of locations and depths to the top of various utilities detected .work to be conducted using 500MHZ and 300MHZ antenna or latest for the best possible resolution and penetration including hydrolic testing			
	Net Total	210.000metre	@6348.83/metre	1333254.30
1.037	OD235709/2022-2023			
	Installation of PE -355mm-500mm mm dia PE pipe by horizontal directional drilling method in all types of soil above /below water table for pumping /gravity /distribution main including preparing and setting up the plant and equipment, installing new pipe work, testing and commissioning excluding cost of pipe (6 m line pipe with butt joint all related civil /mechanical works like entry /exits pit as necessary. Dewatering, drilling stringing, reaming, pulling back the new pipe on the designed alignment and monitoring by approved guidance system. wastage of pipes, proper disposal of drilling fluid /bentonite slurry. Proper back filling pit and holes by approved borrow material as per specification approved method statement or as directed by engineer in charge. Also using Ground penetrating radar survey in corridor with to detect buried utilities on the map of corridor with information of locations and depths to the top of various utilities detected. Work to be conducted using 500MHZ and 300MHZ antenna or latest for the best possible resolution and penetration including hydraulic testing			
	Net Total	341.500metre	@8849.00/metre	3021933.50

Sl No	Specification	Quantity	Rate	Amount
1.038	OD235710/2022-2023			
	Installation of PE -550mm-610mm mm dia PE pipe by horizontal directional drilling method Installation of HDPE -550mm-610mm mm dia PE pipe by horizontal directional drilling method -Add 20% increase to the Installation of HDPE -355mm-500mm mm dia PE pipe by horizontal directional drilling method			
	Net Total	226.500metre	@12335.13/metre	2793906.95
1.039	OD239701/2022-2023			
	Installation of PE -630 mm-710 mm mm dia PE pipe by horizontal directional drilling method Installation of HDPE -630 mm-710mm mm dia PE pipe by horizontal directional drilling method -Add 20% increase to the Installation of HDPE -550 mm-610 mm mm dia PE pipe by horizontal directional drilling method			
	Net Total	1637.700metre	@14802.16/metre	24241497.43
			Heading Total(Rs)	107182083.83
2	**CONSTRUCTION OF MANHOLES**			
2.001	100.3.1.1			
	Earthwork in open well excavation (above water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift up to 1.5m including neat banking.			
	Net Total	3145.067cum	@535.88/cum	1685378.50
2.002	100.3.1.2			
	Earthwork in open well excavation (above water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 1.5m to 3.0m including neat banking.			
	Net Total	2815.895cum	@589.48/cum	1659913.78
2.003	100.3.1.13			
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.5m including neat banking.			
	Net Total	1574.472cum	@771.68/cum	1214988.55
2.004	100.3.1.14			
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.0m including neat banking.			
	Net Total	330.520cum	@835.98/cum	276308.11
2.005	100.3.1.15			
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 6.0m to 7.5m including neat banking.			
	Net Total	8.167cum	@900.29/cum	7352.67

Sl No	Specification	Quantity	Rate	Amount
2.006	100.6.1			
	Providing steel sheet shoring to the sides of the trenches to depths of above 4.00 m but not exceeding 6.00m using 6 mm M.S. sheet 0.50 M wide stiffen on edges with 50 mm x 50mm x 6 mm M.S. angles driving down vertically on either side one after another in lines and levels with suitable pile driving equipments and accessories to a maximum depth of 0.50 M below the bottom of the proposed excavation 0.5 M above ground level suitably braced by horizontal walling pieces at 75 x 150 mm x 8 mm angles on either side at intervals not exceeding 1.50M and horizontal screw jack type struts at 1.50M intervals and maintaining the shoring till the pipes are laid and works are completed, dismantling, cleaning and restacking for reuse including all labour, hire charges and conveyance for equipments, tools and plants and sundries etc. complete.			
	Net Total	11041.528sqm	@753.79/sqm	8322993.39
2.007	100.6.S.1			
	Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete. (excluding cost of materials)			
	Net Total	3312.458kilogram	@25.38/kilogram	84070.18
2.008	100.7.1			
	Bailing out water with 5HP engine and pump set including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	11876.320Kwh	@37.17/Kwh	441442.81
2.009	100.7.4			
	Bailing out water with engine and pump set above 20HP up to 30HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	5729.280Kwh	@6.19/Kwh	35464.24
2.010	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	314.508cum	@7256.34/cum	2282176.98
2.011	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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			

Sl No	Specification	Quantity	Rate	Amount
	workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	2768.056cum	@9947.98/cum	27536565.73
2.012	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	2768.056cum	@82.60/cum	228641.43
2.013	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	941139.040kg	@1.35/kg	1270537.70
2.014	5.22.1			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelMild steel and Medium Tensile steel bars			
	Net Total	331381.560kg	@97.25/kg	32226856.71
2.015	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	11632.303sqm	@721.70/sqm	8395033.08
2.016	5.9.20			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform with water proof ply 12 mm thick			
	Net Total	486.142sqm	@923.03/sqm	448723.65
2.017	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline			

Sl No	Specification	Quantity	Rate	Amount
	slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	4213.095sqm	@573.84/sqm	2417642.43
2.018	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	486.142sqm	@442.30/sqm	215020.61
2.019	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	12976.749sqm	@403.74/sqm	5239232.64
2.020	13.65.1			
	Painting with black anti- corrosive bitumastic paint of approved brand and manufacture to give an even shade:Two or more coats on new work			
	Net Total	12976.749sqm	@125.61/sqm	1630009.44
2.021	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	1469.202Kilolitre	@185.72/Kilolitre	272860.20
2.022	2.25			
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	3290.049cum	@260.18/cum	856004.95
2.023	19.18.3			
	Supplying and fixing C.I with out frame for manholes:560 mm diameter (heavy duty) the weight of the cover to be not less than 108 kg			
	Net Total	347.000each	@8080.96/each	2804093.12
	Heading Total(Rs)			99551310.90
3	**COLLECTION WELLS, LIFTING STATIONS AND ALLIED WORKS**			
3.001	100.3.1.1			
	Earthwork in open well excavation (above water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift up to 1.5m including neat banking.			
	Net Total	122.719cum	@535.88/cum	65762.66
3.002	100.3.1.2			
	Earthwork in open well excavation (above water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 1.5m to 3.0m including neat banking.			
	Net Total	122.719cum	@589.48/cum	72340.40
3.003	100.3.1.13			
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.5m including neat banking.			
	Net Total	75.214cum	@771.68/cum	58041.14
3.004	100.3.1.14			
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.0m including neat banking.			
	Net Total	43.544cum	@835.98/cum	36401.91
3.005	100.3.1.15			
	Earthwork in open well excavation (in or under water) for wells of diameter up to 2.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 6.0m to 7.5m including neat banking.			
	Net Total	43.544cum	@900.29/cum	39202.23
3.006	100.3.3.1			
	Earthwork in open well excavation (above water) for wells of diameter above 2.5m and up to 3.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift up to 1.5m including neat banking.			
	Net Total	68.672cum	@513.78/cum	35282.30
3.007	100.3.3.2			
	Earthwork in open well excavation (above water) for wells of diameter above 2.5m and up to 3.50m in all kinds of soil and conveying and depositing the spoil within			

Sl No	Specification	Quantity	Rate	Amount
	initial lead of 50m and lift from 1.5m to 3.0m including neat banking.			
	Net Total	68.672cum	@565.16/cum	38810.67
3.008	100.3.3.13			
	Earthwork in open well excavation (in or under water) for wells of diameter above 2.5m and up to 3.50m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.5m including neat banking.			
	Net Total	68.672cum	@739.85/cum	50806.98
3.009	100.3.4.14			
	Earthwork in open well excavation (in or under water) for wells of diameter above 2.5m and up to 3.50m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.0m including neat banking.			
	Net Total	68.672cum	@2077.53/cum	142668.14
3.010	100.3.4.15			
	Earthwork in open well excavation (in or under water) for wells of diameter above 2.5m and up to 3.50m in ordinary rock in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 6.0m to 7.5m including neat banking.			
	Net Total	68.672cum	@2237.34/cum	153642.61
3.011	100.3.4.16			
	Earthwork in open well excavation (in or under water) for wells of diameter above 2.5m and up to 3.50m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 7.5m to 9.0m including neat banking.			
	Net Total	27.469cum	@2397.14/cum	65847.04
3.012	2.17.2			
	Close timbering in case of shafts, wells, cesspits, manholes and the like including strutting, shoring and packing cavities (wherever required) etc. complete (Measurements to be taken of the face area timbered).Depth exceeding 1.5 m but not exceeding 3 m			
	Net Total	346.656sqm	@192.50/sqm	66731.28
3.013	100.6.1			
	Providing steel sheet shoring to the sides of the trenches to depths of above 4.00 m but not exceeding 6.00m using 6 mm M.S. sheet 0.50 M wide stiffen on edges with 50 mm x 50mm x 6 mm M.S. angles driving down vertically on either side one after another in lines and levels with suitable pile driving equipments and accessories to a maximum depth of 0.50 M below the bottom of the proposed excavation 0.5 M above ground level suitably braced by horizontal walling pieces at 75 x 150 mm x 8 mm angles on either side at intervals not exceeding 1.50M and horizontal screw jack type struts at 1.50M intervals and maintaining the shoring till the pipes are laid and works are completed, dismantling, cleaning and restacking for reuse including all labour, hire charges and conveyance for equipments, tools and plants and sundries etc. complete.			
	Net Total	284.610sqm	@753.79/sqm	214536.17
3.014	100.6.S.1			
	Structural steel work in single section, fixed with or without connecting plate,			

Sl No	Specification	Quantity	Rate	Amount
	including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete. (excluding cost of materials)			
	Net Total	85.382kilogram	@25.38/kilogram	2167.00
3.015	100.7.1			
	Bailing out water with 5HP engine and pump set including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	477.440Kwh	@37.17/Kwh	17746.44
3.016	100.7.2			
	Bailing out water with engine and pump set above 5HP up to 10HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	716.160Kwh	@18.60/Kwh	13320.58
3.017	100.7.3			
	Bailing out water with engine and pump set above 10HP up to 20HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	895.200Kwh	@9.29/Kwh	8316.41
3.018	100.7.4			
	Bailing out water with engine and pump set above 20HP up to 30HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	1342.800Kwh	@6.19/Kwh	8311.93
3.019	100.7.5			
	Bailing out water with engine and pump set above 30HP up to 40HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	716.160Kwh	@4.64/Kwh	3322.98
3.020	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	19.345cum	@7256.34/cum	140373.90
3.021	5.37.1			
	Providing and laying in position ready mixed M-25 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 all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding 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			

Sl No	Specification	Quantity	Rate	Amount
	workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	199.733cum	@9947.98/cum	1986939.89
3.022	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	199.733cum	@82.60/cum	16497.95
3.023	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	67909.220kg	@1.35/kg	91677.45
3.024	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	745.060sqm	@721.70/sqm	537709.80
3.025	5.9.20			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform with water proof ply 12 mm thick			
	Net Total	32.970sqm	@923.03/sqm	30432.30
3.026	5.22.1			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelMild steel and Medium Tensile steel bars			
	Net Total	23967.960kg	@97.25/kg	2330884.11
3.027	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any			

Sl No	Specification	Quantity	Rate	Amount
	leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	518.100sqm	@573.84/sqm	297306.50
3.028	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	61.230sqm	@442.30/sqm	27082.03
3.029	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	830.138sqm	@403.74/sqm	335159.92
3.030	13.65.1			
	Painting with black anti- corrosive bitumastic paint of approved brand and manufacture to give an even shade:Two or more coats on new work			
	Net Total	830.138sqm	@125.61/sqm	104273.63
3.031	100.41.34			
	Supplying and fixing Rectangular C.I. manhole cover 455mm x 610mm with frame (low duty) charges including all cost, labour charges etc., complete.			
	Net Total	8.000no	@2815.71/no	22525.68
3.032	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a distance of 5 km (average) to the reservoir site and pumping the water into the reservoir of height not less than 3 m using 5 HP diesel engine pump set , hire for tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	181.335Kilo litre	@185.72/Kilo litre	33677.54
3.033	2.25			
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.			
	Net Total	276.383cum	@260.18/cum	71909.33

Sl No	Specification	Quantity	Rate	Amount
3.034	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	113.000each	@548.45/each	61974.85
			Heading Total(Rs)	7181683.75
4	**PUMPING MAINS**			
4.001	100.59.1			
	Cutting the bituminous / concrete roads with cutting machine for a minimum depth of 200mm along the sides of proposed alignment of the pipe to be laid without causing any damage to other utilities, including the charges for hire and conveyance of tools and plant, cost of consumables and charges for lighting, watching, ribbon fencing, caution boards, traffic diversion, and as per the direction of departmental officers etc. complete, before carrying out the demolition of bituminous / concrete road by mechanical means and carrying out the excavation.			
	Net Total	1960.000metre	@30.63/metre	60034.80
4.002	15.43.2			
	Dismantling manually / by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer -in-Charge:Bituminous road			
	Net Total	1818.000sqm	@363.19/sqm	660279.42
4.003	100.1.1			
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50m, in all kinds of soil.			
	Net Total	1454.400cum	@559.02/cum	813038.69
4.004	100.1.5			
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20cm in depth, including consolidating each deposited layer by ramming, watering, etc., and disposing of surplus excavated soil as directed, within a lead of 50 m, in Ordinary Rock.			
	Net Total	363.600cum	@811.79/cum	295166.84

Sl No	Specification	Quantity	Rate	Amount
4.005	100.8.1			
	Fencing one side of trenches, 1.50m height with two rows of 10cm plastic caution tape in vertical casuarina pole (girth 15cm to 24cm) fixed at 2m intervals.			
	Net Total	1372.000metre	@28.15/metre	38621.80
4.006	OD243866/2022-2023			
	Supply of PE Pipe PE 100 (IS 14333), 10kg, 140mm Outer Dia.			
	Net Total	1375.000metre	@642.15/metre	882956.25
4.007	OD243893/2022-2023			
	Supply of PE Pipe, PE100, PN10, 200mm dia, conforming to IS 14333.			
	Net Total	85.000metre	@1308.61/metre	111231.85
4.008	OD243894/2022-2023			
	Supply of PE Pipe, PE100, PN10, 315mm dia, conforming to IS 14333.			
	Net Total	350.000metre	@3239.60/metre	1133860.00
4.009	OD248629/2022-2023			
	Supply of PE Pipe, PE100, PN10, 560mm dia, conforming to IS 4984/2016.			
	Net Total	150.000metre	@13186.35/metre	1977952.50
4.010	OD248631/2022-2023			
	Supply of PE Pipe, PE100, PN10, 630mm dia, conforming to IS 4984/2016.			
	Net Total	50.000metre	@16700.76/metre	835038.00
4.011	100.10.4			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 140mm Nominal Outside Diameter Pipes.			
	Net Total	1375.000metre	@181.34/metre	249342.50
4.012	100.10.7			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 200mm Nominal Outside Diameter Pipes.			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	85.000metre	@321.88/metre	27359.80
4.013	100.10.11			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 315mm Nominal Outside Diameter Pipes.			
	Net Total	350.000metre	@584.63/metre	204620.50
4.014	100.10.16			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 560mm Nominal Outside Diameter Pipes.			
	Net Total	150.000metre	@991.58/metre	148737.00
4.015	100.10.17			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 630mm Nominal Outside Diameter Pipes.			
	Net Total	50.000metre	@1102.31/metre	55115.50
4.016	100.98.471			
	Supply of CI Double Flanged Sluice Valve Conforming to IS 14846 - 2000, Sluice Valve with Cap PN 1.0, Size 125mm.			
	Net Total	5.000no	@10243.27/no	51216.35
4.017	100.98.473			
	Supply of CI Double Flanged Sluice Valve Conforming to IS 14846 - 2000, Sluice Valve with Cap PN 1.0, Size 200mm.			
	Net Total	1.000no	@21987.20/no	21987.20
4.018	100.98.475			
	Supply of CI Double Flanged Sluice Valve Conforming to IS 14846 - 2000, Sluice Valve with Cap PN 1.0, Size 300mm.			
	Net Total	1.000no	@40473.63/no	40473.63
4.019	100.98.479			

Sl No	Specification	Quantity	Rate	Amount
	Supply of CI Double Flanged Sluice Valve Conforming to IS 14846 - 2000, Sluice Valve with Cap PN 1.0, Size 500mm.			
	Net Total	1.000no	@170798.58/no	170798.58
4.020	100.98.480			
	Supply of CI Double Flanged Sluice Valve Conforming to IS 14846 - 2000, Sluice Valve with Cap PN 1.0, Size 600mm.			
	Net Total	1.000no	@197549.08/no	197549.08
4.021	100.31.2.3			
	Conveying and fixing C.I. sluice valves (with cap) by providing bolts, nuts, rubber insertions etc., complete, but excluding the cost of the valve (tail pieces, if required, will be paid separately): 125mm diameter, Class II.			
	Net Total	5.000no	@1067.00/no	5335.00
4.022	100.31.2.5			
	Conveying and fixing C.I. sluice valves (with cap) by providing bolts, nuts, rubber insertions etc., complete, but excluding the cost of the valve (tail pieces, if required, will be paid separately): 200mm diameter, Class II.			
	Net Total	1.000no	@1740.29/no	1740.29
4.023	100.31.2.7			
	Conveying and fixing C.I. sluice valves (with cap) by providing bolts, nuts, rubber insertions etc., complete, but excluding the cost of the valve (tail pieces, if required, will be paid separately): 300mm diameter, Class II.			
	Net Total	1.000no	@2974.80/no	2974.80
4.024	100.31.2.11			
	Conveying and fixing C.I. sluice valves (with cap) by providing bolts, nuts, rubber insertions etc., complete, but excluding the cost of the valve (tail pieces, if required, will be paid separately): 500mm diameter, Class II.			
	Net Total	1.000no	@7741.81/no	7741.81
4.025	100.31.2.12			
	Conveying and fixing C.I. sluice valves (with cap) by providing bolts, nuts, rubber insertions etc., complete, but excluding the cost of the valve (tail pieces, if required, will be paid separately): 600mm diameter, Class II.			
	Net Total	1.000no	@10226.82/no	10226.82
4.026	5.1.3			
	Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)			
	Net Total	25.000cum	@8642.34/cum	216058.50
4.027	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	100.000sqm	@337.42/sqm	33742.00
4.028	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	2000.000kilogram	@98.92/kilogram	197840.00
			Heading Total(Rs)	8451039.51
5	**WATER SUPPLY AND SANATORY ARRANGEMENTS, ELECTRICAL WIRING IN PUMPING STATIONS**			
5.001	OD235712/2022-2023			
	Water Supply and Sanatory arrangements, Electrical wiring in pumping stations			
	Net Total	8.000no	@100000.00/no	800000.00
			Heading Total(Rs)	800000.00
6	**MECHANICAL, ELECTRICAL-PUMPSETS, GRIT CHAMBER SCREEN, GENERATOR, TRANSFORMER & ALLIED WORKS COMPLETE**			
6.001	OD252058/2022-2023			
	Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards), CI construction, bronze impeller,complete with 3 phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Three phase Motor with IP 68 protection (1W 1S)" - Upto 10 HP			
	Net Total	66.500HP (Horse power)	@35000.00/HP (Horse power)	2327500.00
6.002	OD235714/2022-2023			
	Supple and erection of Indoor Type Generator Capacity-1KVA to 5 KVA - 7 Nos. @ Rs 3 Lakhs/Nos. Capacity-25 KVA - 1 No. @ 10 Lakhs/No.			
	Net Total	1.000no	@3100000.15/no	3100000.15
6.003	OD235715/2022-2023			
	Control Room, Generator Room and Compound wall with gate			
	Net Total	8.000no	@500000.02/no	4000000.16
6.004	OD235716/2022-2023			

Sl No	Specification	Quantity	Rate	Amount
	Automatic Control system			
	Net Total	8.000no	@100000.01/no	800000.08
6.005	OD235720/2022-2023			
	Supply, delivery and erection of Multistage force Pump 600LPM X 30M head suitable for cleaning the screen chamber,Pumpset during servicing with 16 m of 20 mm dia hose required for operating the pump .			
	Net Total	8.000set	@55000.00/set	440000.00
6.006	OD235721/2022-2023			
	Supply and delivery of breathing apparatus with Oxygen cylinder mask etc complete .			
	Net Total	2.000set	@75000.01/set	150000.02
6.007	OD235722/2022-2023			
	Supply and delivery of Diaphragm type pressure gauge with necessary S.S tubes and isolating valves			
	Net Total	8.000no	@6000.00/no	48000.00
6.008	OD235723/2022-2023			
	Supply and delivery of spare parts for pumps,motors and starter for maintenance.			
	Net Total	8.000no	@25000.00/no	200000.00
6.009	OD256786/2022-2023			
	Electromagnetic Flow meter,pressure and quality sensors- Supply and erection of electromagnetic flow meter, pressure and quality sensors compatible to IoT and central control system with flow recorder, digital flow/quality/pressure indicator, flow/quality/pressure integrator with sensors, totaliser, transmittal and display arrangements and all accessories including housing arrangements, etc. complete to fix in the incoming pipeline to STP or at the Screen channel as directed by the Engineer in Charge			
	Net Total	8.000no	@50000.01/no	400000.08
6.010	OD235725/2022-2023			
	Supply, delivery and usage of tools required for maintenance works including double end spanners, ring spanners, screw drivers,electrical megger,Tong testers,hand gloves etc.			
	Net Total	8.000set	@10000.01/set	80000.08
6.011	OD235726/2022-2023			
	Supply, delivery and erecting of following safety items ,including cost of same. I. Fire extinguisher of 5 Kg capacity (powder type 2 no’s) II. Fire buckets with stand 5no’s III. Electric quality Rubber mat to be laid in front of all the panel boards including starter panels			
	Net Total	8.000no	@40000.00/no	320000.00
6.012	OD235730/2022-2023			
	Supply and fixing of stainless steel screen made of bars of size 50 mm x 10 mm for fixing across the screen chamber channel (fixed type) at 45 degree inclination for a clear passage of 40 mm solids and suitable for manual cleaning including cost of of			

Sl No	Specification	Quantity	Rate	Amount
	screen ,Grab bucket and lifting arrangement material and fixing charges for 1.00m x 1.30m size.			
	Net Total	8.000no	@90000.00/no	720000.00
6.013	OD235731/2022-2023			
	Supply , delivery , erecting and maintenance of 2 ton or suitable capacity hand operated pulley block hoist with mono rail traveling on single girder with over head traveling trolley for a clear lift according to site condition for a travel of 9 (well dia+3m) meters or suitable design for erection and easy loading and unloading of Pumps and specials from trucks.			
	Net Total	2.000no	@50000.01/no	100000.02
6.014	OD256787/2022-2023			
	Supply, installation and commissioning of solar power system low-capacity systems			
	Net Total	8.0001 nos	@100000.01/1 nos	800000.08
6.015	OD256926/2022-2023			
	Wiring & Lighting accessories :- Wiring for circuit/submain wiring along with earthwire with required sizes of FRLS PVC insulated copper conductor,supply and fitting of GI boxes along with modular base and cover plates,supplying and fixing following modular switch/ sockets,supply,installation,testing and commissioning of all accessories and fixtures as approved by dept.			
	Net Total	8.000no	@50000.01/no	400000.08
	Heading Total(Rs)			13885500.75
7	**LINE EXTENSION, DEPOSIT TO KSEB, ETC**			
7.001	OD235689/2022-2023			
	Line extension , Deposit to KSEB, etc			
	Net Total	8.000no	@50000.00/no	400000.00
	Heading Total(Rs)			400000.00
8	**SEWERAGE SERVICE CONNECTION CHARGES**			
8.001	OD235711/2022-2023			
	Sewer service connection charges including connection deposite fee and all materials and labour charges			
	Net Total	690.000no	@40000.00/no	27600000.00
	Heading Total(Rs)			27600000.00
9	**PWD & NH - BM&BC ROAD REFORMATION WORK WITH MORTH SPECIFICATION**			
9.001	4.2.A.1			
	Construction of granular sub-base by providing graded material, spreading in uniform layers with a motor grader on a prepared surface, mixing by mix in-place method with rotavator at OMC, and compacting with a vibratory roller to achieve the desired			

Sl No	Specification	Quantity	Rate	Amount
	density, complete as per clause 401. Grading-III -For lower sub-base - Mix in Place Method			
	Net Total	1452.775cum	@3168.55/cum	4603190.23
9.002	4.12			
	Providing, laying, spreading and compacting graded stone aggregate to Wet Mix Macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.			
	Net Total	1452.775cum	@3260.62/cum	4736947.22
9.003	5.1.a			
	Providing and applying primer coat with bitumen emulsion (SS) on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.70 - 1.0 kg/sqm using mechanical means.			
	Net Total	5811.100sqm	@61.52/sqm	357498.87
9.004	5.2.b			
	Providing and applying tack coat with bitumen emulsion (RS) using emulsion pressure distributor at the rate of 0.25 - 0.30 kg per sqm on the prepared Granular Surface cleaned with mechanical broom.			
	Net Total	9397.100sqm	@14.03/sqm	131841.31
9.005	5.3.2.a			
	Providing and laying bituminous macadam with 80-100 TPH hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading premixed with a bituminous binder (VG 30), transported to the site, laid over a previously prepared surface with paver finisher to the required grade, level, and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction For Grading II - (19 mm nominal size)			
	Net Total	469.855cum	@8337.93/cum	3917618.10
9.006	5.2.a			
	Providing and applying tack coat with bitumen emulsion(RS) using emulsion pressure distributor at the rate of 0.20 - 0.30 kg per sqm on the prepared bituminous surface cleaned with mechanical broom.			
	Net Total	9397.100sqm	@11.58/sqm	108818.42
9.007	5.6.2.a			
	Providing and laying bituminous concrete with 80-100 TPH hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with a bituminous binder(NRMB) @ 5.4 percent of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level, and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects For Grading - II (13.2 mm Nominal Size)			
	Net Total	281.913cum	@12748.61/cum	3593998.89
9.008	8.13			

Sl No	Specification	Quantity	Rate	Amount
	Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads on Bituminous Surface @ 250 gms per sqm area, the thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35. The finished surface to be level, uniform, and free from streaks and holes.			
	Net Total	387.470sqm	@506.97/sqm	196435.67
9.009	8.35			
	Providing and fixing reflective road studs (Raised Pavement Marker) of ' category A' made out of ASA/HIPS/ABS moulded body with shanks and conforming to ASTM D 4280, strong enough to support a load of more than 13.635 T when tested in accordance with ASTM D 4280, reflective panel confirming to ASTM D 788, and reflectivity conforming to clause 804.4. including installation, drilling, fixing with adhesive etc. with 2 years warranty for the road stud as well as for in field performance as per clause 804.7.3 Road Markers/Road Stud with Lense Reflector :-			
	Net Total	1266.000no	@200.84/no	254263.44
			Heading Total(Rs)	17900612.15
10	**PWD - BT ROAD REFORMATION WORK WITH MORTH SPECIFICATION**			
10.001	4.2.A.1			
	Construction of granular sub-base by providing graded material, spreading in uniform layers with a motor grader on a prepared surface, mixing by mix in-place method with rotavator at OMC, and compacting with a vibratory roller to achieve the desired density, complete as per clause 401. Grading-III -For lower sub-base - Mix in Place Method			
	Net Total	325.450cum	@3168.55/cum	1031204.60
10.002	4.12			
	Providing, laying, spreading and compacting graded stone aggregate to Wet Mix Macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.			
	Net Total	325.450cum	@3260.62/cum	1061168.78
10.003	5.1.a			
	Providing and applying primer coat with bitumen emulsion (SS) on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.70 - 1.0 kg/sqm using mechanical means.			
	Net Total	1301.800sqm	@61.52/sqm	80086.74
10.004	5.2.b			
	Providing and applying tack coat with bitumen emulsion (RS) using emulsion pressure distributor at the rate of 0.25 - 0.30 kg per sqm on the prepared Granular Surface cleaned with mechanical broom.			
	Net Total	1995.400sqm	@14.03/sqm	27995.46
10.005	5.7.1			

Sl No	Specification	Quantity	Rate	Amount
	Providing, laying and rolling of close-graded premix surfacing material of 20 mm thickness composed of 11.2 mm to 0.09 mm (Type-A) aggregates using viscosity grade bitumen (VG - 30) to the required line, grade, and level to serve as wearing course on a previously prepared base, including mixing in a suitable HMP of appropriate capacity not less than 75 tonnes/hour., laying and rolling with a Smooth wheeled roller 8-10 tonne capacity, and finishing to the required level and grade.			
	Net Total	1995.400sqm	@200.75/sqm	400576.55
10.006	5.8.a			
	Providing and laying surface dressing as wearing course in single coat using crushed stone aggregates of specified size on a layer of bituminous binder (VG 30) laid on the prepared surface and rolling with 8-10 tonne smooth wheeled steel roller. Grading I - 19 mm nominal chipping size			
	Net Total	1995.400sqm	@107.64/sqm	214784.86
	Heading Total(Rs)			2815816.99
11	**MUNICIPALITY (BT) ROAD REFORMATION WORK WITH MoRD SPECIFICATION**			
11.001	4.1.A.1			
	Granular Sub-base with Well Graded Material (Table 400.1) (A) By Mix in Place Method Construction of granular sub-base by providing well graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with smooth wheel roller to achieve the desired density, complete as per Technical Specification Clause 401. (i) For Grading I Material			
	Net Total	1677.280cum	@2988.07/cum	5011830.05
11.002	4.9			
	Wet Mix Macadam Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the material with water at OMC in mechanical mixer (Pug Mill), carriage of mixed material by tipper to site, laying in uniform layers in sub-base/base course on a well prepared sub-base and compacting with smooth wheel roller of 80 to 100kN weight to achieve the desired density including lighting, barricading and maintenance of diversion, etc as per Tables 400.11 & 400.12 and Technical Specification Clause 406. By Mechanical Means with 1 km lead			
	Net Total	1677.280cum	@3336.88/cum	5596882.09
11.003	5.1.1a			
	Prime Coat :- Low porosity Providing and applying primer coat with bitumen emulsion (SS-1) on prepared surface of granular base including cleaning of road surface and spraying primer at the rate of 0.70-1.0 kg/sqm using mechanical means as per Technical Specification Clause 502			
	Net Total	8386.400sqm	@74.01/sqm	620677.46
11.004	5.2.3a			
	Tack Coat Providing and applying tack coat with Bitumen emulsion (RS-1) using emulsion distributor at the rate of 0.25 to 0.30 kg per sqm on the prepared granular surfaces treated with primer & cleaned with Hydraulic broom as per Technical Specification Clause 503.			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	13838.200sqm	@15.56/sqm	215322.39
11.005	5.9.1.2a			
	20mm thick Open-Graded Premix Carpet using Bituminous (penetration grade/modified bitumen) Binder - Bitumen S-65 Providing, laying and rolling of open-graded premix carpet of 20 mm thickness composed of 13.2 mm to 5.6 mm aggregates either using penetration grade bitumen or emulsion to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a three wheel 80-100 kN static roller capacity, finished to required level and grades to be followed by seal coat of either Type A or Type B or Type C as per Technical Specification Clause 508. Case - I By Manual Means (II) Bitumen (S-65)			
	Net Total	13838.200sqm	@196.59/sqm	2720451.74
11.006	5.12.A.3.2a			
	Seal Coat - Manual Means - Type C - Bitumen S-65 Providing and laying seal coat sealing the voids in a bituminous surface laid to the specified levels, grade and cross fall using Type A, Type B and Type C as per Technical Specification Clause 510 A. By Manual Means :- Case - III : Type C (II) Bitumen (S-65)			
	Net Total	12850.600sqm	@83.30/sqm	1070454.98
			Heading Total(Rs)	15235618.71
12	**HARBOUR DEPT ROAD REFORMATION WORK WITH MoRD SPECIFICATION**			
12.001	4.1.A.1			
	Granular Sub-base with Well Graded Material (Table 400.1) (A) By Mix in Place Method Construction of granular sub-base by providing well graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with smooth wheel roller to achieve the desired density, complete as per Technical Specification Clause 401. (i) For Grading I Material			
	Net Total	313.000cum	@2988.07/cum	935265.91
12.002	4.9			
	Wet Mix Macadam Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the material with water at OMC in mechanical mixer (Pug Mill), carriage of mixed material by tipper to site, laying in uniform layers in sub-base/base course on a well prepared sub-base and compacting with smooth wheel roller of 80 to 100kN weight to achieve the desired density including lighting, barricading and maintenance of diversion, etc as per Tables 400.11 & 400.12 and Technical Specification Clause 406. By Mechanical Means with 1 km lead			
	Net Total	313.000cum	@3336.88/cum	1044443.44
12.003	5.1.1a			
	Prime Coat :- Low porosity Providing and applying primer coat with			

Sl No	Specification	Quantity	Rate	Amount
	bitumen emulsion (SS-1) on prepared surface of granular base including cleaning of road surface and spraying primer at the rate of 0.70-1.0 kg/sqm using mechanical means as per Technical Specification Clause 502			
	Net Total	1565.000sqm	@74.01/sqm	115825.65
12.004	5.2.3a			
	Tack Coat Providing and applying tack coat with Bitumen emulsion (RS-1) using emulsion distributor at the rate of 0.25 to 0.30 kg per sqm on the prepared granular surfaces treated with primer & cleaned with Hydraulic broom as per Technical Specification Clause 503.			
	Net Total	2465.450sqm	@15.56/sqm	38362.40
12.005	5.9.1.2a			
	20mm thick Open-Graded Premix Carpet using Bituminous (penetration grade/modified bitumen) Binder - Bitumen S-65 Providing, laying and rolling of open-graded premix carpet of 20 mm thickness composed of 13.2 mm to 5.6 mm aggregates either using penetration grade bitumen or emulsion to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a three wheel 80-100 kN static roller capacity, finished to required level and grades to be followed by seal coat of either Type A or Type B or Type C as per Technical Specification Clause 508. Case - I By Manual Means (II) Bitumen (S-65)			
	Net Total	2465.450sqm	@196.59/sqm	484682.82
12.006	5.12.A.3.2a			
	Seal Coat - Manual Means - Type C - Bitumen S-65 Providing and laying seal coat sealing the voids in a bituminous surface laid to the specified levels, grade and cross fall using Type A, Type B and Type C as per Technical Specification Clause 510 A. By Manual Means :- Case - III : Type C (II) Bitumen (S-65)			
	Net Total	2465.450sqm	@83.30/sqm	205371.99
			Heading Total(Rs)	2823952.21
13	**INTERCEPTION AND DIVERSION WORK**			
13.001	2.8.1			
	Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil			
	Net Total	39.000cum	@298.84/cum	11654.76
13.002	4.1.8			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)			
	Net Total	4.500cum	@6857.60/cum	30859.20
13.003	4.1.5			
	Providing and laying in position cement concrete of specified grade excluding the			

Sl No	Specification	Quantity	Rate	Amount
	cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)			
	Net Total	6.000cum	@7413.74/cum	44482.44
13.004	4.1.3			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand (zone-III) : 4 graded stone aggregate 20 mm nominal size)			
	Net Total	1.000cum	@8040.94/cum	8040.94
13.005	5.1.2			
	Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:1:5:3 (1 cement 1.5 coarse sand :3 graded stone aggregate 20 mm nominal size			
	Net Total	3.900cum	@9142.08/cum	35654.11
13.006	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	80.000sqm	@721.70/sqm	57736.00
13.007	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	32.000sqm	@820.86/sqm	26267.52
13.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	331.500kilogram	@98.92/kilogram	32791.98
13.009	OD264189/2022-2023			
	Supplying and fixing Mechanical gates			
	Net Total	8.000no	@100000.01/no	800000.08
			Heading Total(Rs)	1047487.03
			Total Estimation PAC	304875105.83
15	**Extra Charges**			
14.001	Provision for GST			
		304875105.83	18.00%	54877519.05
			Grand Total	0.00
			Round off	0.00

Sl No	Specification	Quantity	Rate	Amount
			Rounded Total(Rs)	359752624.88
	Rupees Thirty Five Crore Ninety Seven Lakh Fifty Two Thousand Six Hundred and Twenty Four			

Assistant Engineer
Sewerage Camp Office
Kerala Water Authority
Malappuram-676 505

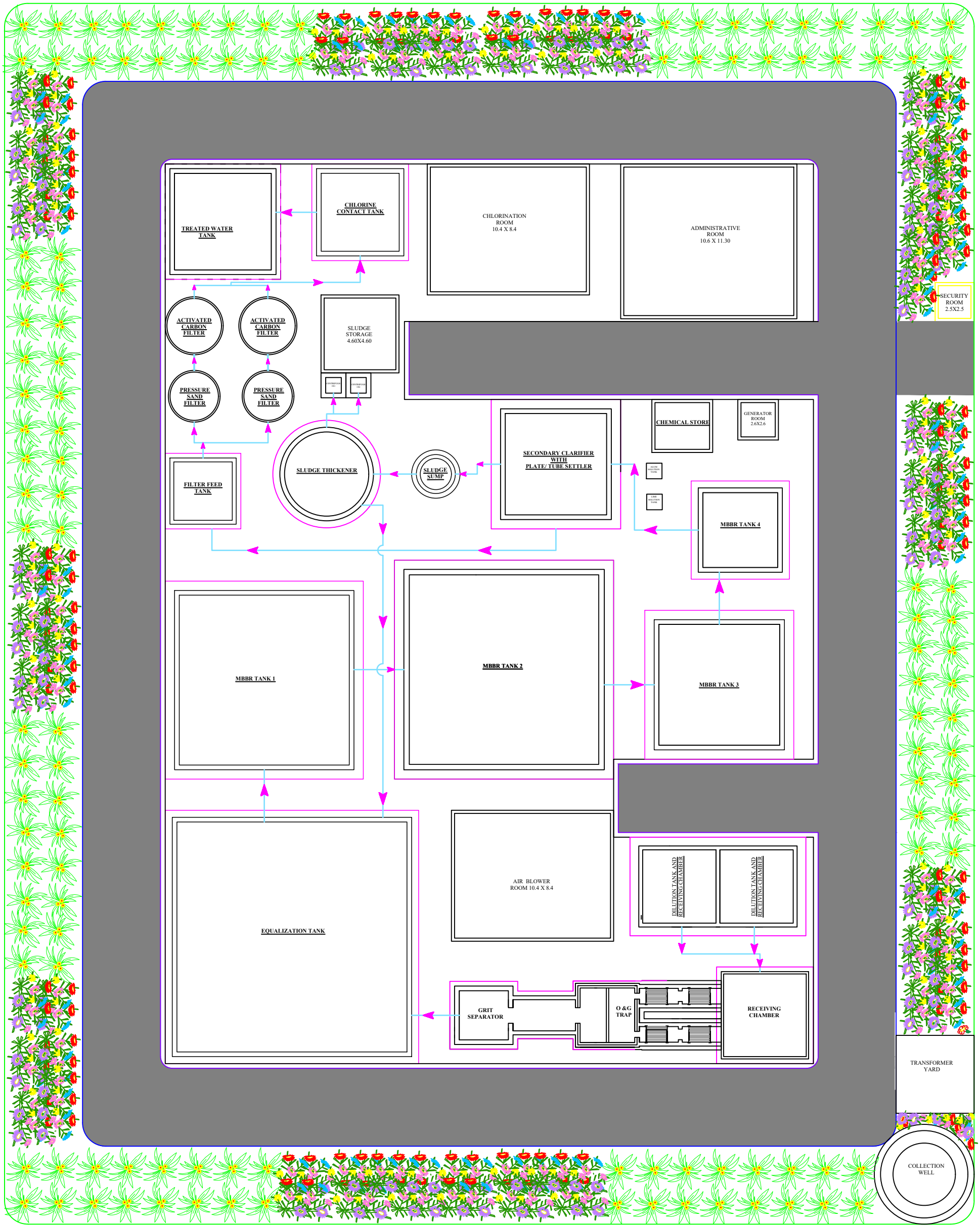
Assistant Executive Engineer
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Executive Engineer (i/c)
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Superintending Engineer
PPD Regional Office
Kerala Water Authority
Kochi - 682011

Office of the Superintending Engineer
Kerala Water Authority
Kochi - 682011
PPD Regional Office

DRAFT
PRICE
e-PLATFORM FOR THE MANAGEMENT OF PUBLIC WORKS



KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

ALL DIMENSIONS ARE IN METERS

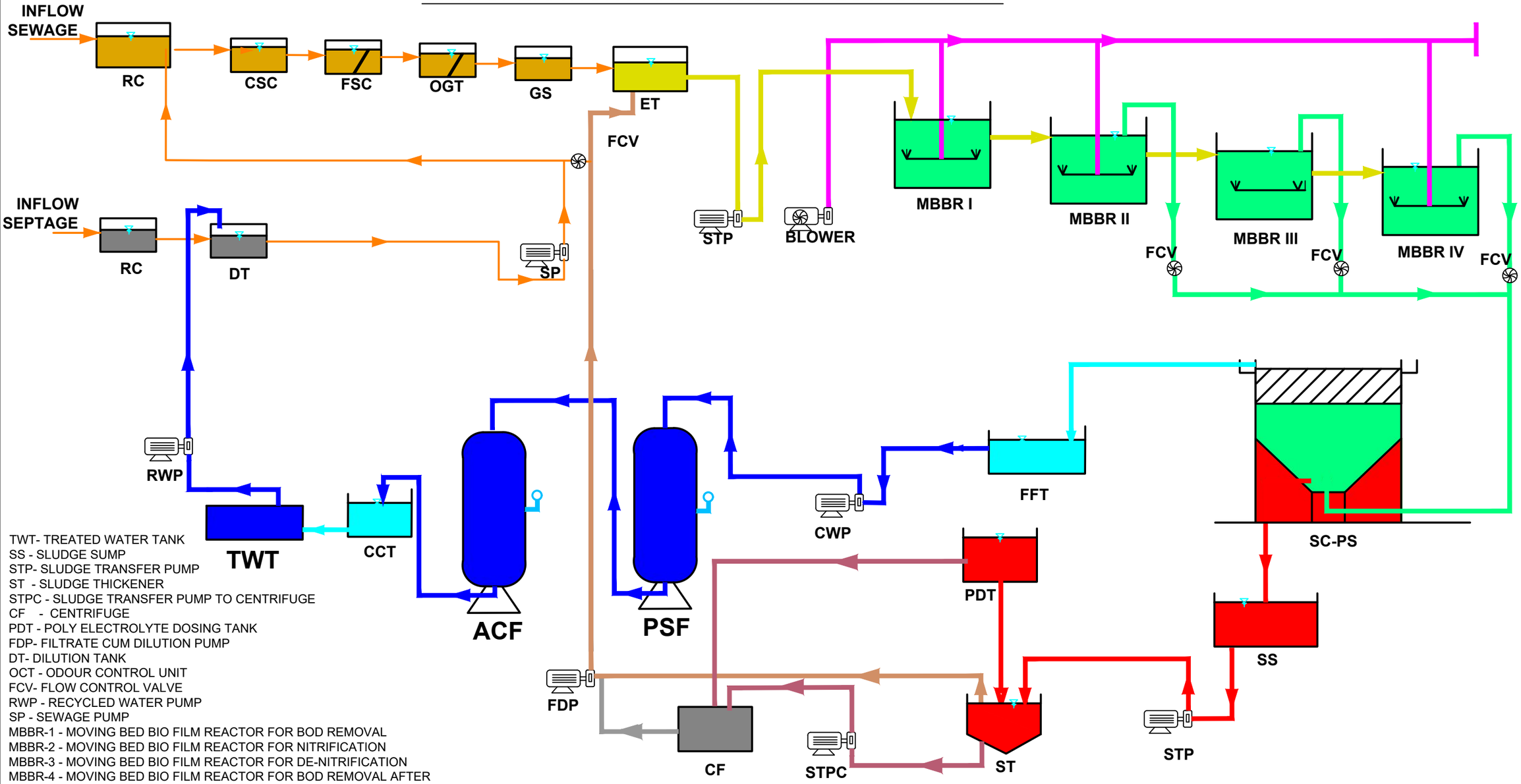
FILE NO : SEW/MPM/2023/HARBOUR SBM2

TITLE : STP LAYOUT

DRAWING NO : HARBOUR SBM 2 -1

DATE: 16-03-2023

UNIT OPERATIONS AND PROCESS FLOW DIAGRAM



TWT- TREATED WATER TANK
SS - SLUDGE SUMP
STP- SLUDGE TRANSFER PUMP
ST - SLUDGE THICKENER
STPC - SLUDGE TRANSFER PUMP TO CENTRIFUGE
CF - CENTRIFUGE
PDT - POLY ELECTROLYTE DOSING TANK
FDP- FILTRATE CUM DILUTION PUMP
DT- DILUTION TANK
OCT - ODOUR CONTROL UNIT
FCV- FLOW CONTROL VALVE
RWP - RECYCLED WATER PUMP
SP - SEWAGE PUMP
MBBR-1 - MOVING BED BIO FILM REACTOR FOR BOD REMOVAL
MBBR-2 - MOVING BED BIO FILM REACTOR FOR NITRIFICATION
MBBR-3 - MOVING BED BIO FILM REACTOR FOR DE-NITRIFICATION
MBBR-4 - MOVING BED BIO FILM REACTOR FOR BOD REMOVAL AFTER DE-NITRIFICATION
SC-PS - SECONDARY CLARIFIER WITH PLATE SETTLER
FFT- FILTER FEED TANK
AT - ALUM TANK
LT - LIME TANK
CCT - CHLORINE CONTACT TANK
CWP - CLARIFIED WATER PUMP
PSF - PRESSURE SAND FILTER
ACF -ACTIVATED CARBON FILTER
RC- RECEIVING CHAMBER
OGT- OIL AND GREASE TRAP
CSC - COARSE SCREEN CHANNEL
FSC - FINE SCREEN CHANNEL
GS- GRIT SEPARATOR
ET - EQUALISATION TANK

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

ALL DIMENSIONS ARE IN METERS

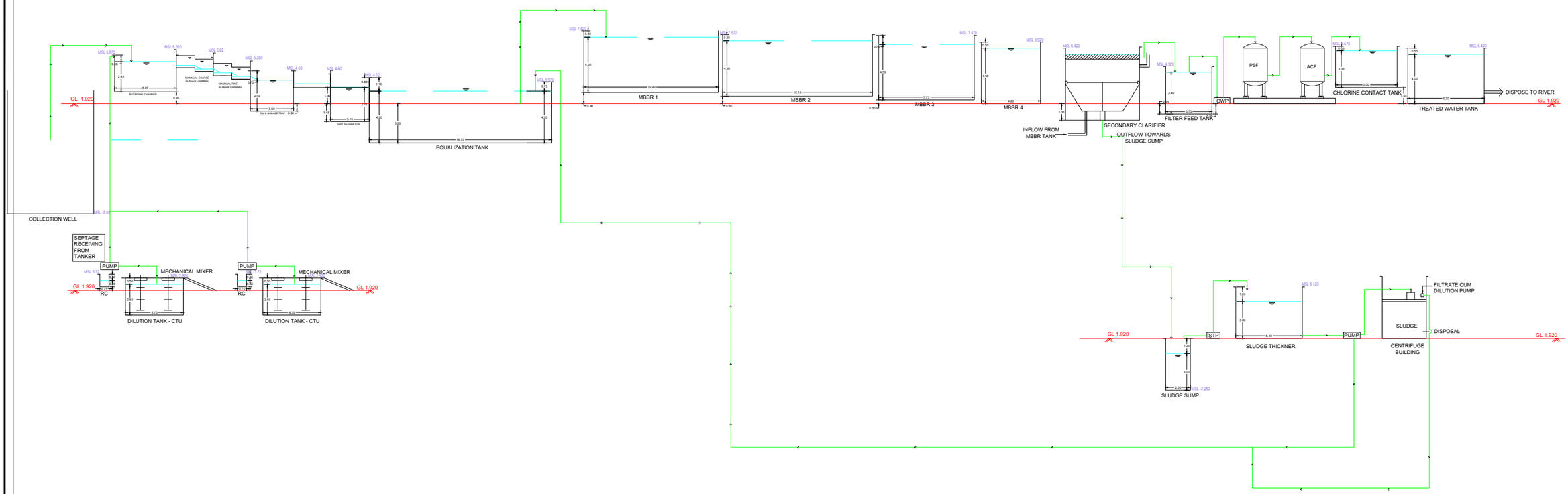
FILE NO : SEW/MPM/2023/HARBOUR SBM2

TITLE : UNIT OPERATIONS AND PROCESS FLOW DIAGRAM

DRAWING NO : HARBOUR SBM 2 - 2

DATE: 16-03-2023

HYDRAULIC FLOW DIAGRAM



KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

ALL DIMENSIONS ARE IN METERS

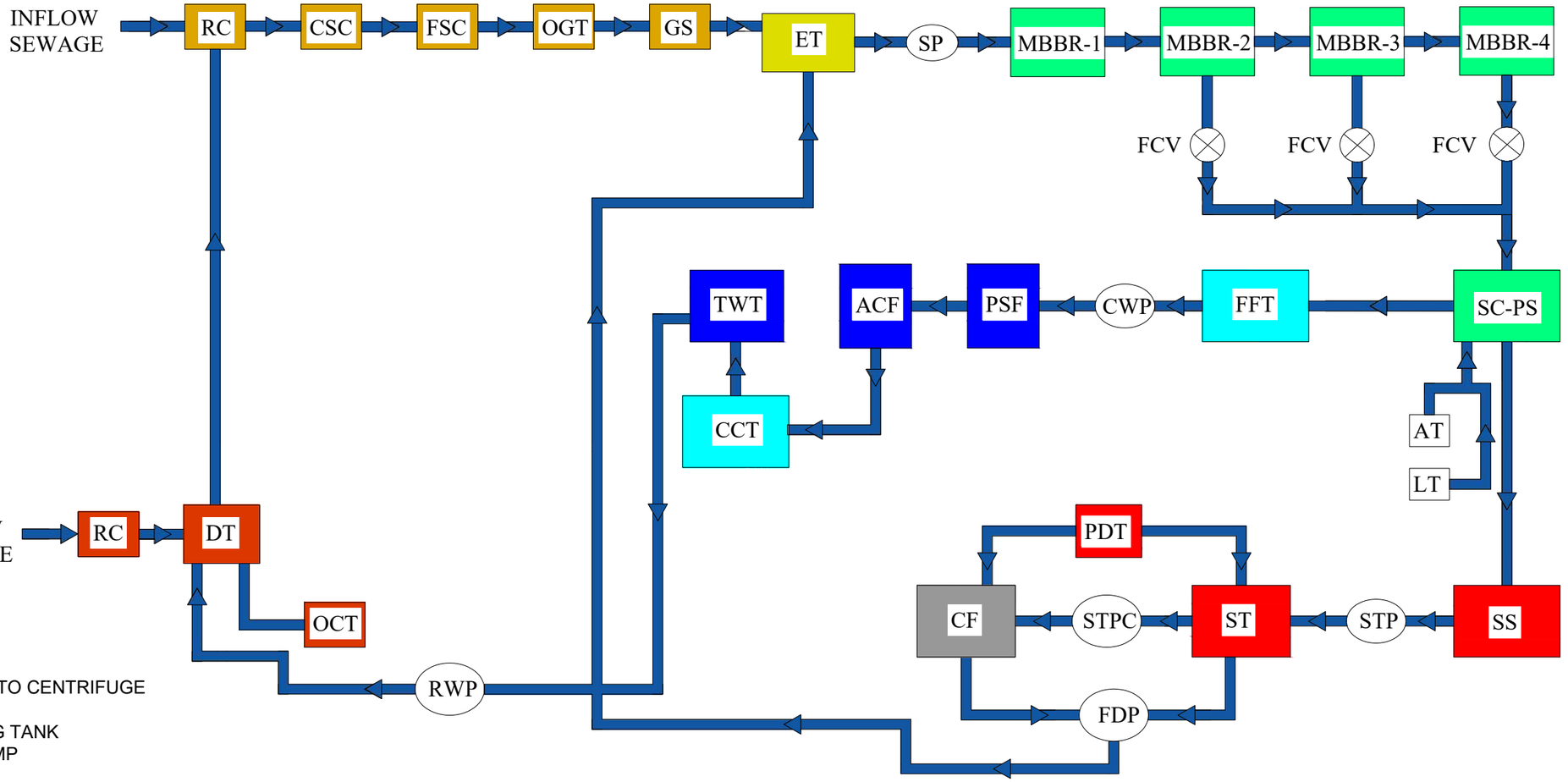
FILE NO : SEW/MPM/2023/HARBOUR SBM2

TITLE : UNIT OPERATIONS AND PROCESS FLOW DIAGRAM

DRAWING NO : HARBOUR SBM 2 - 2

DATE: 16-03-2023

SCHEMATIC DIAGRAM



TWT- TREATED WATER TANK
SS - SLUDGE SUMP
STP- SLUDGE TRANSFER PUMP
ST - SLUDGE THICKENER
STPC - SLUDGE TRANSFER PUMP TO CENTRIFUGE
CF - CENTRIFUGE
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MBBR-4 - MOVING BED BIO FILM REACTOR FOR BOD REMOVAL AFTER DE-NITRIFICATION
SC-PS - SECONDARY CLARIFIER WITH PLATE SETTLER
FFT- FILTER FEED TANK
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LT - LIME TANK
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CWP - CLARIFIED WATER PUMP
PSF - PRESSURE SAND FILTER
ACF -ACTIVATED CARBON FILTER
RC- RECEIVING CHAMBER
OGT- OIL AND GREASE TRAP
CSC - COARSE SCREEN CHANNEL
FSC - FINE SCREEN CHANNEL
GS- GRIT SEPARATOR
ET - EQUALISATION TANK

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

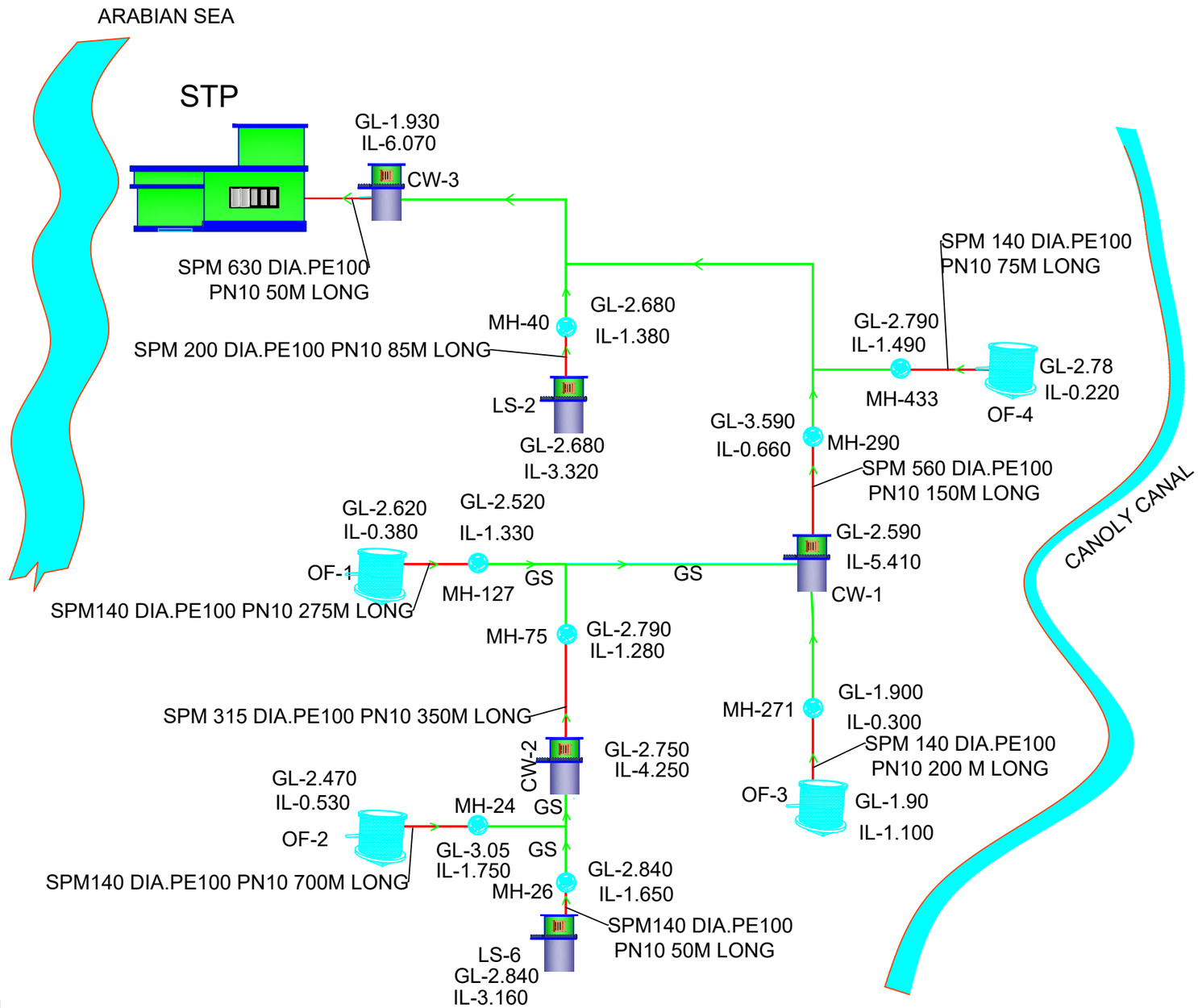
ALL DIMENSIONS ARE IN METERS

FILE NO : SEW/MPM/2023/HARBOUR SBM2

TITLE : SCHEMATIC DIAGRAM

DRAWING NO : HARBOUR SBM 2 - 4a

DATE: 16-03-2023



LS - LIFTING STATION
MH - MANHOLE
OF - OUT FALL
CW - COLLECTION WELL
STP - SEWAGE TREATMENT PLANT
GS - GRAVITY SEWER
IL - INVERT LEVEL
GL - GROUND LEVEL
SPM-SEWAGE PUMPING MAIN

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

ALL DIMENSIONS ARE IN METERS

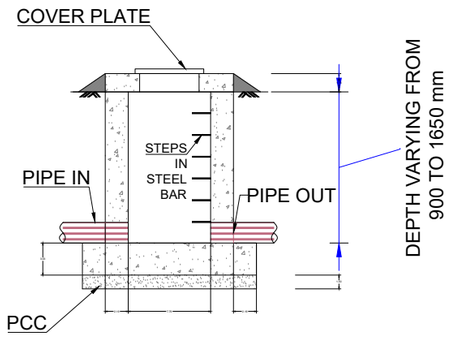
FILE NO : SEW/MPM/2023/HARBOUR SBM2

TITLE : SCHEMATIC DIAGRAM

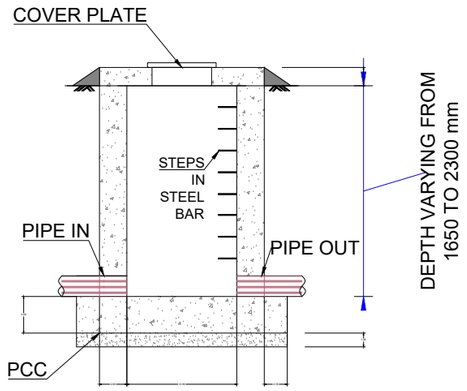
DRAWING NO : HARBOUR SBM 2 - 4b

DATE: 16-03-2023

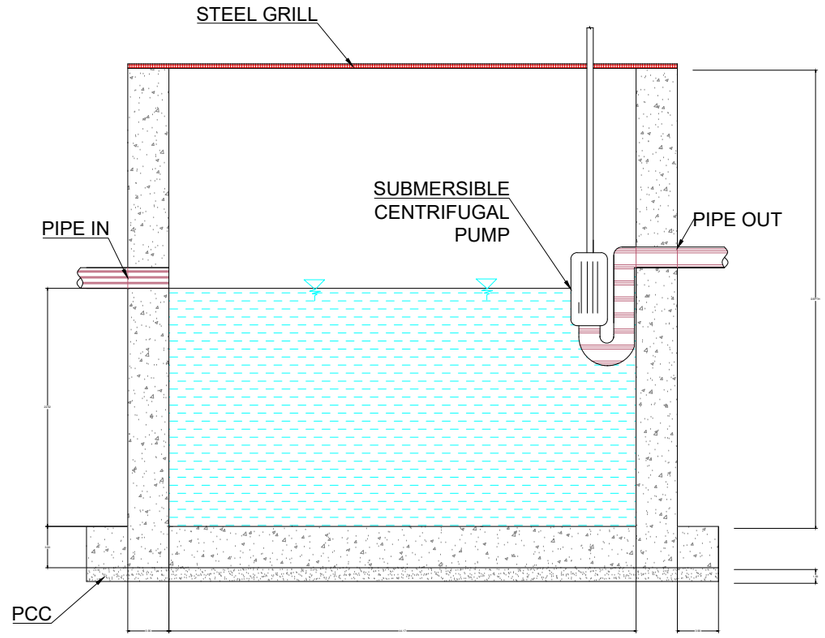
MANHOLES



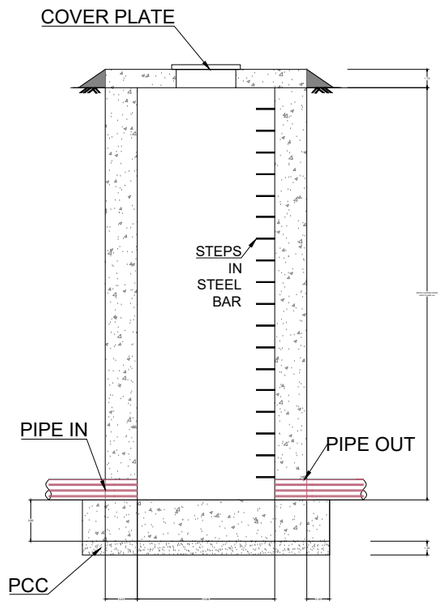
CLASS -I



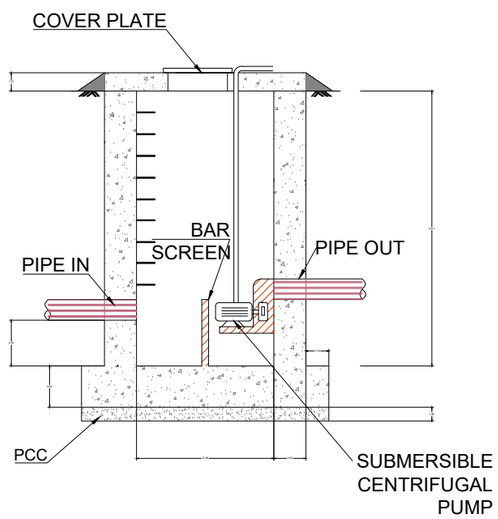
CLASS - II



COLLECTION WELL



CLASS - III



LIFT MANHOLE

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

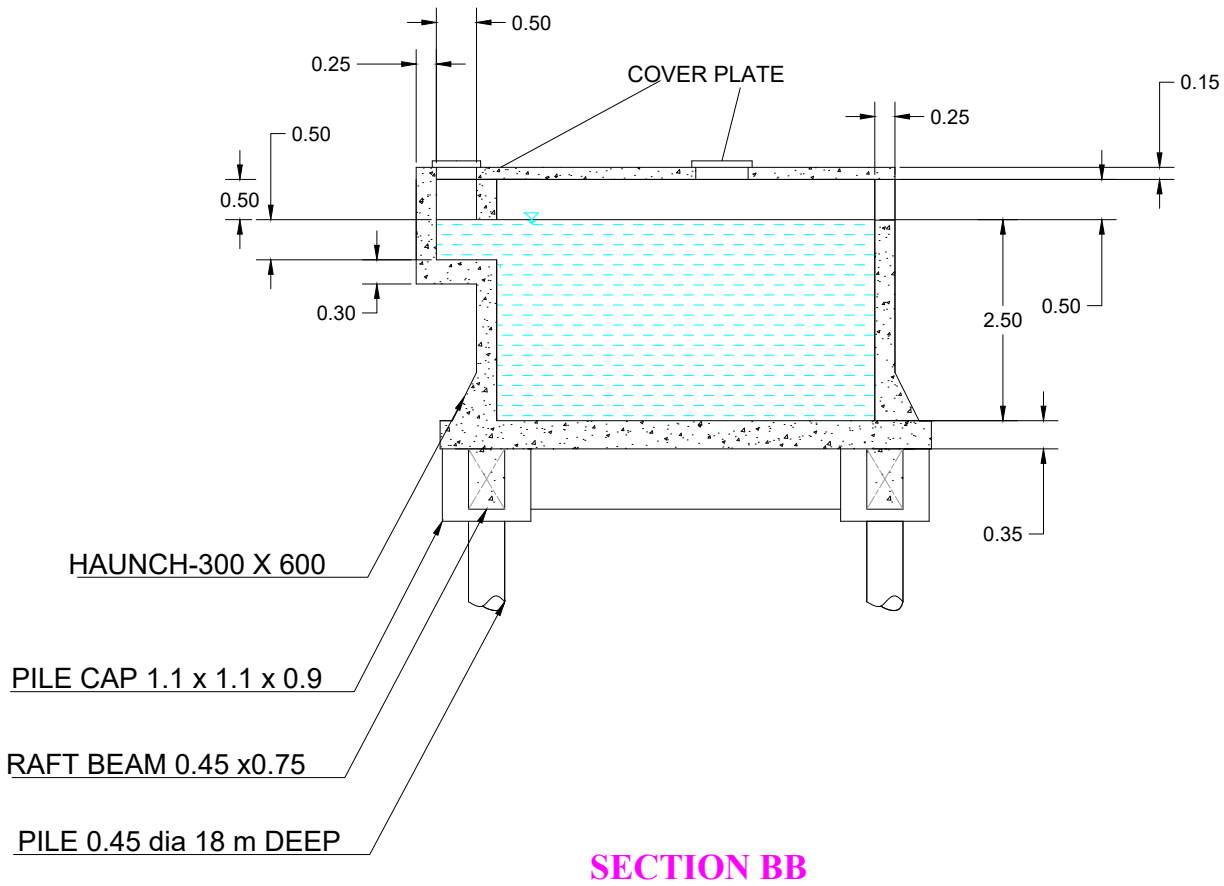
ALL DIMENSIONS ARE IN METERS

FILE NO : SEW/MPM/2023/HARBOUR SBM2

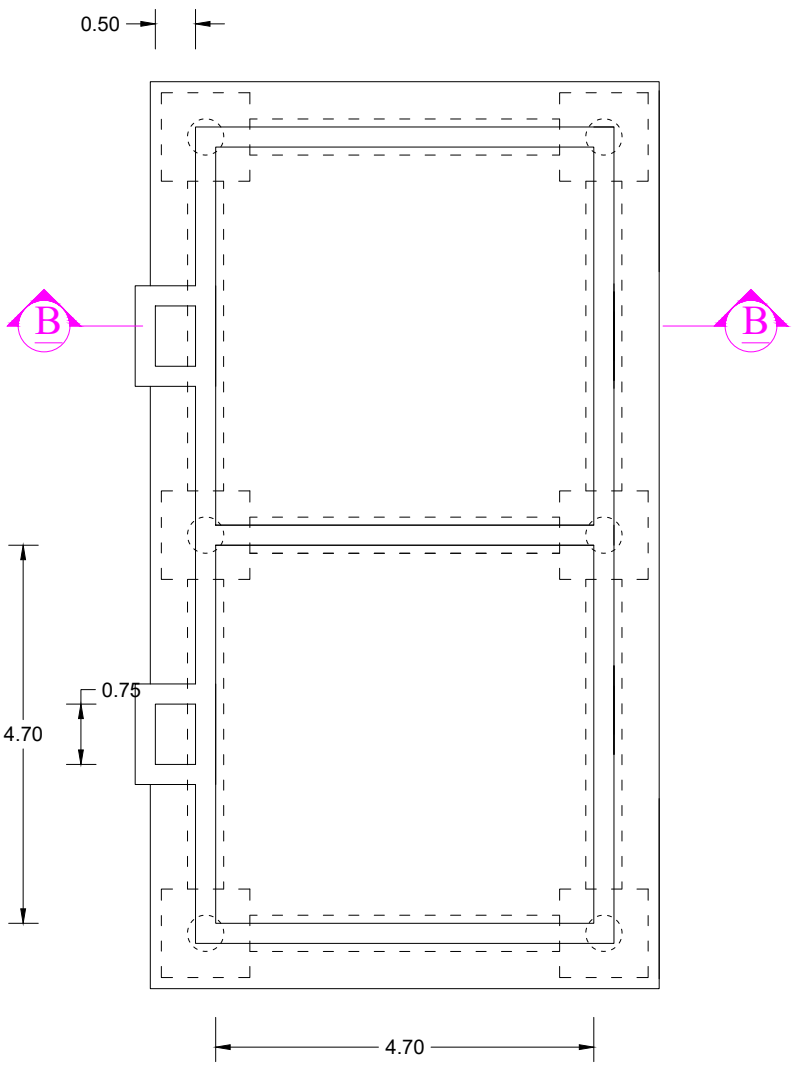
TITLE : TYPICAL MANHOLES&COLLECTION WELLS

DRAWING NO : HARBOUR SBM 2 - 5

DATE: 16-03-2023



SECTION BB



PLAN

DILUTION TANK AND RECEIVING CHAMBER

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1x1.1 x 1.1- 4 Nos.
2	Exterior	single	45 cm Dia	2	1.1 x1.1 x1.1 - 2 Nos

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : DILUTION TANK & RECIEVING CHAMBER

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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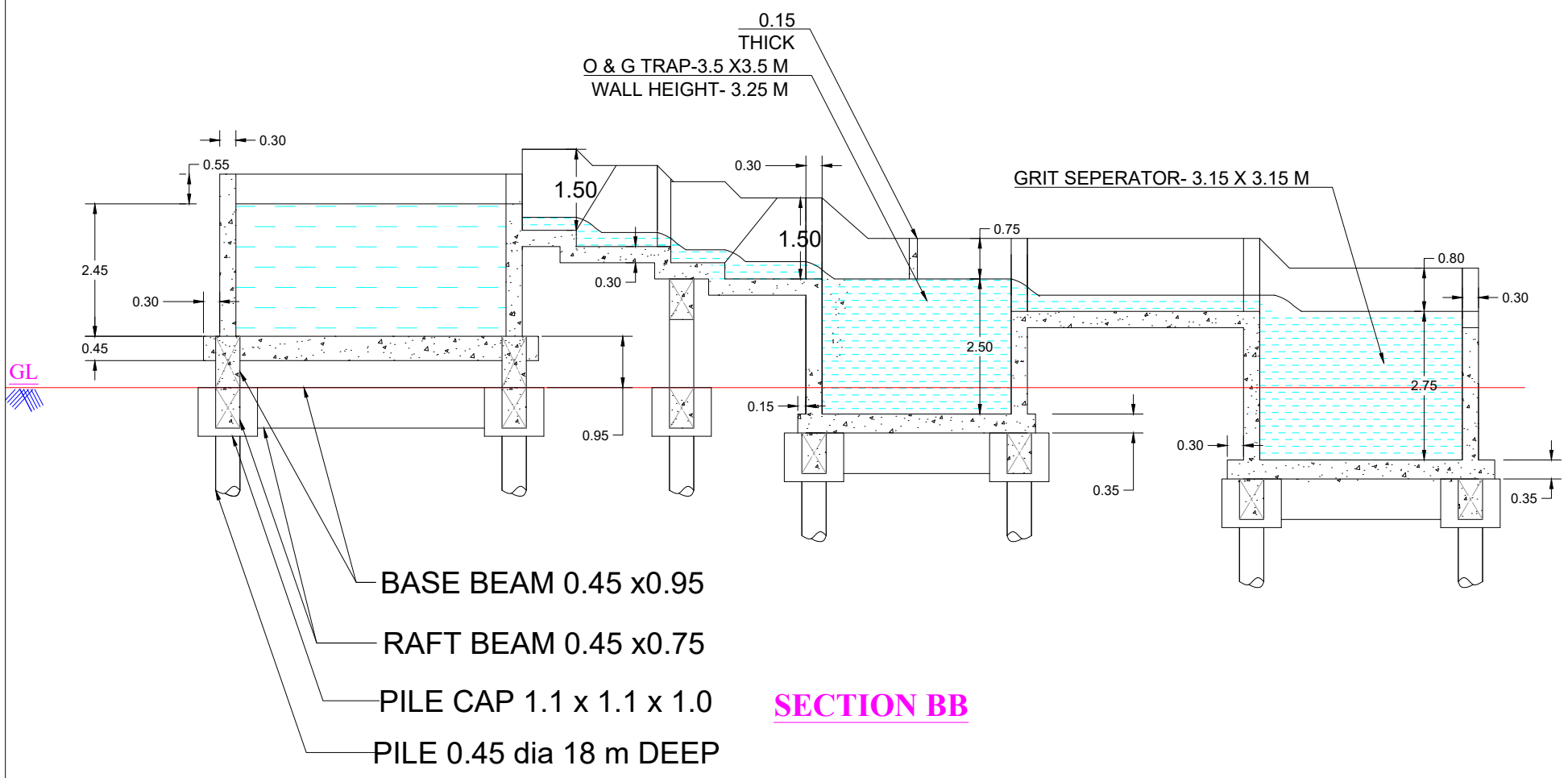
ALL DIMENSIONS ARE IN METERS

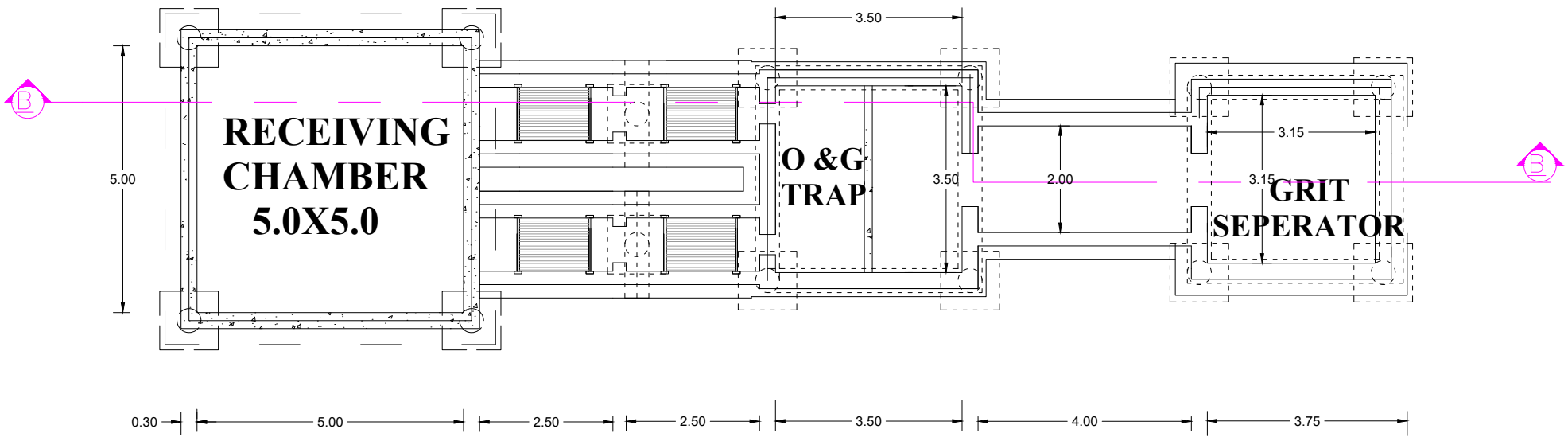
FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 6

DATE: 16-03-2023



SECTION BB



RECEVING CHAMBER,GRIT CHAMBER , O &G TRAP

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	14	1.1 x1.1 x 1.0- 14 Nos.

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : RECEIVING CHAMBER,GRIT CHAMBER O &G TRAP

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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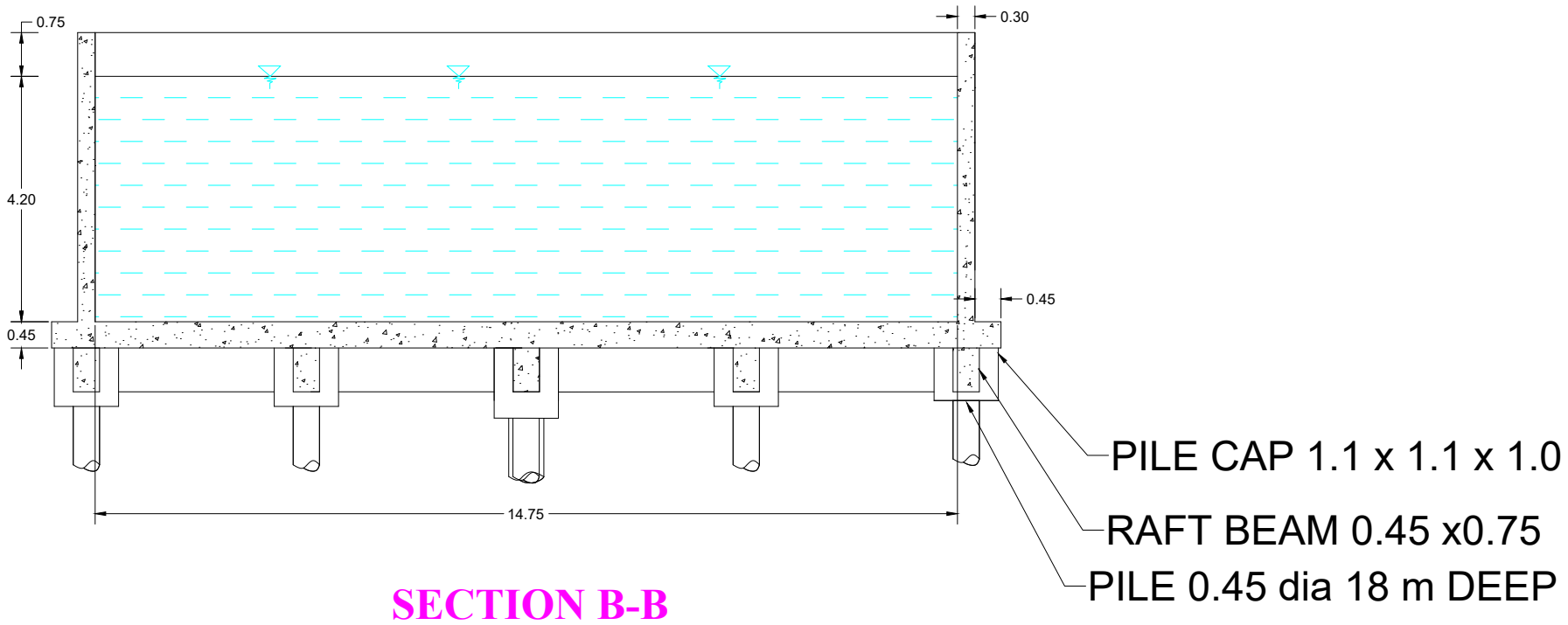
ALL DIMENSIONS ARE IN METERS

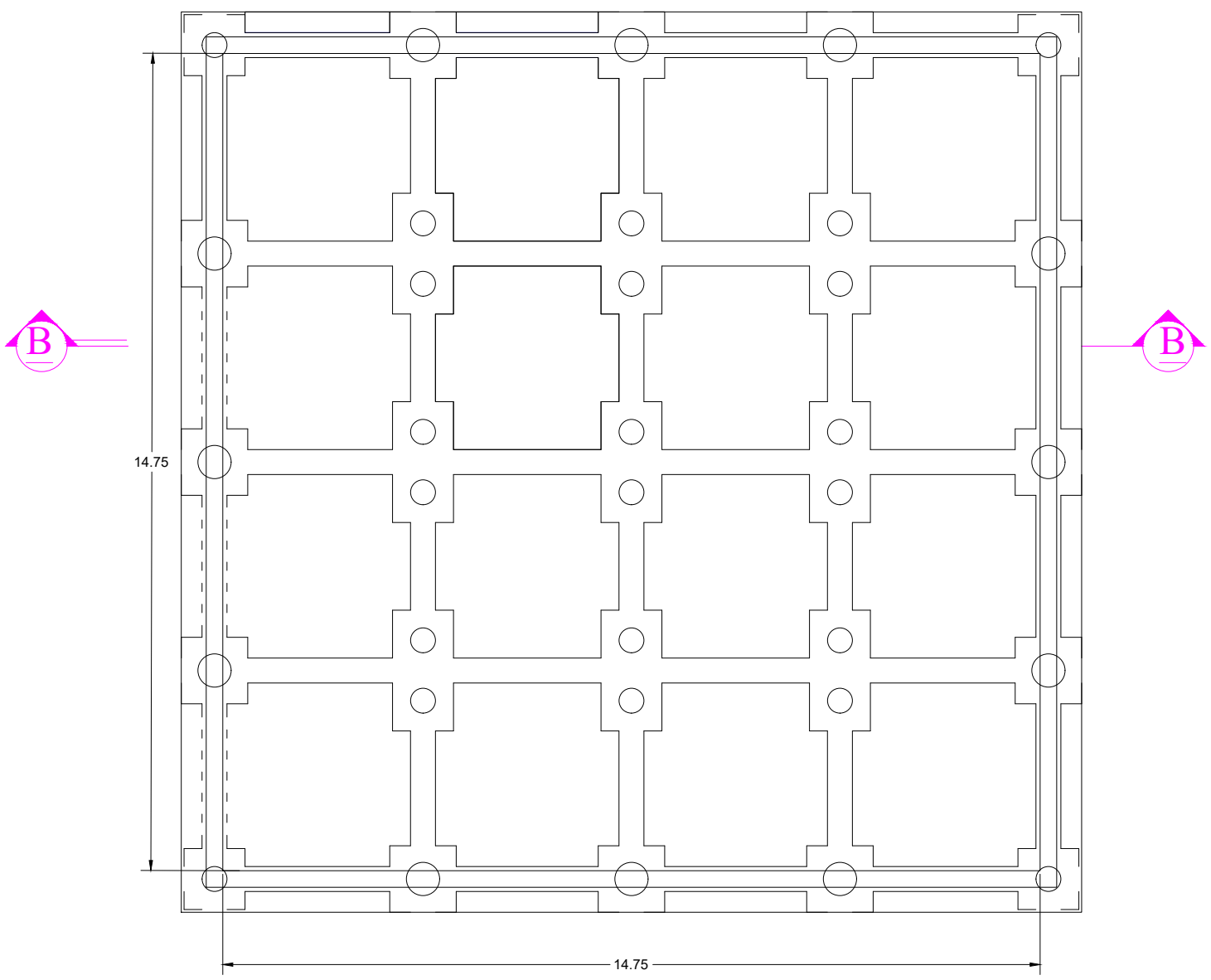
FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 7

DATE: 16-03-2023



SECTION B-B



EQUALIZATION TANK

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1.0- 4 Nos.
2	Interior pile	double	45cm Dia.	18	1.2 x 1.2 x 1.0- 9 Nos
3	Exterior pile	single	60 cm Dia.	12	1.1 x 1.1 x1.0- 12 Nos

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : EQUALIZATION TANK

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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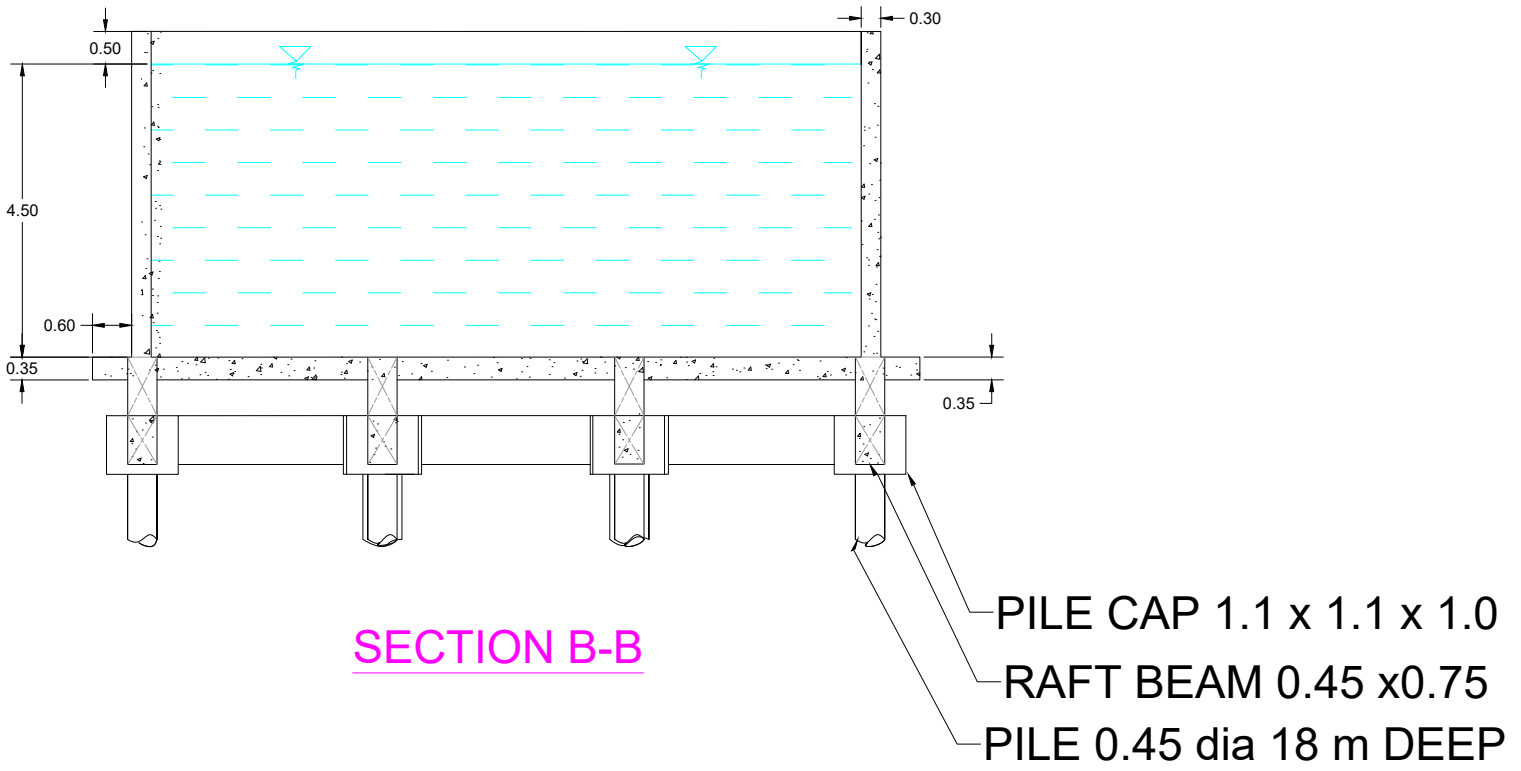
ALL DIMENSIONS ARE IN METERS

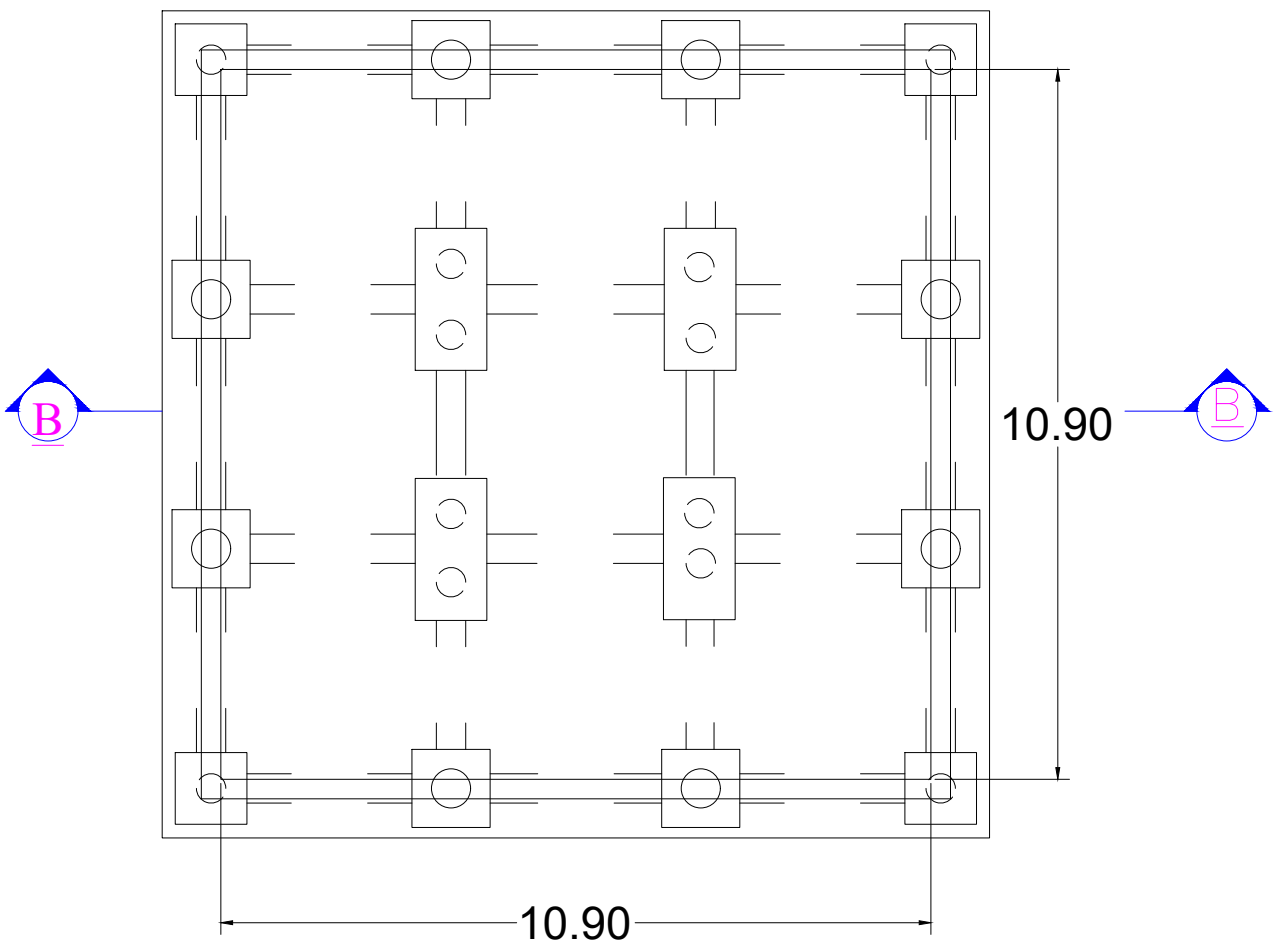
FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2-8

DATE: 16-03-2023



SECTION B-B



PLAN

MBBR TANK 1

SlNo.	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1.1 - 4 Nos.
2	Exterior pile	double	60cm Dia.	8	1.2 x 1.2 x 1.2- 8 Nos.
3	Interior pile	double	45 cm Dia.	8	2.18 x 1.1 x1.1 -4 Nos.

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : MBBR TANK 1

PREPARED BY: SEWERAGE CIRCLE THRISSUR

AE.	
AEE.	
EE .	
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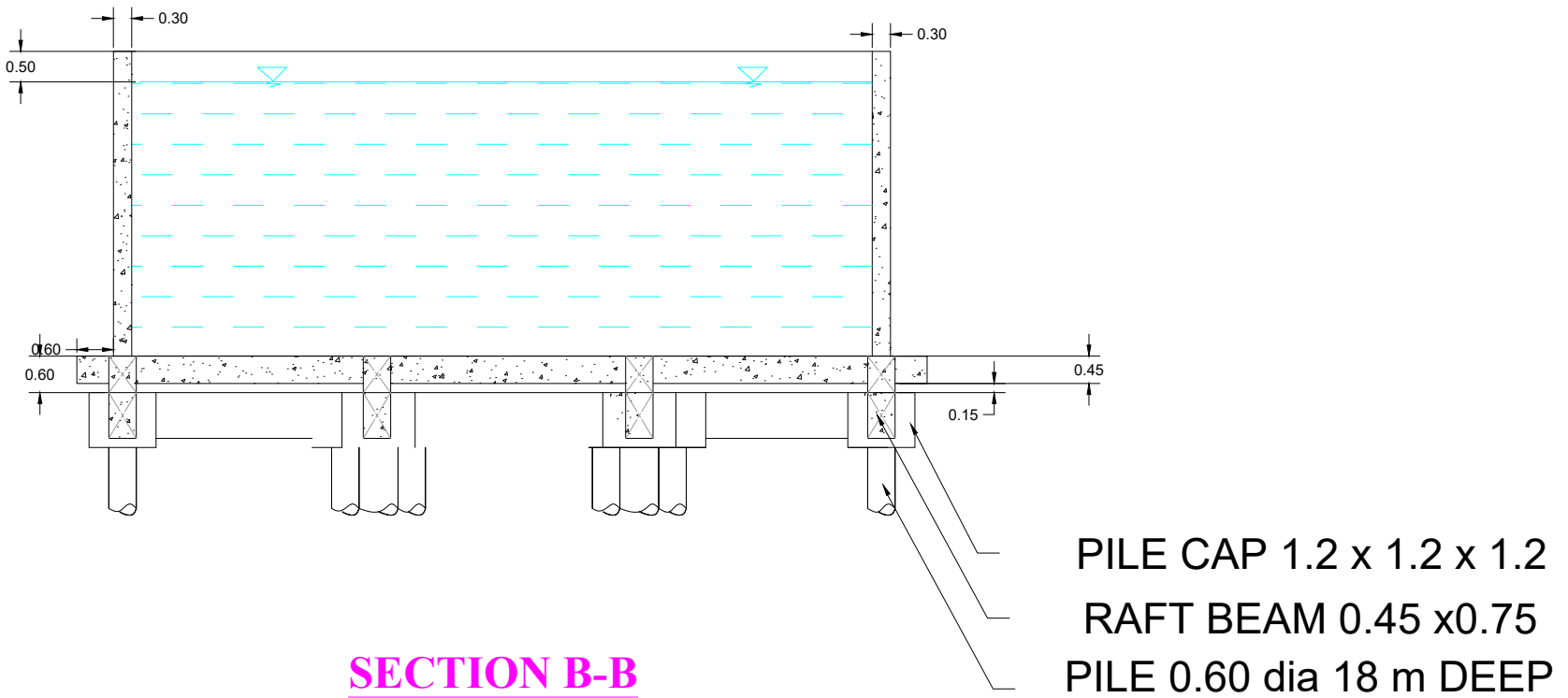
ALL DIMENSIONS ARE IN METERS

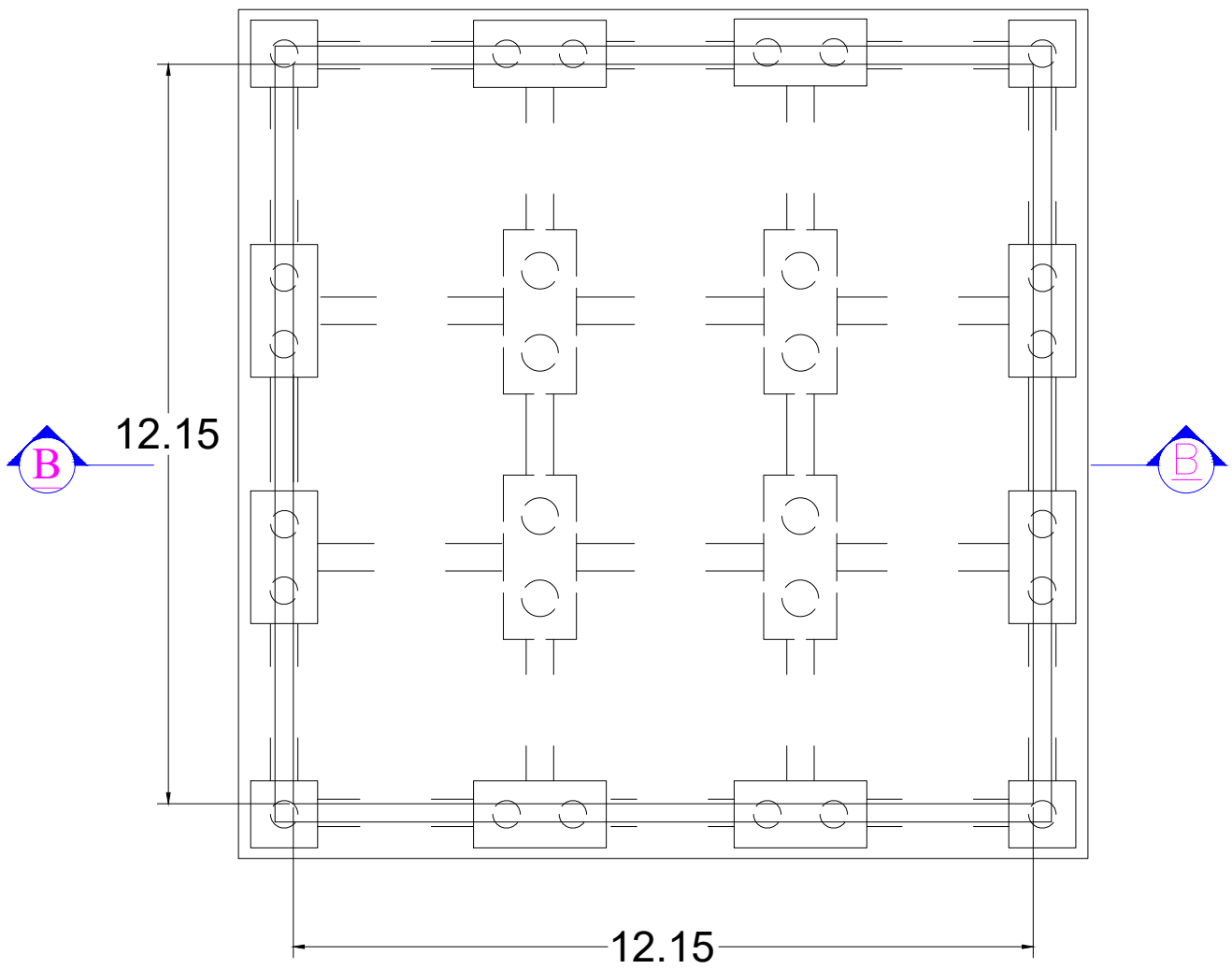
FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 9

DATE: 16-03-2023



SECTION B-B



PLAN

MBBR TANK 2

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1x1.1 x 1.1- 4 Nos.
2	Exterior	Double	45 cm Dia	16	2.18x1.1x1 - 8 Nos
3	Interior	Double	60cm Dia	8	2.17x1.2x1.2 - 4 Nos

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : MBBR TANK 2

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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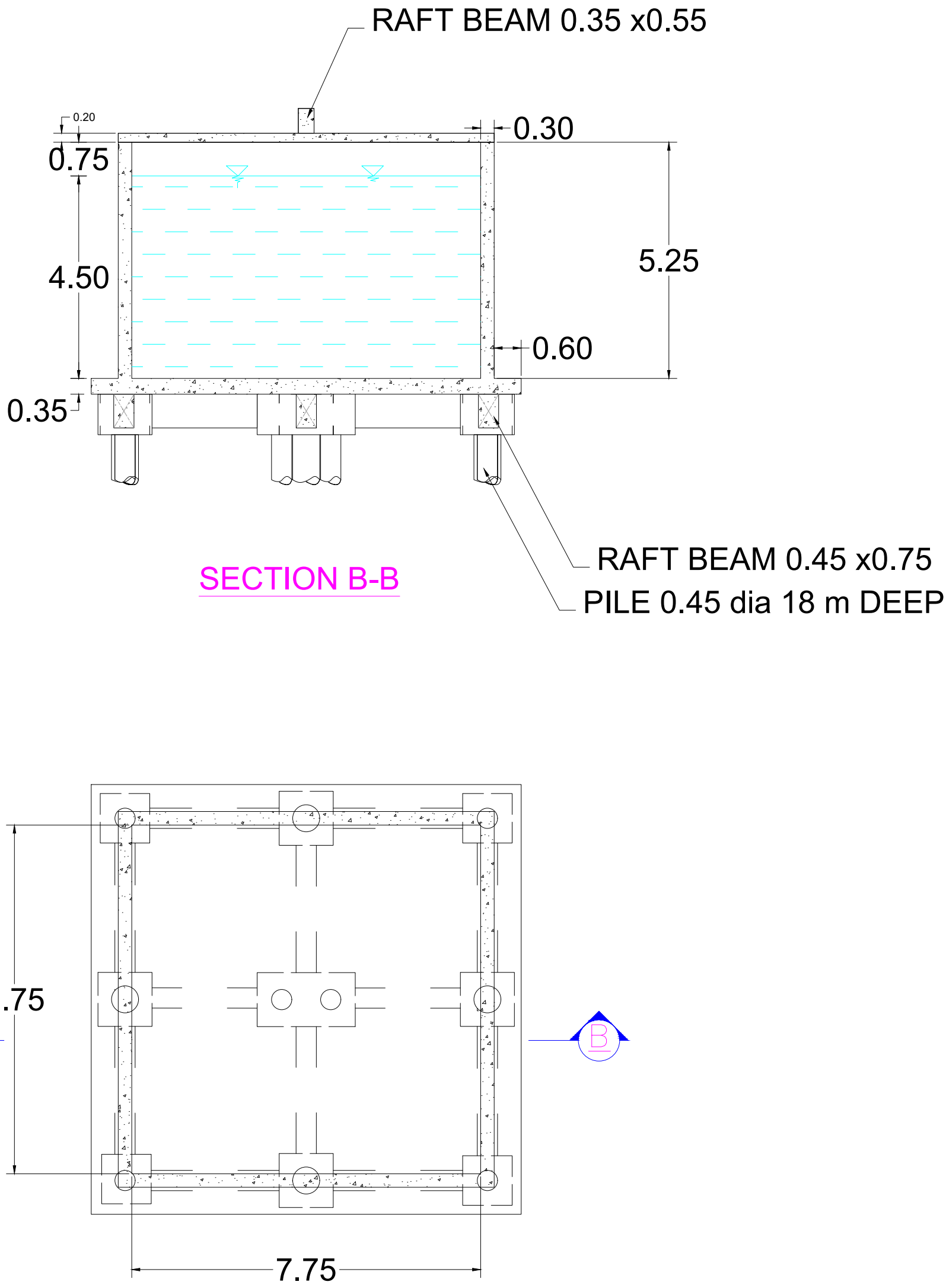
ALL DIMENSIONS ARE IN METERS

FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 10

DATE: 16-03-2023



PLAN
MBBR TANK 3

SL NO	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1.1- 4 Nos.
2	Exterior pile	single	60 cm Dia.	4	1.2 x 1.2 x1.2 - 4 Nos.
3	Interior pile	double	45 cm Dia.	2	2.18 x 1.1 x1.1 - 1 Nos.

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : MBBR TANK 3

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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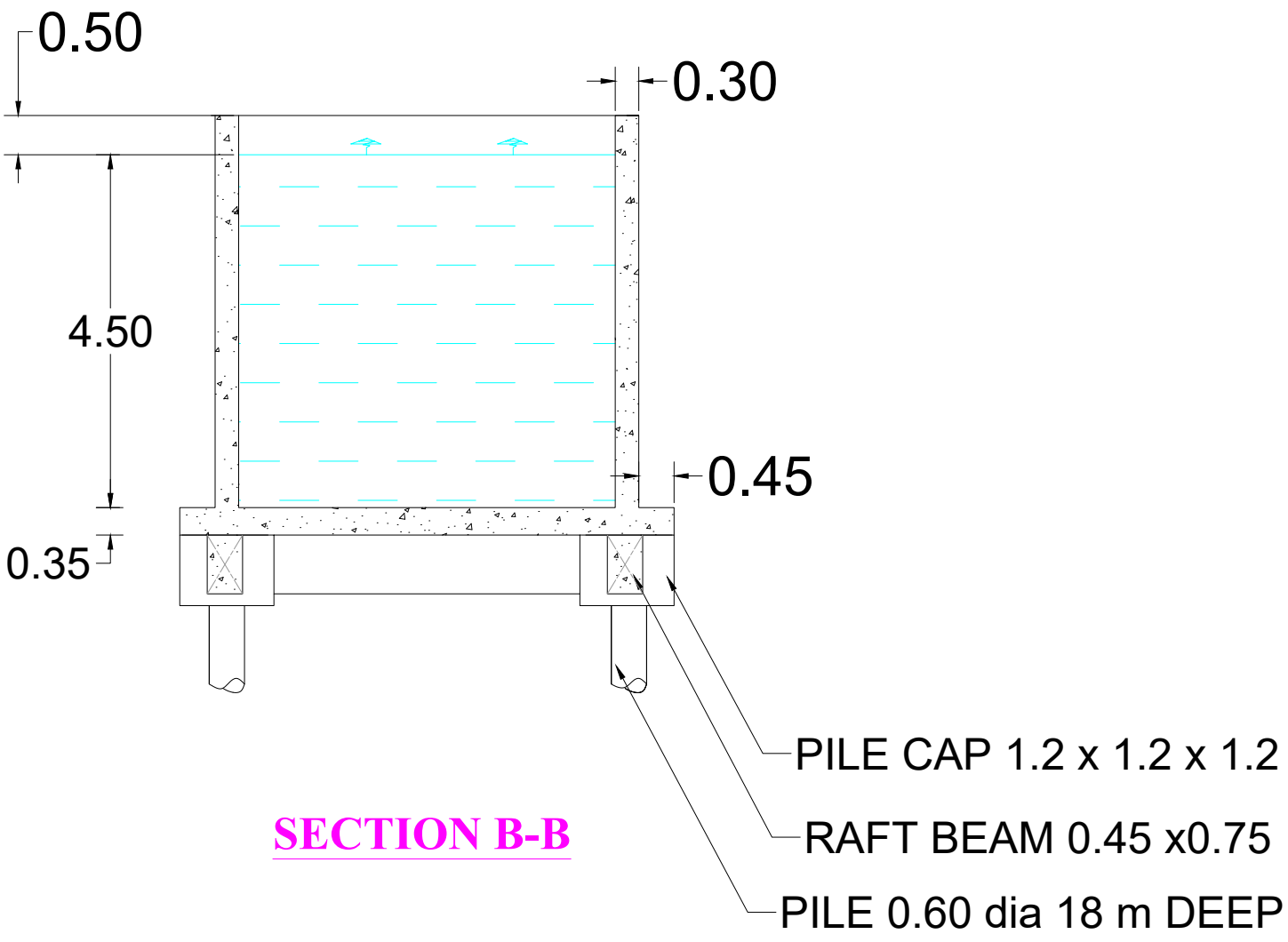
ALL DIMENSIONS ARE IN METERS

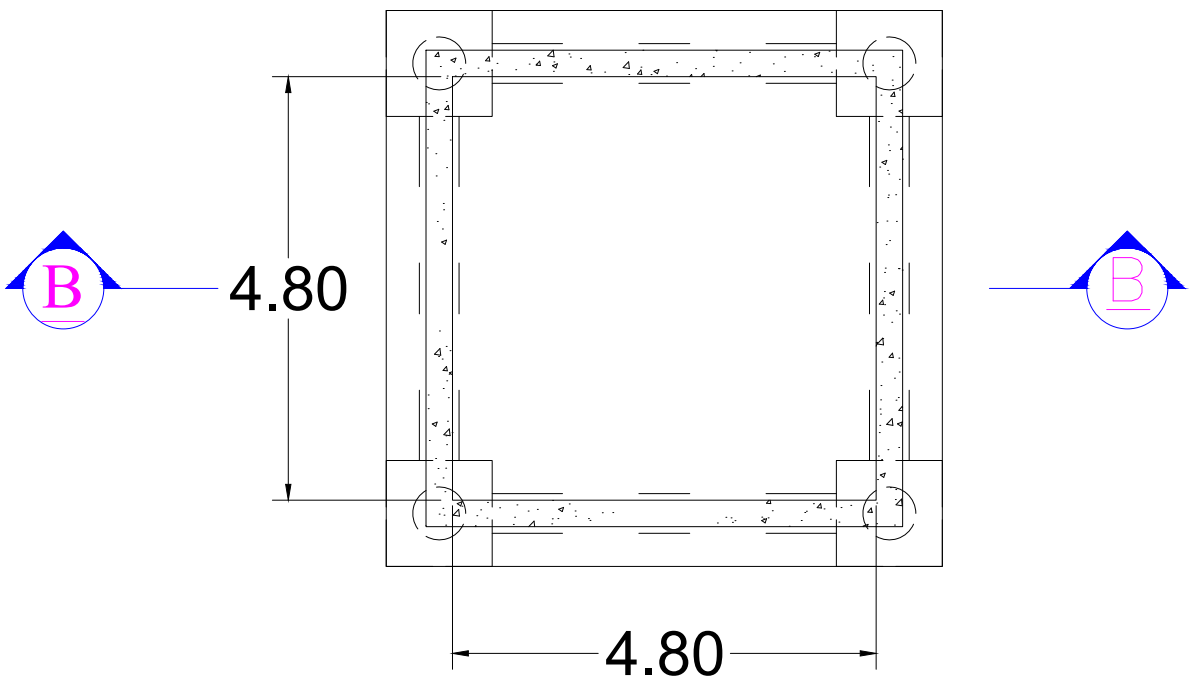
FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 11

DATE: 16-03-2023



SECTION B-B



PLAN

MBBR TANK 4

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	60 cm Dia.	4	1.2 x1.2 x 1.2- 4 Nos.

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : MBBR TANK 4

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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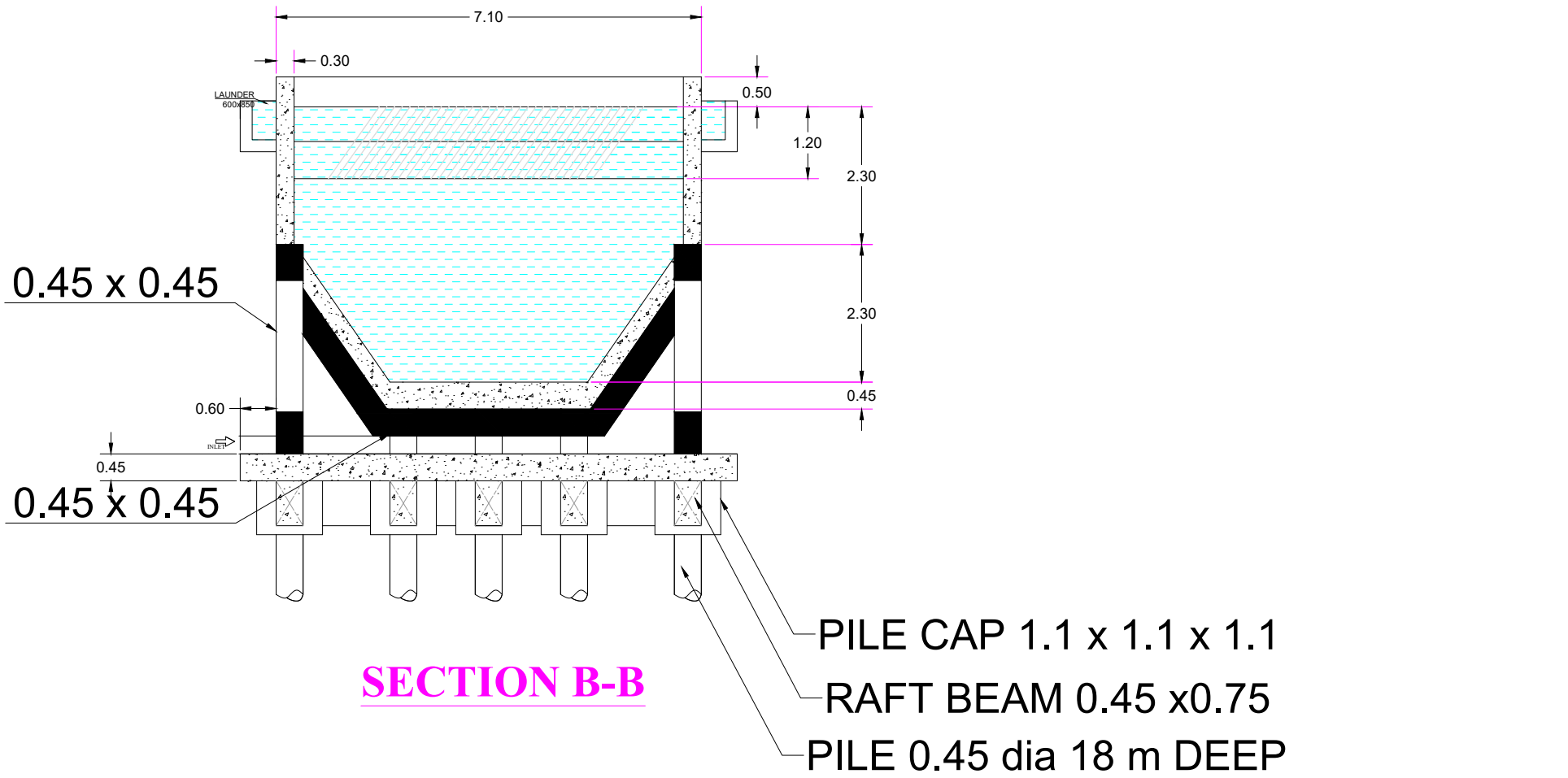
ALL DIMENSIONS ARE IN METERS

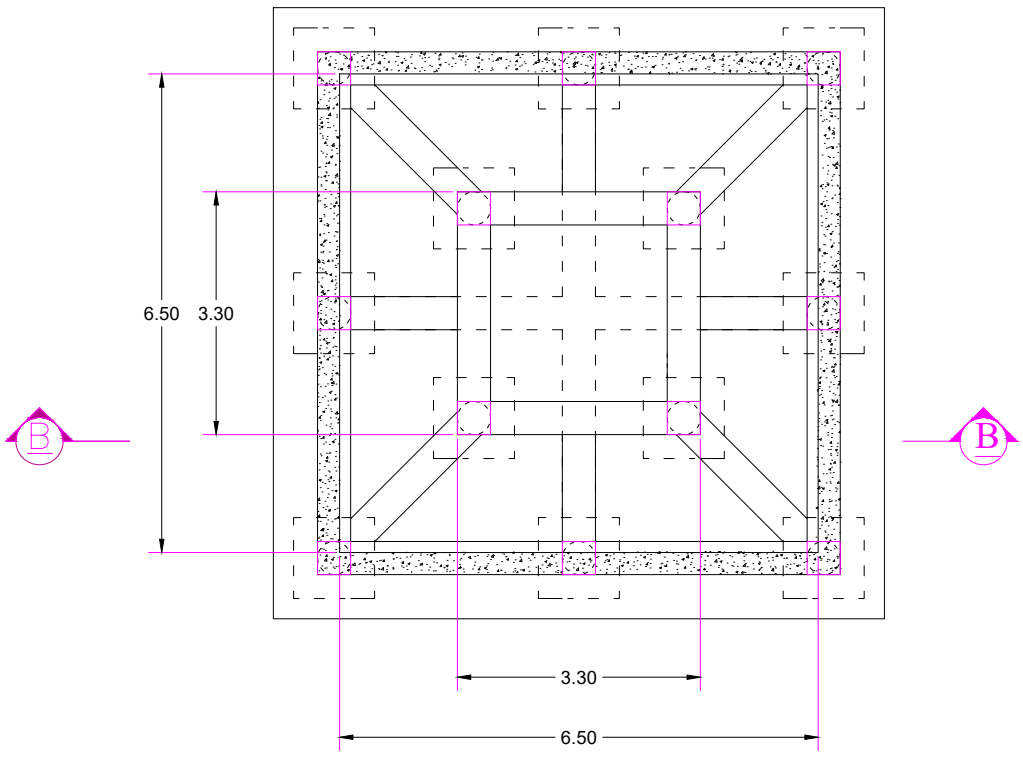
FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 12

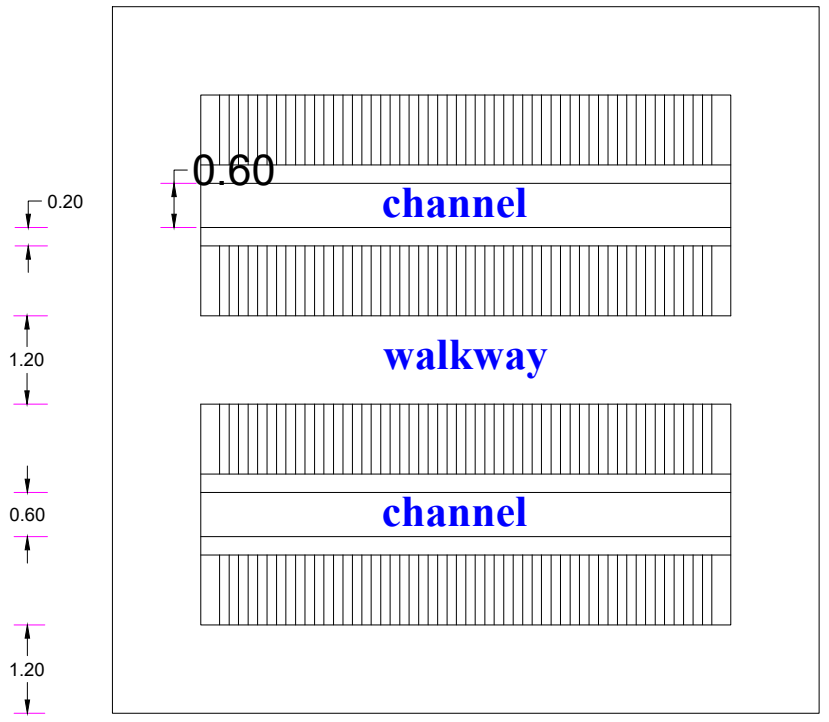
DATE: 16-03-2023



SECTION B-B



SECONDARY CLARIFIER WITH PLATE/ TUBE SETTLER



TOP VIEW

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1x1.1 x 1.1- 4 Nos.
2	Exterior	single	45 cm Dia	4	1.1x1.1 x 1.1- 4 Nos.
3	Interior	single	45cm Dia	4	1.1x1.1 x 1.1- 4 Nos.

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : SECONDARY CLARIFIER WITH PLATE/ TUBE SETTLER

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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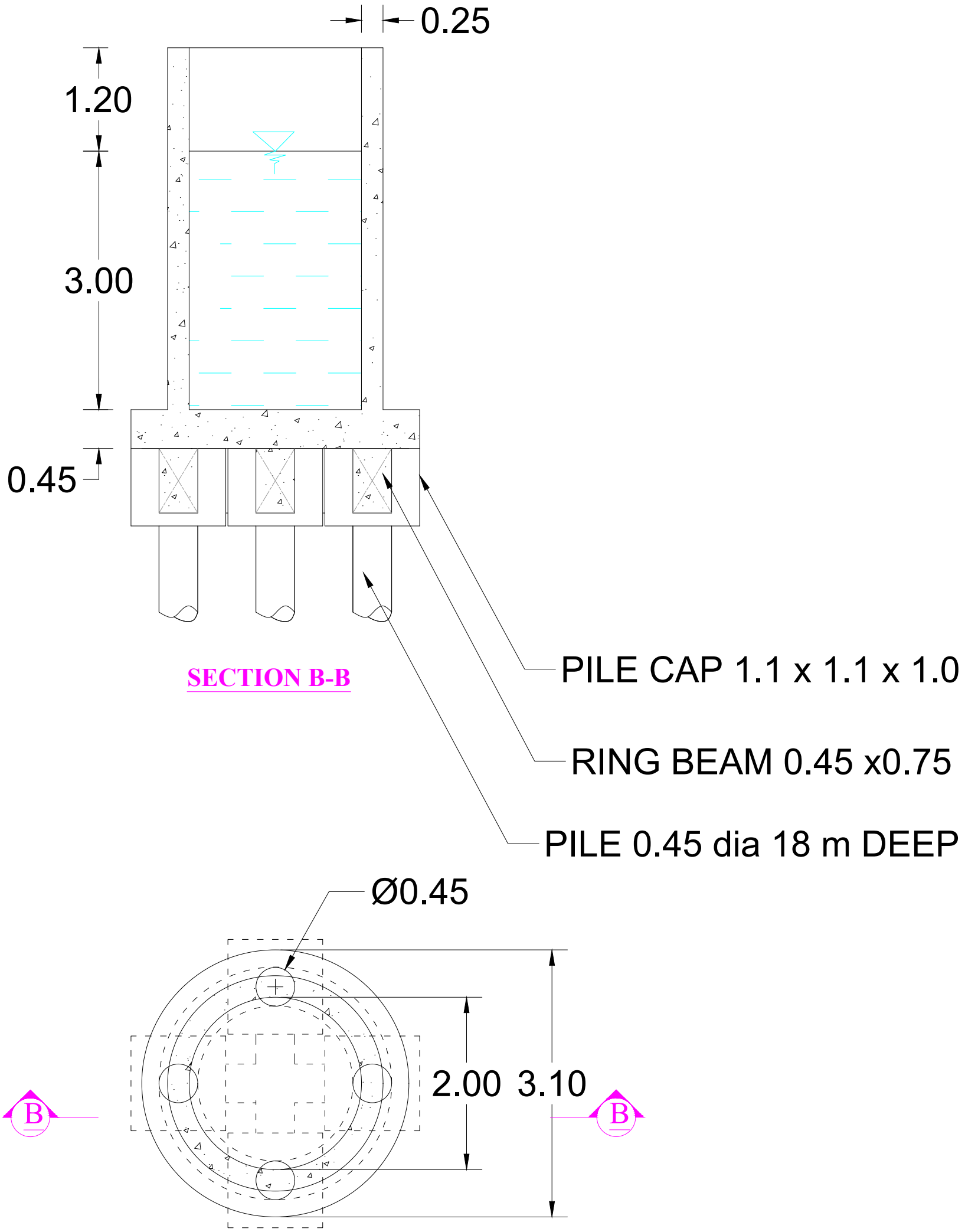
ALL DIMENSIONS ARE IN METERS

FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 13

DATE: 16-03-2023



SECTION B-B

PLAN

SLUDGE SUMP

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1- 4 Nos.

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : SLUDGE SUMP

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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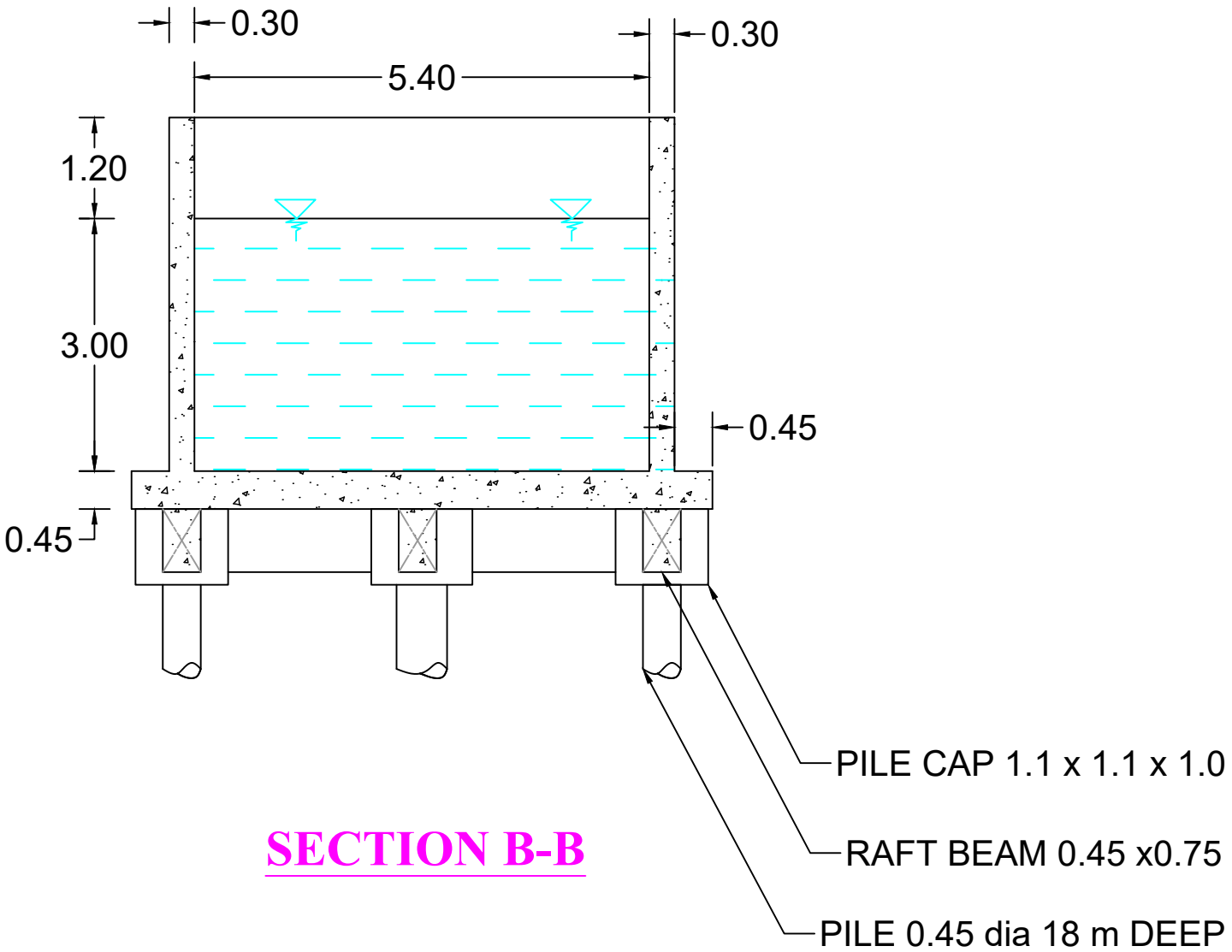
ALL DIMENSIONS ARE IN METERS

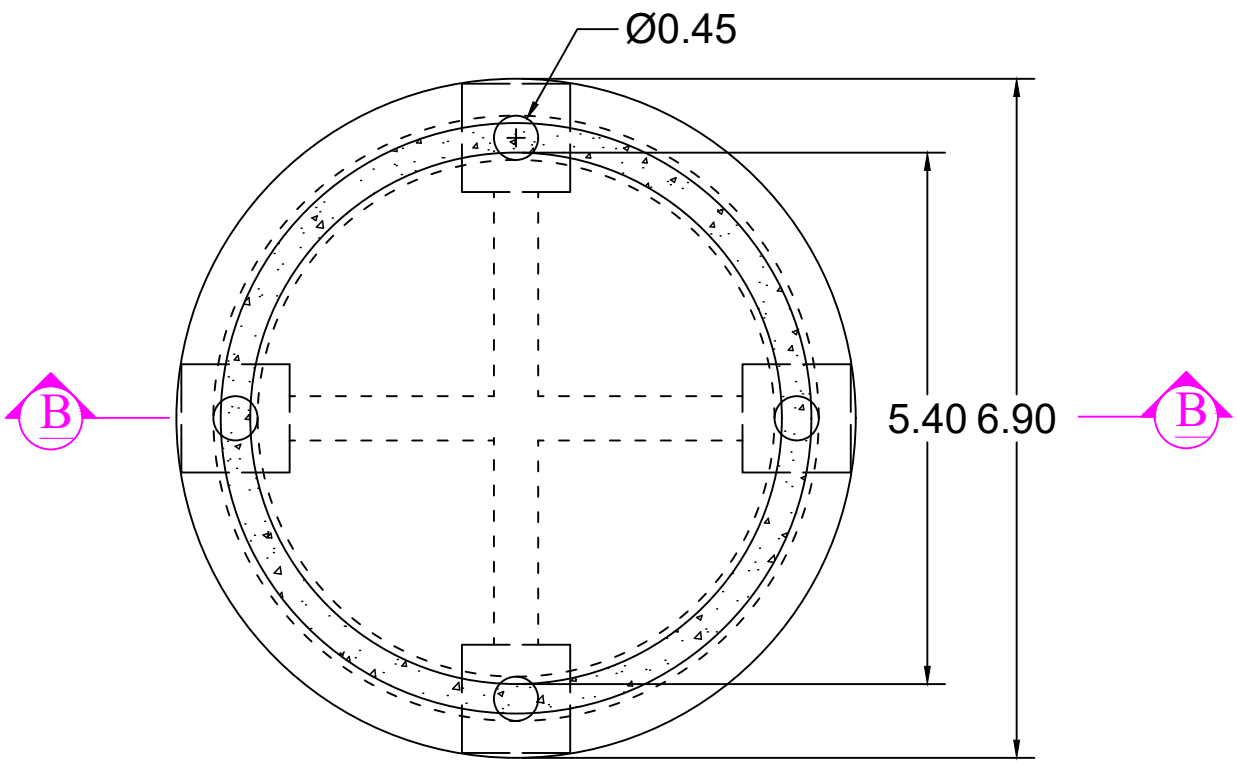
FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 14

DATE: 16-03-2023



SECTION B-B



PLAN
SLUDGE THICKENER

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1- 4 Nos.

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : SLUDGE THICKENER

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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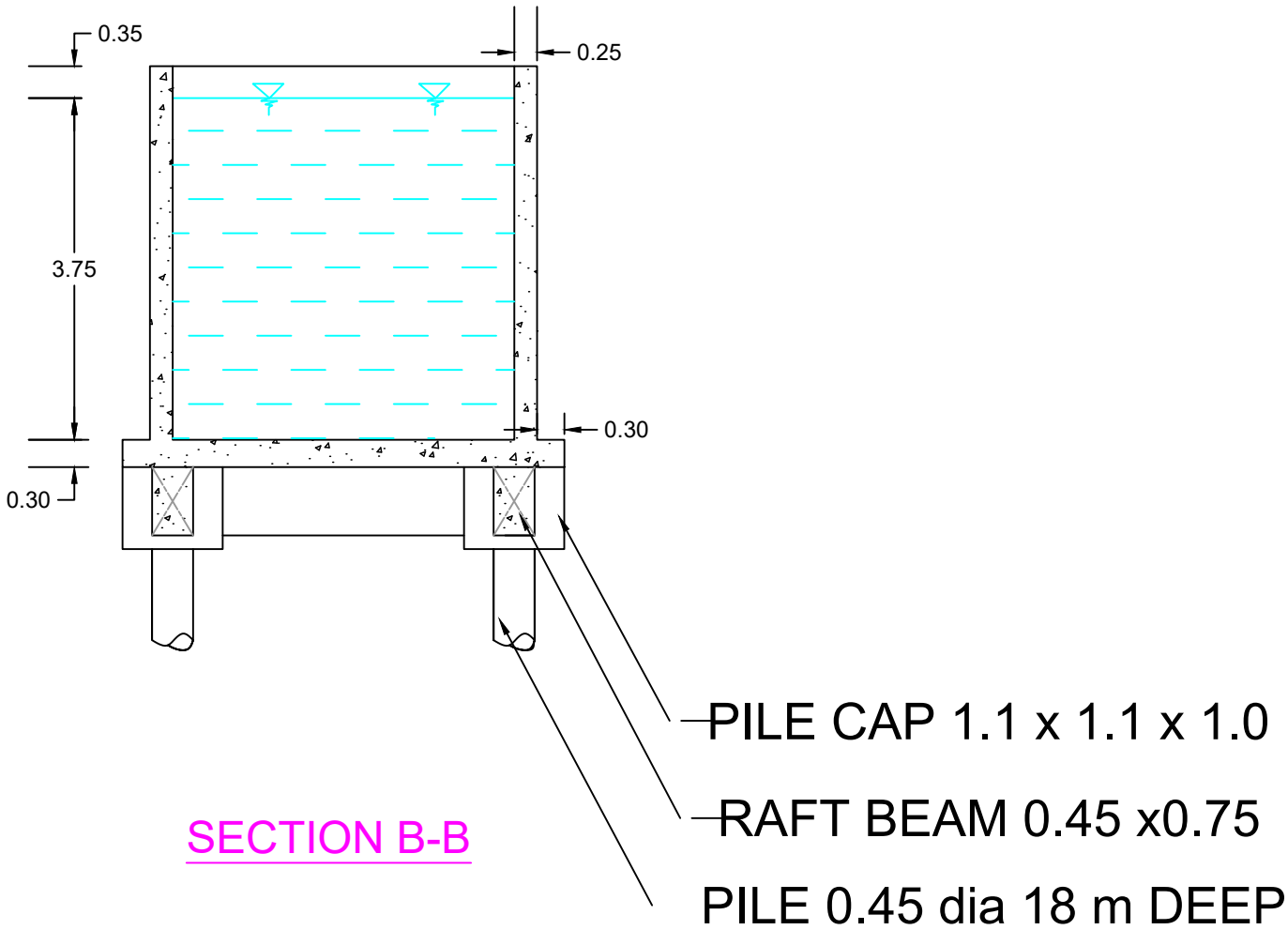
ALL DIMENSIONS ARE IN METERS

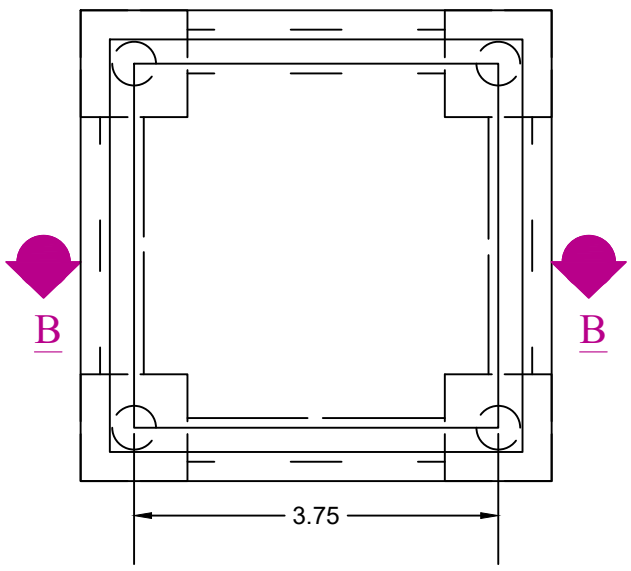
FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 15

DATE: 16-03-2023



SECTION B-B



PLAN

FILTER FEED TANK

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1- 4 Nos.

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : FILTER FEED TANK

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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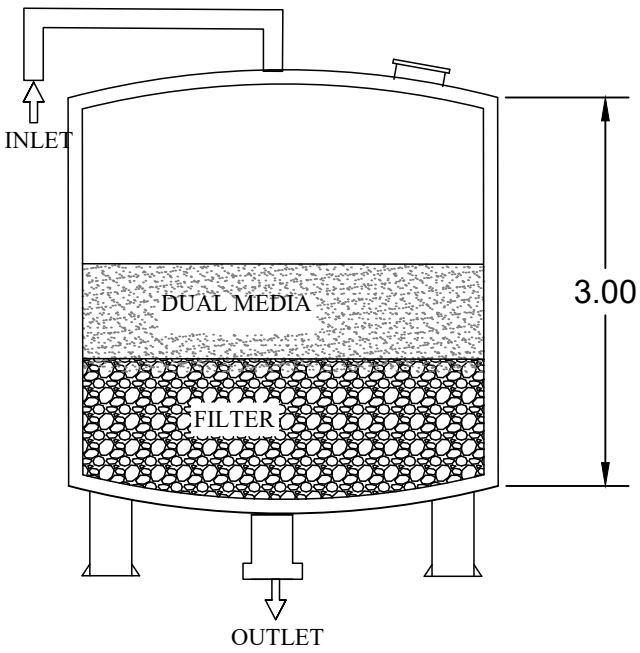
ALL DIMENSIONS ARE IN METERS

FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 16

DATE: 16-03-2023



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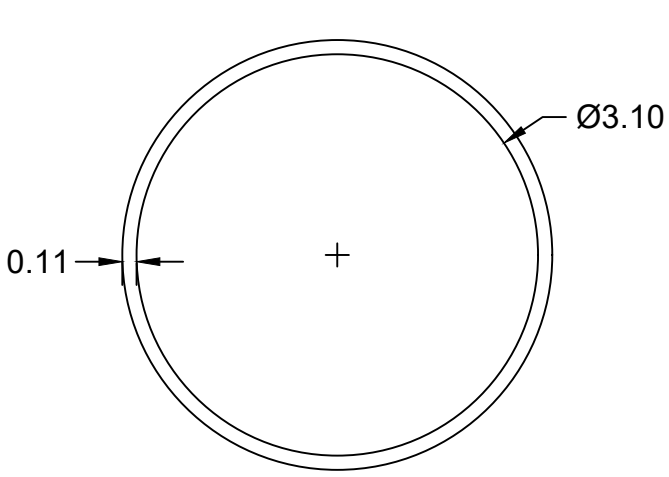
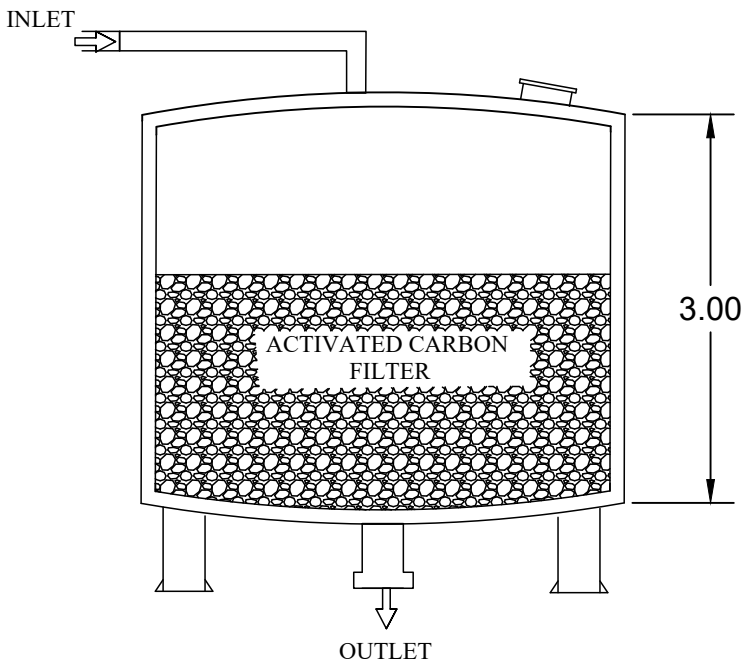


PRESSURE SAND FILTER



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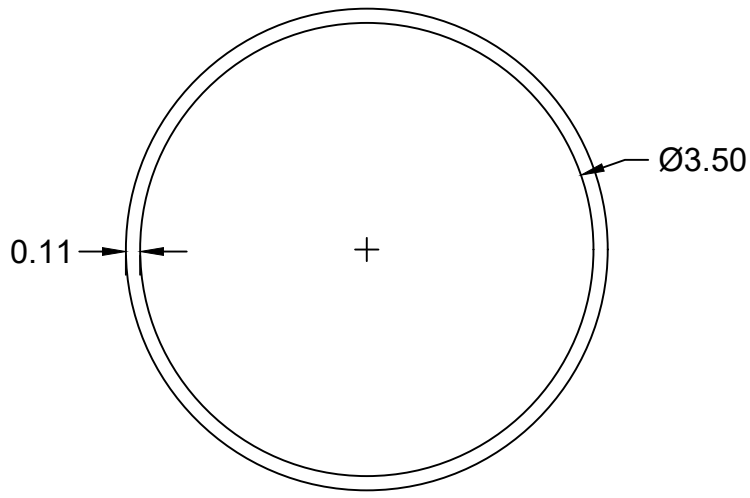

ACTIVATED CARBON FILTER

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

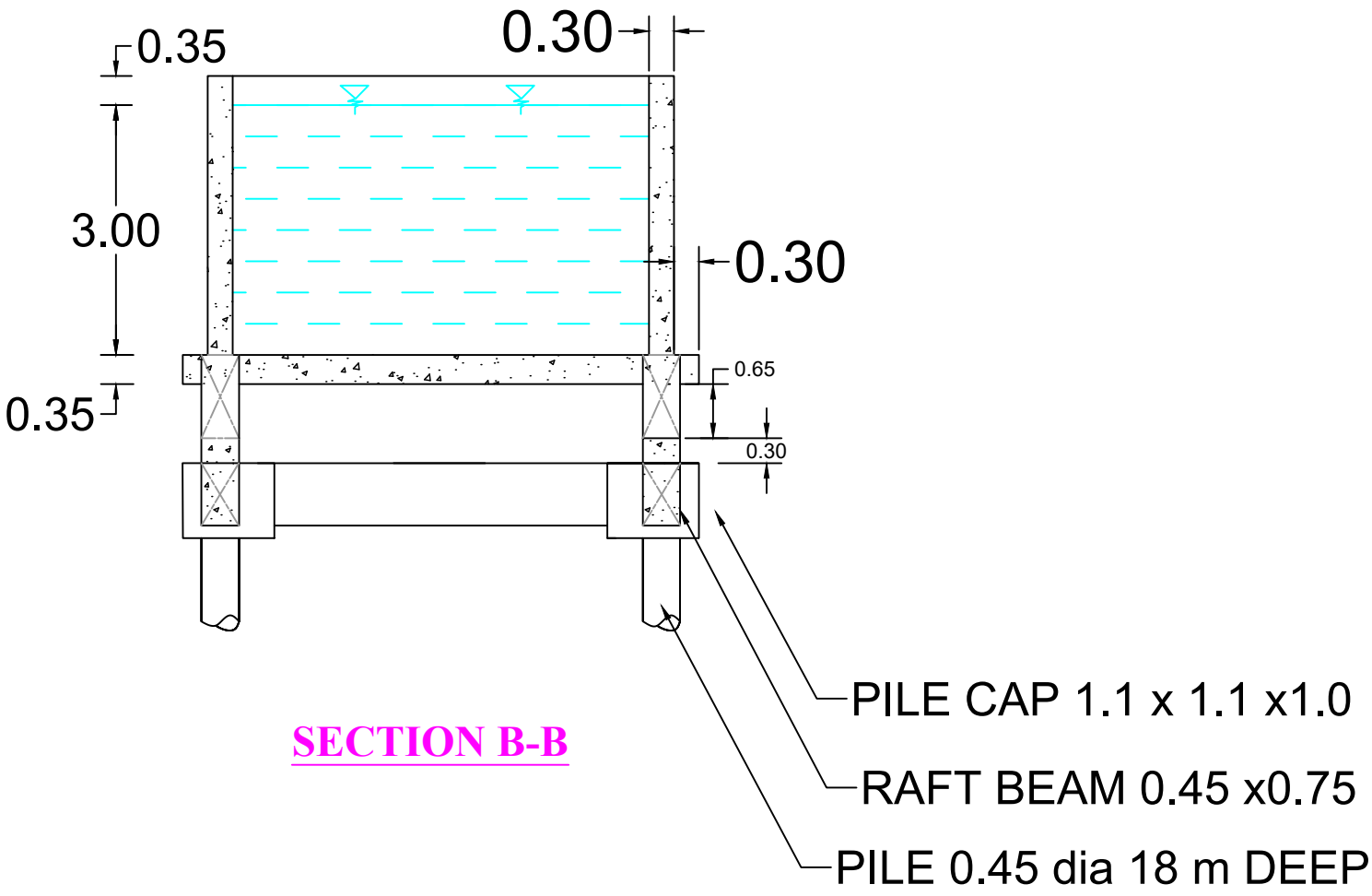
ALL DIMENSIONS ARE IN METERS

FILE NO : SEW/MPM/2023/HARBOUR SBM2

TITLE : PRESSURE SAND FILTER& ACTIVATED CARBON FILTER

DRAWING NO : HARBOUR SBM 2 - 17

DATE: 16-03-2023



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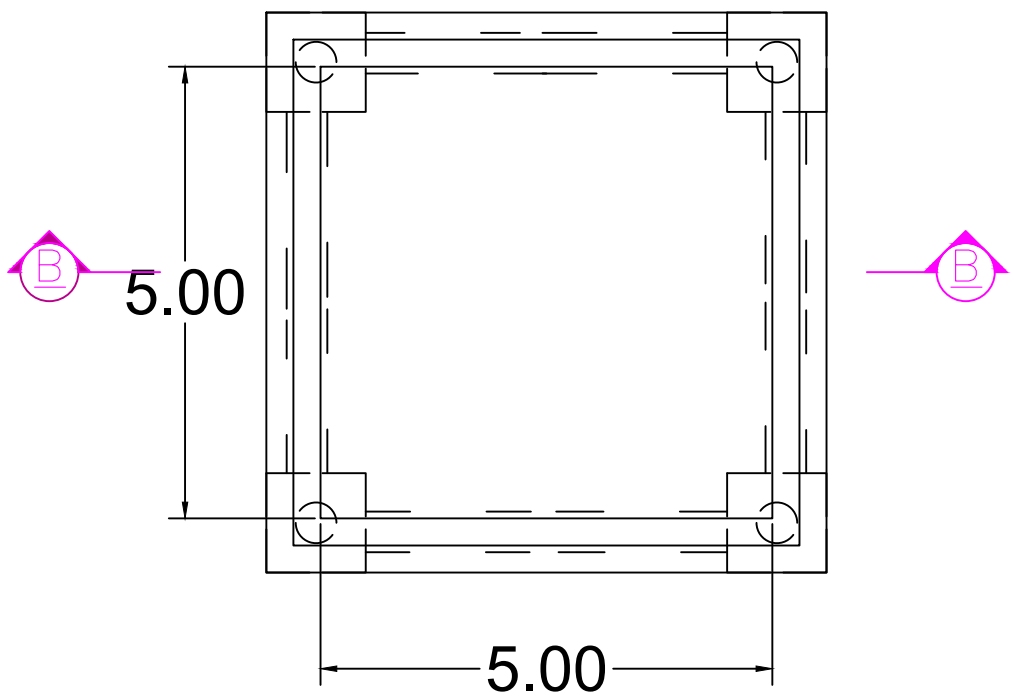

PLAN

CHLORINE CONTACT TANK

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1- 4 Nos.

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

PREPARED BY: SEWERAGE CIRCLE THRISSUR

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3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

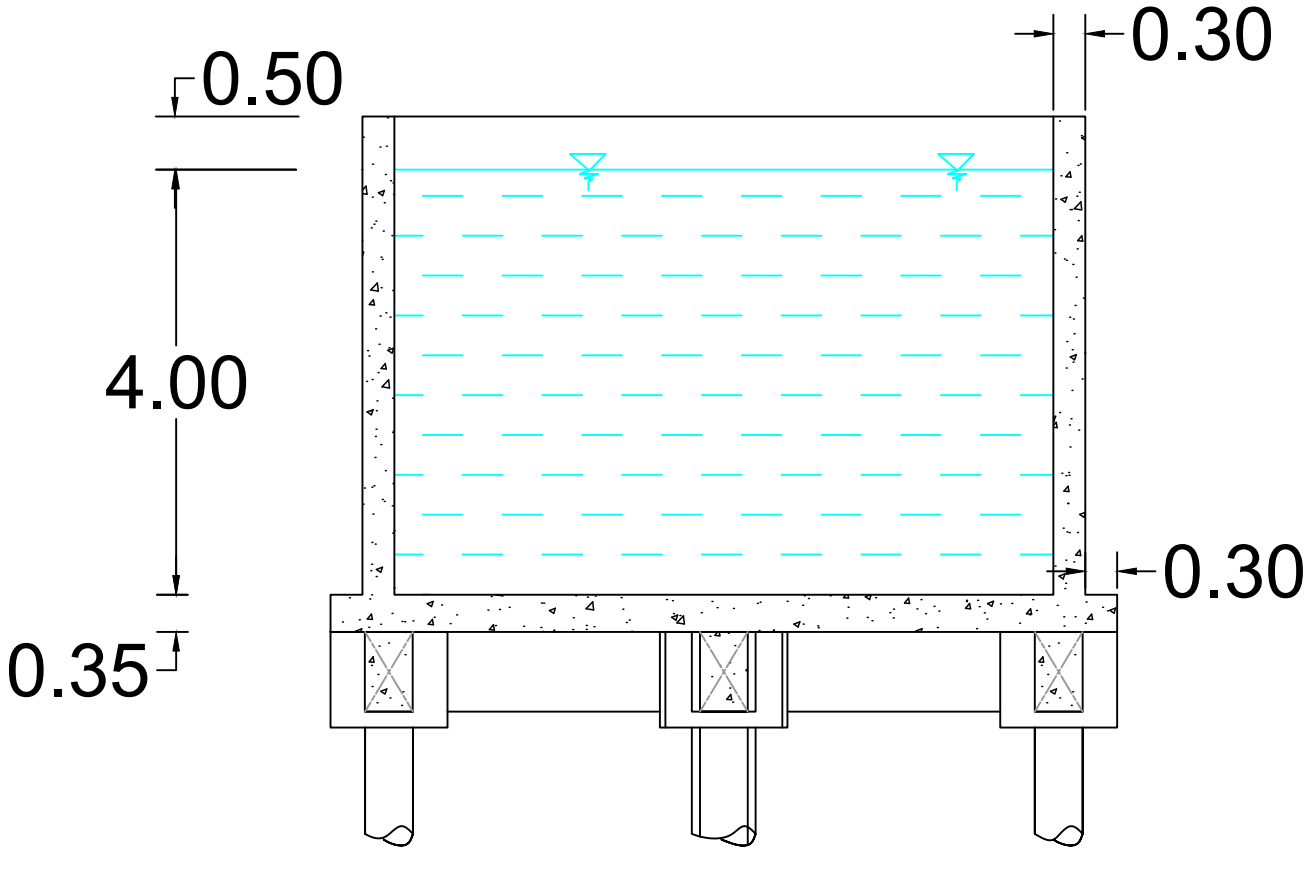
ALL DIMENSIONS ARE IN METERS

FILE NO : SEW/MPM/2023/HARBOUR SBM2

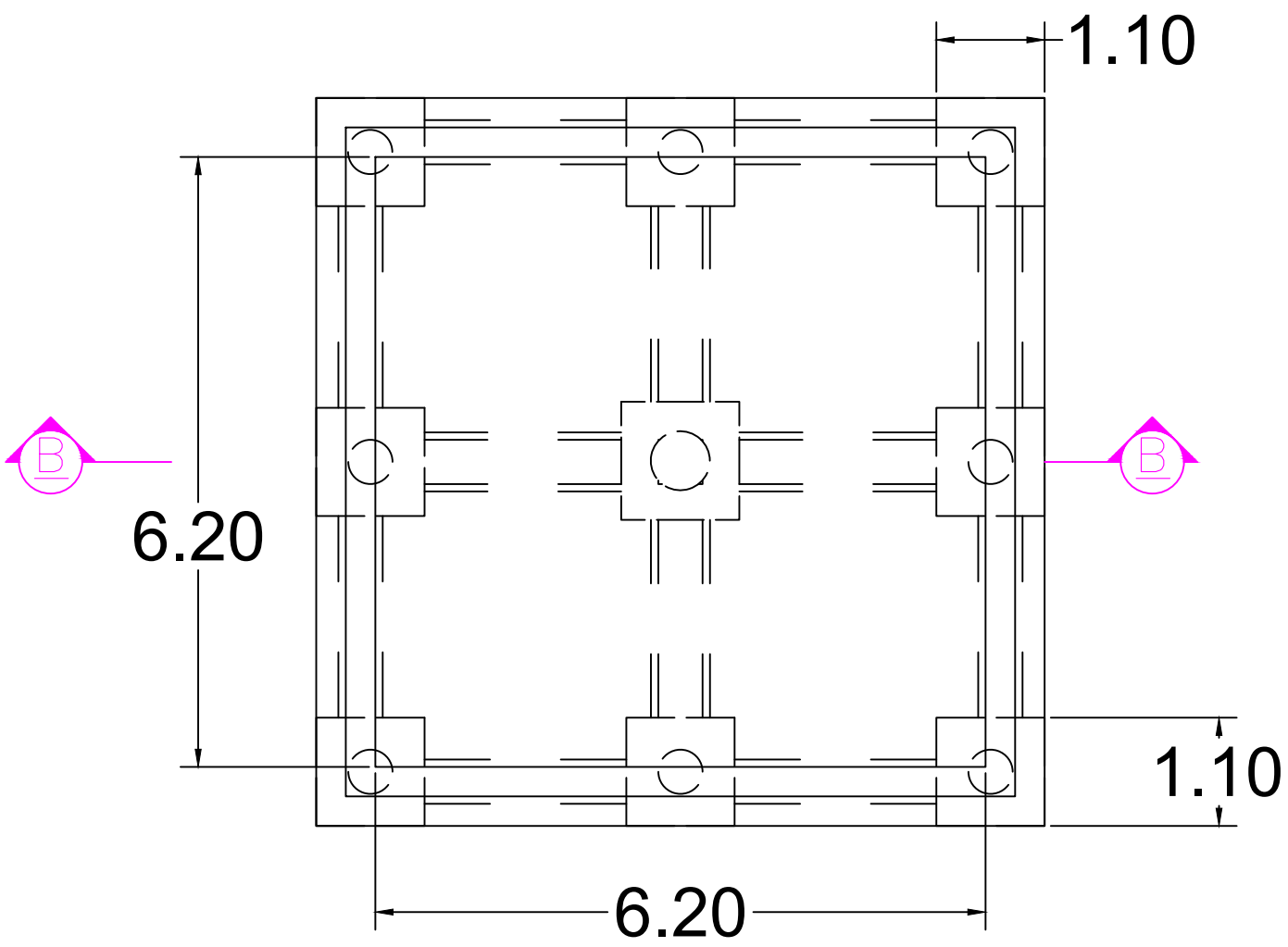
TITLE : CHLORINE CONTACT TANK

DRAWING NO : HARBOUR SBM 2 - 18

DATE: 16-03-2023



SECTION B



PLAN

TREATED WATER TANK

	PILE DETAILS	TYPE	SIZE	NO	PILE CAP
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1.0- 4 Nos.
2	Interior pile	single	60cm Dia.	1	1.2 x 1.2 x 1.0- 1 Nos
3	Exterior pile	single	45 cm Dia.	4	1.1 x 1.1 x1.0- 4 Nos

KERALA WATER AUTHORITY

SEWERAGE CIRCLE THRISSUR

3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)

TITLE : TREATED WATER TANK

PREPARED BY: SEWERAGE CIRCLE THRISSUR

AE.	
AEE.	
EE .	
SE	

ALL DIMENSIONS ARE IN METERS

FILE NO : SEW/MPM/2023/HARBOUR SBM2

DRAWING NO : HARBOUR SBM 2 - 19

DATE: 16-03-2023