

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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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	
I	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 CHIEF E	NGLALERI
18	Implementation agency	As per the decisions of the Government of Kerala Wat	& WASCON CE Authority
19	Period of execution	· 36 Months	napurari -33
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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.	ITEM	AMOUNT
140.	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	Contraction of the second
SI. 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.



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

- 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

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/Km²) and 2nd urban dense district in the state as against state density (860/Km²). 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 km², 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 Km². 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
51	Wicchuleruvu

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 & 51 fully.



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.

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

 Table 2 Population projection and Sewerage load calculation of Ponnani Municipality

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	Туре	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 in	filtration			0.15
TOTAL SEWAG	E LOAD			1.90

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

Sl No.	Item	Quantity	Water	Supply	Sewerage	load
			(LPCD))	(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

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, desludging from sources are performed annually using special equipment and septage is carried to the STP for co-treatment after desirable dilution.



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



3.2 COMPONENTS OF SEWAGE NETWORK

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

Sl.	Type of	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.

Table 9 Components of sewage network

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.

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

Table 10 Details of social survey performed in the scheme area

MH 135	10								0.083	0.265
MH 136	5				100				0.083	0.265
MH 137	5	2			100				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	10							0.05	0.16
MH 146	6	1							0.05	0.16
MH 147	10	5							0.085	0.273
MH 148	7	5							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 152	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

MII 227	5						0.042	0.122
MH 228	7						0.042	0.135
MII 220	2	5			2		0.038	0.165
MH 229	2	5			2	100	0.028	0.09
MIL 221	5 10					100	0.039	0.125
MH 231	10	า					0.085	0.203
MH 232	3	2					0.026	0.083
MH 233	3	2					0.025	0.08
MH 234	6	3					0.051	0.163
MH 235	3	10					0.029	0.093
MH 236	2	2			0.70	0.0	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									0.023	0.108
MH 323	9									0.035	0.100
MH 324	11						50			0.075	0.24
MH 325	13						50			0.077	0.315
MH 226	5									0.108	0.343
MH 227	12									0.042	0.133
MII 327	12									0.1	0.32
MH 328	12									0.1	0.32
MH 329	/					50				0.058	0.185
MH 330	12				10	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
	4									0.033	0.108
MH 373											

MII 276	10	1			6					0 161	0.515
MII 370	19	1			0					0.101	0.313
MII 279	14									0.117	0.373
MH 378	12									0.122	0.52
MH 3/9	10						470			0.133	0.425
MH 380	15						4/9			0.325	1.035
MH 381	12									0.1	0.32
MH 382	10									0	0
MH 383	7	I								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						175			0.746	2.378
NIL 421	2						0	75		0.027	0.000
MH 421	2		10					/5		0.027	0.088
MH 422	1		13							0.03	0.095
MH 426	10				6					0.083	0.265
MH 427	9				6					0.078	0.248
MH 428	l									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								142	0.222	0.708
MH 467	1								0	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	2								0.009	0.03
	3									0.025	0.028
	,									0.04.)	0.00

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	-	5									0.01	0.033
MH 484	2	9									0.02	0.065
MH 485	2	,		2							0.02	0.065
MH 486	2	2		2							0.02	0.003
MH 508	7	2									0.020	0.005
MH 512	/		5								0.003	0.105
MH 513	3		5								0.005	0.01
MH 514	2								50		0.025	0.08
MH 515	2								50		0.024	0.073
MII 515	2				5						0.017	0.035
МП 510 MII 517	2 1				5						0.038	0.165
MIL 519	1										0.008	0.028
MH 518	2								10		0.01/	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	I			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 577	8									0.067	0.213
MH 578	0									0	0
MH 652	6							50		0.057	0 183
MH 653	10							50		0.083	0.165
MH 951	13									0.108	0.345
MH 1008	15									0.100	0.545
MH 1000										0	0
MH 1010										0	0
MH 1011										0	0
MH 1012										0	0
MII 1012	12						220	200		0 420	1 269
MII 1070	12					45	230	300		0.429	0.278
МП 1077 MII 1079	12	6				43				0.119	0.378
MH 1078	0	0	10							0.009	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	1				50				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 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



Autor Lengths Off 🔹 Offsets, Depth 🔹 Flow linits, LPS 🔹 💐 Zourn Level, 100% 🛛 X, N. 598517.483, 1191380.086

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

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Map 12 Study Area Map	= 0
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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

Sl No	From	То	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 11 Hydraulic network flow route - Pumping

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		112.9	140	PN 10	1375
2		161.5	200	PN 10	85
3	PE 100 PN	254.5	315	PN 10	350
4	10	450.1	560	PN 10	150
5		506.6	630	PN 10	50
		TOTAL	1		2010

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

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		189.7	225	PN 8	5612.7	4963.4	649.3
2		236.1	280	PN 8	279	69	210
3	PE 100	299.5	355	PN 8	1048.6	740.5	308.1
4	PN 8	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.	Pange of denths in m	Internal	Total	Percentage of total					
No.	Kange of depuis, in in	diameter in m	number	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 W	ELL-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	17.69	LPS		
well				
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/se		
		с		
Diameter of pumping line required	250.1	mm	fix OD	560
	2			
Actual inside diameter of pumping line in mm	450.1	press	ure rating	PN
	1.5			10
Total head for the pump set from EPANET analysis	17 (0	m	CC ·	0.4/
Discharge for the single pump set	17.69	LPS	efficienc	0.43
Power required for nump set/number	7.86	НР	y fix HP	1(
DESIGN OF COLLECTION W	FLL-CW	2	пл пп	10
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	4.47	LPS		
well				
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		
	-24.07	m ³		
Volume of sewage to be stored in well				
Volume of sewage to be stored in well Diameter of collection well-inner	3	m		
Volume of sewage to be stored in well Diameter of collection well-inner Depth of well	3 7	m m		
Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage	3 7 3	m m m		
Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well	3 7 3 21.21	m m m m ³	ok	
Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well Wall thickness of collection well	3 7 3 21.21 0.45	m m m m ³ m	ok	
Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well Wall thickness of collection well Base slab thickness	3 7 3 21.21 0.45 0.45	m m m ³ m m	ok	
Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well Wall thickness of collection well Base slab thickness Offset to base slab	3 7 3 21.21 0.45 0.45 0.60	m m m ³ m m m	ok	
Volume of sewage to be stored in wellDiameter of collection well-innerDepth of wellDepth of collection well for storageVolume of sewage actually stored in wellWall thickness of collection wellBase slab thicknessOffset to base slabOuter dia of collection well	3 7 3 21.21 0.45 0.45 0.60 3.9	m m m ³ m m m m m	ok	
Volume of sewage to be stored in wellDiameter of collection well-innerDepth of wellDepth of collection well for storageVolume of sewage actually stored in wellWall thickness of collection wellBase slab thicknessOffset to base slabOuter dia of collection wellFreeboard of collection well	3 7 3 21.21 0.45 0.45 0.60 3.9 0.5	m m m ³ m m m m m m	ok	

Velocity of travel adopted for peak discharge	0.9	m/se c		
Diameter of pumping line required	125.7 7	mm	fix OD	315
Actual inside diameter of pumping line in mm	254.5	press	ure rating	PN 10
Total head for the pump set from EPANET analysis	10	m		
Discharge for the single pump set	4.47	LPS	efficienc y	0.45
Power required for pump set/number	1.32	HP	fix HP	2
DESIGN OF COLLECTION WELL	L-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	-	m^3		
	149.6 5			
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/se c		
Diameter of pumping line required	313.0 8	mm	fix OD	630
Actual inside diameter of pumping line in mm	506.6	press	ure rating	PN 10
Total head for the pump set from EPANET analysis	15	m		
Discharge for the single pump set	27.71	LPS	efficienc y	0.45
Power required for pump set/number	12.32	HP	fix HP	15
DESIGN OF LIFTING STAT	ION 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		
Deals flow into wall from other wall	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/se		
		с		
Diameter of pumping line required	125.5 9	mm	fix OD	200
Actual inside diameter of pumping line in mm	161.5	press	ure rating	PN 10
Total head for the pump set from EPANET analysis	10	m		
Discharge for the single pump set	4.46	LPS	efficienc v	0.45
Power required for pump set/number	1.32	HP	fix HP	1.5
DESIGN OF LIFTING STAT	ION 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 average inflow into well from network+other well Total peak inflow into well from network+other well	0.88	LPS LPS		
Total average inflow into well from network+other well Total peak inflow into well from network+other well Peak hours	0.88 2.21 3	LPS LPS		
Total average inflow into well from network+other well Total peak inflow into well from network+other well Peak hours Number of pumps operated in peak hours	0.88 2.21 3 2	LPS LPS		
Total average inflow into well from network+other wellTotal peak inflow into well from network+other wellPeak hoursNumber of pumps operated in peak hoursRated outflow during peak hours/pump in parallel	0.88 2.21 3 2 0.88	LPS LPS LPS		
Total average inflow into well from network+other wellTotal peak inflow into well from network+other wellPeak hoursNumber of pumps operated in peak hoursRated outflow during peak hours/pump in parallelTotal rated outflow in peak hours	0.88 2.21 3 2 0.88 1.77	LPS LPS LPS LPS		
Total average inflow into well from network+other wellTotal peak inflow into well from network+other wellPeak hoursNumber of pumps operated in peak hoursRated outflow during peak hours/pump in parallelTotal rated outflow in peak hoursInflow converted into storage during peak hours	0.88 2.21 3 2 0.88 1.77 0.44	LPS LPS LPS LPS LPS		
Total average inflow into well from network+other wellTotal peak inflow into well from network+other wellPeak hoursNumber of pumps operated in peak hoursRated outflow during peak hours/pump in parallelTotal rated outflow in peak hoursInflow converted into storage during peak hoursVolume of sewage to be stored in well	0.88 2.21 3 2 0.88 1.77 0.44 4.77	LPS LPS LPS LPS LPS m ³		
Total average inflow into well from network+other wellTotal peak inflow into well from network+other wellPeak hoursNumber of pumps operated in peak hoursRated outflow during peak hours/pump in parallelTotal rated outflow in peak hoursInflow converted into storage during peak hoursVolume of sewage to be stored in wellDiameter of collection well-inner	0.88 2.21 3 2 0.88 1.77 0.44 4.77 2	LPS LPS LPS LPS LPS m ³ m		
Total average inflow into well from network+other well Total peak inflow into well from network+other well Peak hours Number of pumps operated in peak hours Rated outflow during peak hours/pump in parallel Total rated outflow in peak hours Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner Depth of well	0.88 2.21 3 2 0.88 1.77 0.44 4.77 2 6	LPS LPS LPS LPS M ³ m m		
Total average inflow into well from network+other wellTotal peak inflow into well from network+other wellPeak hoursNumber of pumps operated in peak hoursRated outflow during peak hours/pump in parallelTotal rated outflow in peak hoursInflow converted into storage during peak hoursVolume of sewage to be stored in wellDiameter of collection well-innerDepth of wellDepth of collection well for storage	0.88 2.21 3 2 0.88 1.77 0.44 4.77 2 6 2	LPS LPS LPS LPS M ³ m m m		
Total average inflow into well from network+other well Total peak inflow into well from network+other well Peak hours Number of pumps operated in peak hours Rated outflow during peak hours/pump in parallel Total rated outflow in peak hours Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well	0.88 2.21 3 2 0.88 1.77 0.44 4.77 2 6 6 2 6.28	LPS LPS LPS LPS m ³ m m m m	ok	
Total average inflow into well from network+other well Total peak inflow into well from network+other well Peak hours Number of pumps operated in peak hours Rated outflow during peak hours/pump in parallel Total rated outflow in peak hours Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well Wall thickness of collection well	0.88 2.21 3 2 0.88 1.77 0.44 4.77 2 6 2 6 2 6.28 0.4	LPS LPS LPS LPS m ³ m m m m m m m	ok	
Total average inflow into well from network+other well Total peak inflow into well from network+other well Peak hours Number of pumps operated in peak hours Rated outflow during peak hours/pump in parallel Total rated outflow in peak hours Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well Wall thickness of collection well	0.88 2.21 3 2 0.88 1.77 0.44 4.77 2 6 2 6.28 0.4 0.4	LPS LPS LPS LPS m ³ m m m m m ³ m m m	ok	

Outer dia of collection well	28	m		
Freeboard of collection well	0.5	m		
Distance of travel in pumping to peyt station	50	m		
Velocity of travel adopted for peak discharge	0.9	m/se		
versionly of nuver adopted for peak discharge	0.9	c		
Diameter of pumping line required	55.92	mm	fix OD	140
Actual inside diameter of pumping line in mm	112.9	press	ure rating	PN
		•	Ũ	10
Total head for the pump set from EPANET analysis	10	m		
Discharge for the single pump set	0.88	LPS	efficienc	0.45
			У	
Power required for pump set/number	0.26	HP	fix HP	0.5
DESIGN OF OUTFALL WEI	LL - 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		
I otal average inflow into well from network+other	2.90	LPS		
Well Total neak inflow into well from network+other well	2 90	I PS		
Peak hours	2.90	LIS		
Number of numps operated in neak hours	1			
Rated outflow during neak hours/nump in parallel	2 90	I PS		
Total rated outflow in peak hours	2.90	LIS		
Inflow converted into storage during neak hours	0.00	LPS		
Volume of sewage to be stored in well	0.00	m ³		
Diameter of collection well inner	2.00	m		
Death of well	2	m		
Depth of collection well for storage	2	m		
Volume of sewage actually stored in well	6.28	m^3	ok	
Well distance of cellection reall	0.20	111	UK	
Wall thickness of collection well	0.30	m		
Offset to here sleb	0.30	m		
Outer dia of collection well	0.50	m		
Ereeboard of collection well	2.0	m		
Distance of travel in pumping to next station	275	m		
Velocity of travel adopted for peak discharge	0.9	m/se		
	0.7	C		
Diameter of pumping line required	64.05	mm	fix OD	140
Actual inside diameter of pumping line in mm	112.9	press	ure rating	PN
			U	10
Total head for the pump set from EPANET analysis	7.5	m		
Discharge for the single pump set	2.90	LPS	efficienc y	0.45
Power required for pump set/number	0.64	HP	fix HP	1
DESIGN OF OUTFALL WEI	LL - 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/se		
······		с		
Diameter of pumping line required	64.05	mm	fix OD	140
Actual inside diameter of pumping line in mm	112.9	press	ure rating	PN 10
Total head for the pump set from EPANET analysis	8.5	m		
Discharge for the single pump set	2.90	LPS	efficienc y	0.45
Power required for pump set/number	0.73	HP	fix HP	1
DESIGN OF OUTFALL WEI	LL - 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		
	2.90	LPS		
I otal rated outflow in peak hours		1 1)C		
I otal rated outflow in peak hours Inflow converted into storage during peak hours	0.00			
I otal rated outflow in peak hours Inflow converted into storage during peak hours Volume of sewage to be stored in well	0.00	m ³		
Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner	0.00 0.00 2	m ³ m		
Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner Depth of well	0.00 0.00 2 3	m ³ m m		
I otal rated outflow in peak hours Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage	0.00 0.00 2 3 2	m m m m		
Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well	0.00 0.00 2 3 2 6.28	m ³ m m m m m ³	ok	
Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well Wall thickness of collection well	0.00 0.00 2 3 2 6.28 0.30	m ³ m m m m ³ m	ok	
Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well Wall thickness of collection well Base slab thickness	0.00 0.00 2 3 2 6.28 0.30 0.30	m ³ m m m m ³ m m	ok	
Iotal rated outflow in peak hours Inflow converted into storage during peak hours Volume of sewage to be stored in well Diameter of collection well-inner Depth of well Depth of collection well for storage Volume of sewage actually stored in well Wall thickness of collection well Base slab thickness Offset to base slab	0.00 0.00 2 3 2 6.28 0.30 0.30 0.30	m ³ m m m m ³ m m m m	ok	

Freehoard of collection well	0.5	122		
Distance of travel in pumping to next station	275	m		
Velocity of travel adopted for peak discharge	0.0	m/se		
velocity of traver adopted for peak discharge	0.9	ni/se		
Diameter of pumping line required	64.05	mm	fix OD	140
Actual inside diameter of pumping line in mm	112.9	press	ure rating	PN
		1	U	10
Total head for the pump set from EPANET analysis	7.5	m		
Discharge for the single pump set	2.90	LPS	efficienc	0.45
Deriver mensional fear assume act/assume her	0.64	IID	y fra LID	1
Power required for pump set/number	0.04 L OE 4	HP	IIX HP	1
DESIGN OF OUTFALL WEL	L - OF 4	I DC		
Average inflow into well from network	2.90	LPS	DF	1.00
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		
I otal 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/se c		
Diameter of pumping line required	64.05	mm	fix OD	140
Actual inside diameter of pumping line in mm	112.9	press	ure rating	PN 10
Total head for the pump set from EPANET analysis	7.5	m		
Discharge for the single pump set	2.90	LPS	efficienc v	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

- 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 quicks and 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.
- 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/cm² 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 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:

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

Table 17 Components of sewage treatment system

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	Clarification of biologically treated water using sludge
10	plate settler	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
1.7	D 1 C1	before pumping to filter units
15	Pressure sand filter	Filtration of clarified water using sand and anthracite
1.0		coal dual media for better results
10	Activated carbon filter	Filtration of clarified water using activated carbon filter
1/	I reated water tank	I his unit is used for holding filtered clear water
18	Sludge sump	Sludge from clarified is collected and transferred to
10	C1	sludge thickener
19	Sludge thickener	Studge is inickened in gravity separation and supernatant
20	Cantrifuga	This contraction of the second s
20	Centrifuge	Inickened 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 cotreatment 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 W	ITH MOVI	NG BED BIO	OFILM-REACT	OR (MBE	BR)	
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 Sewa	age Characte	ristics			
Average sewage flow entering the	145.83	m ³ /hour				
STP	110.00	in / nour				
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	0.15					
fraction of plant flow						
Thickener overflow return	0.525	MLD				
Thickener overflow return BOD	350	mg/l				
Centrate from sludge dewatering	0.006					
as fraction of plant flow						
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	3000000	mpn/100				
E Coliform	40000000	mpn/100				
		ml				
Chlorides as Cl	125	mg/l				
pН	6					
Treated	l Sewage Ch	aracteristics	(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	· 01 1				
	Recei	ving Chamb	er			
Average quantity of now	143.83	m ² /nour				
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 an	d Grease Tr	ap			
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 Coa	arse 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	11	0.05		
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)			
		62				

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	q	0.5		
Full height of channel	1.5	m	tb	0.5		
Angle of inclination	45	degree	0.79	rad		
Actual velocity at peak now	0.70	0.60 0.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 F	ine Screen C	hannel			
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	0.25	m	
Width of shownal marridad	1		thickness	0.25		
Dorth of flow	1	m	offset to wall	0.23	m	
Depth of now	0.17	III	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	9	^ -		
Full height of channel	1.5	m	tb	0.5		
Angle of inclination	45	degree	0.79	rad		
Actual velocity at peak flow	1.24	(between				
		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	n Channel			
Peak design flow	0.10	m ³ /sec				
Number of channels	1					
Peak flow rate per screen	0.10	m ³ /sec				

	0.6	1				
Velocity at peak flow	0.6	m/sec	assumed			
Velocity through clean bar screen	0.85	m/sec		0.25		
Length of channel 0/S	2	III	thickness	0.23	m	
Width of channel provided	1	m	offset to wall	0.25	m	
Depth of flow	0.17	m	slab	0.30	m	
			thickness			
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		
		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	3 /				
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			

Number of bars	62					
Clear bar spacing obtained	6.2	mm	OK			
Inside width of screen (openings)	0.38	m	a	0.5		
Full height of channel	1.5	m	Ib	0.5		
Angle of inclination	/0	degree	1.22	rad		
Actual velocity at peak flow	1.09	(between				
		0.00 m/sec and				
		0 90				
		m/sec)				
Length of channel required D/S	0.55	m	fix	2	m	
					area in	8
					m ²	
	Daily so	creening qua	ntity			
Daily sewage quantity	3500.00	m³/day				
Rate of screening quantity	0.015	$m^{3}/1000$				
		m^3				
Daily screening quantity	0.0525	m ³ /day				
	Gr	rit 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,			
Malana af an't diamhan	(00	3	typical 60)			
volume of grit chamber	0.08	m ²	<i>.</i>			
SOR	900	m ³ /m ² /day	(empirical,			
			Jrom observations)			
	0.010	$m^3/m^2/sec$	observations)			
A rea required	0.010	m /m /see	wa11	0.20		
Area required	9.12	111	thickness	0.30	111	
SWD	2.75	m	slab	0.35	m	
5112	2.70		thickness	0.00		
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	27.29	m ³	OK
			given			
Specific gravity of liquid	2.65	2.				
Kinematic viscosity	000010030	m ² /sec				
V _p in m/sec	0.020	<i>let Nr</i> <				
		I, apply				
		Stoke's				
		torminal				
		velocity				
		vn				
 Nr	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	$R_{\rm v}$	1.23	
					area in m ²	18.92

4.4 DESIGN OF CO-TREATMENT UNITS FOR SEPTAGE

Latrine or septic tank in FSM areas

Primary emtying and transfer in vacuum trucks

Co-treatment in STP

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	l for 2 strear 11496	ns of sept 0populati	age treatn on	nent for			
Sludge deposit coefficient	67	litres/per	rson/year	(interva	l once in 1	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 /hou r			
Peak design flow	22.00	KLD	22000	LPD	22	m ³ /day			
					0.92	m ³ /hou r			
Number of trips/day	8				0.0002 5	cum/se c			
Quantity of septage obtained in single trip with peak factor	2.75	m ³							
	Raw Septage	Characteris	stics						
COD	25000	mg/l							
BOD	5000	mg/l							
TSS	5000	mg/l							
Treated S	Sewage Chara	cteristics (a	fter filtratior	1)					
COD	50	mg/l							
BOD	10	mg/l							
TSS	20	mg/l							
A suggest as a suggestion of flows	Receivin	g Chamber							
Average quantity of now	0.40	m ² /nour							
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	13	m				
			height	1.5	111				
Area required for inlet chamber	0.31	m ²	height wall thickness	0.25	m				
Area required for inlet chamber Length of the tank	0.31 0.75	m ² m	height wall thickness slab thickness	0.25	m m				
Area required for inlet chamber Length of the tank Breadth of the tank	0.31 0.75 0.41	m ² m fix	height wall thickness slab thickness 0.5	0.25 0.3 m	m m area in m ²	2.96			
Area required for inlet chamber Length of the tank Breadth of the tank Design of Dilu	0.31 0.75 0.41	m ² m fix r from Mass	height wall thickness slab thickness 0.5 s-balance Pr	0.25 0.3 m	m m area in m ²	2.96			
Area required for inlet chamber Length of the tank Breadth of the tank Design of Dilu Target outflow BOD (actual incoming BOD to STP)	0.31 0.75 0.41 ution Chamber 265	m ² m fix r from Mass mg/l	height wall thickness slab thickness 0.5 s-balance Pr offset to wall	0.25 0.3 m inciple 0.45	m m area in m ² m	2.96			
Area required for inlet chamber Length of the tank Breadth of the tank Design of Dilu Target outflow BOD (actual incoming BOD to STP) Target outflow TSS (actual incoming TSS to STP)	0.31 0.75 0.41 1tion Chamber 265 400	m ² m fix r from Mass mg/l mg/l	height wall thickness slab thickness 0.5 s-balance Pr offset to wall free board	0.25 0.3 m inciple 0.45 0.50	m m area in m ² m	2.96			
Area required for inlet chamber Length of the tank Breadth of the tank Design of Dilu Target outflow BOD (actual incoming BOD to STP) Target outflow TSS (actual incoming TSS to STP) Volume of recycled water used for dilution	0.31 0.75 0.41 1tion Chamber 265 400 51500	m ² m fix r from Mass mg/l mg/l litres	height wall thickness slab thickness 0.5 s-balance Pr offset to wall free board total height	0.25 0.3 m inciple 0.45 0.50 3.00	m m area in m ² m m	2.96			
Area required for inlet chamber Length of the tank Breadth of the tank Design of Dilu Target outflow BOD (actual incoming BOD to STP) Target outflow TSS (actual incoming TSS to STP) Volume of recycled water used for dilution Quantity of septage obtained as above	0.31 0.75 0.41 1tion Chamber 265 400 51500 2.75	m ² m fix r from Mass mg/l mg/l litres m ³	height wall thickness slab thickness 0.5 s-balance Pr offset to wall free board total height No.of Tank	0.25 0.3 m inciple 0.45 0.50 3.00 2	m m area in m ² m m	2.96			

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	unekness			
Breadth of dilution tank adopted	4.70	m	ratio of d	ilution	18.73	
Average outflow from dilution	9.04	m ³ /hour	volume	55.23	m ³	ok
tank						
-do-	0.22	mld			area in m ²	37.21
Design o	f pile foundat	ion for one	-dilution tar	ık		
Number of pile grid	2	ext piles	0	int	0	
		no		piles no		
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	freeboar d	0.50	m	
Floor slab thickness	0.35	m	offset to wall	0.45	m	
Sidewall thickness	0.25	m				
Value of load computaion	А	5.19	В	0.42	С	1.88
constants for piles						
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 O	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			111	
Dicadan of barne wan inside	Ianual Coarse	e Screen Ch	annel			
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 coefficie nt = 0.7			
Assumed depth of flow after	0.02	m	0.02	(contro		
inserting bar screen				l 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		OV			
Clear bar spacing obtained	21	mm	OK		· · · · ·	4.25
Inside width of screen (openings)	0.48	m	3	0.2	area in m ²	4.25
Full height of channel	1	m	1b	0.3		
Actual velocity at peak flow	0.42	(between 0.60 m/sec and 0.90 m/sec)	0.79	Tau		
Length of channel required D/S	1.00	m	fix	1.5	m	
Sewage pump- for pum	nping to receiv	ving chamb	er/equalisati	on tank o	f STP	
Number of pumps	1	SB	1			
Type of pump set	submersibl e centrifugal sewage transfer- non clog					
Average flow	9.04	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 v	vater pump- fo	or pumping	to dilution t	ank		
Number of pumps	1	SB	1			
Type of pump set	submersibl					
	e					
	centrilugai					
	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 mechanica	l mixer for o	dilution tank			
Capacity of dilution tank provided	54.25	m				
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

	Equal	ization Tan	k				
Number of units	1	2 4					
Average design flow to one unit	145.83	m ³ /hour					
Volume of tank required	909.33	m ³	from de	tailed anal	lysis		
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	А	5.90	В	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	-8	0.00		18.00	
Number of 60cm dia piles	12	0.00		12.00		0.00	
	200						
Total length of 45cm dia piles	396	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:

 $CO_2 + H_2 O + sunlight \rightarrow organic plant matter (primarily C, H, & O) + oxygen (this reaction is catalysed by the chlorophyll in green plants)$

Biological Oxidation:

waste organic matter (primarily C, H & O) + $O_2 \rightarrow CO_2 + H_2O$ + 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 Ódegaard 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 m²/m³ 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. Ódegaard).



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 m² 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 m². 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.

	Sewage pump	- for pumping	to MBBR Tan	k	
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	76.09	m ³ /hour			
pump					
Peak factor	1.20				
Discharge	25.36	LPS	0.0254	m ³ /sec	

4.6.1 PROCESS ANALYSIS AND DESIGN

Head required	20	m				
Efficiency	55%					
Power required	12.30	HP	fix	15	HP	
Energy	421.98	kwh				
Mov	ing Bed Biofili	m-Reactor (M	BBR 1)-Single	Stage		
Number of tanks	1					
Average design flow to	3500.0	m ³ /day				
one unit						
BOD of incoming sewage	263.13	mg/l				
TSS of incoming sewage	400	mg/l				
BOD expected after	10	mg/l				
treatment						
BOD to be removed	253.13	mg/l				
BOD removal % expected	96.20	1 / 3/1				
BOD loading rate/volume	4	kg/m ³ /day	4-/ kg/m ³ /day as per M&E			
Actual BOD loading rate	920.96	ka/dav	MAL			
Quantity of BOD to be	885.96	kg/day				
removed per day	000.70	Kg, day				
Volume of reactor required	230.24	m ³				
Surface area loading rate	7 50	$g/m^2/day$				
(SALR) for BOD removal	7.50	g/m/day				
Required carrier surface area	122794.69	m²				
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	lenoth	10.9	m	
Side of square tank	10.66	m	breadth	10.9	m	
Actual capacity provided-	526.05	m ³	OK	10.7	111	
circular	520.05	3				
rectangular	534.65	m	UK			
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	1.23	hours	73.9	minutes		
SARR for the given SALR	6.94	g/m²/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
	Desi	gn of pile foun	dation			
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	А	5.93	В	0.56	С	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 Be	d Biofilm-Rea	ctor (MBBR 2)-Single Stage	Nitrificatio	on	
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				
		77				

Design minimum waste	20.00	° C				
water temperature	0.61		CADD		1.050	
SAKK _{max}	0.61		SARR		1.058	
			temp			
Minimum NIH, N of	0.50			0.81	$\alpha/m^2/day$	
	0.50		SAKKT	0.81	g/m /day	
Design value of SALR	0.88	$\alpha/m^2/day$				
NUL N Los ding note	140.00	lice/dext				
	140.00	kg/day	C 1 1	0.50		
Required carrier surface	158845.87	m²/day	freeboard	0.50	m	
area Specific surface area of	600.00	m^{2}/m^{3}	donth of			
specific surface area of	000.00	111 / 111	base		III	
Required carrier volume	264 74	m ³ /day	depth of	0	m	
	201.71	iii / ddy	masonry	Ŭ	111	
Volume of media required	40%		slab	0.45	m	
			thickness			
Volume of tank required-	661.86	m ³	offset to	0.60	m	
SALR method			wall			
Volume of each tank	661.86	m ³	total height	5.00	m	
SWD	4.5	m	wall	0.30	m	
			thickness			
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-	663.35	m ³	OK			
circular						
Actual capacity provided-	664.30	m^2	OK			
rectangular		2				
Fix capacity	664.30	m ³				
Actual volume of media	265.72	m ³				
obtained		2				
Actual carrier surface area	159432.30	m^2				
Volume of liquid in the	558.01	m ³				
tank						
Hydraulic Retension Time	3.83	hours	229.58	minutes		
at design average flow	1.60	1	01.02			
Hydraulic Retension Time	1.53	nours	91.83	minutes		
	0.44	$\alpha/m^2/day$	should be			
DOD SALK	0.44	g/m/day	< 0.5 to			
			achieve			
			good			
			nitrification			
Using the equivalent weight	of CaCO ₃ as	50, the equival	ent weight of	NaHCO3 a	as 84, t <u>he a</u>	lkalinity
use for nitrification as 7.14 g	g CaCO ₃ /g NH	3-N and the tar	get effluent all	calinity as	80 mg/L as	CaCO ₃ ,
give the calculated alkalinity	v requirement a	as 118.5 mg/L :	as CaCO ₃ .			
Influent alkalinity	140.00	mg/l				
Target effluent alkalinity	80.00	mg/l				
Alkalinity used for	7.14	g CaCO ₃ /g				
Nitrification	000.01	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	1187.98	kg/day				
requirement		NaHCO ₃				
					area in m ²	194.60
	Desi	gn of pile foun	dation			
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	А	6.75	В	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 Read	ctor (MBBR 3)	-post-anoxic d	lenitrificati	on	
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	0.886	mg/l				
ratio	0.000					
ratio Target % N removal	91.75					
ratio Target % N removal Specific surface area of carrier	91.75 600.00	m ² /m ³				
Target % N removal Specific surface area of carrier NO ₃ -N daily loading rate	91.75 600.00 128.45	m ² /m ³ kg/day	freeboard	0.75	m	

Required carrier volumeVolume of media requiredSALR methodVolume of tank required- SALR methodVolume of each tankSWDArea of each tankDiameter of circular tankSide of square tankActual capacity provided- circularActual capacity provided- rectangularFix capacityActual volume of media obtained	107.04 40% 267.60 267.6 4.5 59.47 8.70 7.71 273.70 270.28 270.28 108.11	m ³ m ³ m m m ² m m m ³ m ³	depth of masonry slab thickness offset to wall total height thickness fix length breadth oK	0.35 0.60 5.25 0.30 8.8 7.75 7.75	m m m m m m m m	
Volume of media requiredVolume of tank required- SALR methodVolume of each tankSWDArea of each tankDiameter of circular tankSide of square tankActual capacity provided- circularActual capacity provided- rectangularFix capacityActual volume of media obtained	40% 267.60 267.6 4.5 59.47 8.70 7.71 273.70 270.28 270.28 108.11	m ³ m ³ m m ² m m m ³ m ³	slab thickness offset to wall total height thickness fix length breadth OK	0.35 0.60 5.25 0.30 8.8 7.75 7.75	m m m m m m m	
Volume of tank required- SALR methodSALR methodVolume of each tankSWDArea of each tankDiameter of circular tankSide of square tankActual capacity provided- circularActual capacity provided- rectangularFix capacityActual volume of media obtained	267.60 267.6 4.5 59.47 8.70 7.71 273.70 270.28 270.28 108.11	m ³ m ³ m m ² m m m ³ m ³	offset to wall total height wall thickness fix length breadth OK	0.60 5.25 0.30 8.8 7.75 7.75	m m m m m m	
Volume of each tankSWDArea of each tankDiameter of circular tankSide of square tankActual capacity provided- circularActual capacity provided- rectangularFix capacityActual volume of media obtained	267.6 4.5 59.47 8.70 7.71 273.70 270.28 270.28 108.11	m ³ m m ² m m m ³ m ³	total height wall thickness fix length breadth OK	5.25 0.30 8.8 7.75 7.75	m m m m m	
SWDArea of each tankDiameter of circular tankSide of square tankActual capacity provided- circularActual capacity provided- rectangularFix capacityActual volume of media obtained	4.5 59.47 8.70 7.71 273.70 270.28 270.28 108.11	m m ² m m m ³ m ³	wall thickness fix length breadth OK OK	0.30 8.8 7.75 7.75	m m m m	
Area of each tankDiameter of circular tankSide of square tankActual capacity provided- circularActual capacity provided- rectangularFix capacityActual volume of media obtained	59.47 8.70 7.71 273.70 270.28 270.28 108.11	m ² m m m ³ m ³ m ³	fix length breadth OK OK	8.8 7.75 7.75	m m m	
Diameter of circular tankSide of square tankActual capacity provided- circularActual capacity provided- rectangularFix capacityActual volume of media obtained	8.70 7.71 273.70 270.28 270.28 108.11	m m m ³ m ³	length breadth OK OK	7.75 7.75	m m	
Side of square tankActual capacity provided- circularActual capacity provided- rectangularFix capacityActual volume of media obtained	7.71 273.70 270.28 270.28 108.11	m m ³ m ³	breadth OK OK	7.75	m	
Actual capacity provided- circularImage: Constraint of the sector of th	273.70 270.28 270.28 108.11	m ³ m ³	OK OK			
Actual capacity provided- rectangular Fix capacity Actual volume of media obtained	270.28 270.28 108.11	m^3	OK			
Fix capacity Actual volume of media	270.28 108.11	m ³				
Actual volume of media	108.11					
ootumea		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/m²/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	498.50	kg/day				
requirement		NaHCO ₃				
4.6 lb COD/lb NO ₃ -N remove calculated as: $4.6/1.5 = 3.1$ lb	ed and 1.5 lb methanol /ll	COD/lb Meth b NO ₃ -N remo	anol. The required the required the second sec	ired metha	anol dosage rement in l	e is then b/day is
then equal to 3.1 times the prev Methanol requirement in kg/day	viously calcu 398.20	llated NO ₃ -N r kg/day	emoval rate			

					area in m ²	91.20
	Desi	gn of pile foun	dation			
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	А	6.35	В	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				
Des	ign of mechan	ical 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 React	or (MBBR 4) c	hamber after o	le-n <u>itrifica</u>	tion	
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 servage	50	ma/l				
BOD expected after	50	mg/l				
treatment	/	iiig/1				
BOD to be removed	79.83	mg/l				
BOD removal % expected	91.94	iiig/1				
BOD loading rate/volume	4	kg/m ³ /day	4-7			
8		6 5	kg/m³/day			
			as per			
			M&E			
Actual BOD loading rate	303.92	kg/day				
Quantity of BOD to be	279.42	kg/day				
removed per day		2				
Volume of reactor required	75.98	m ³				
Surface area loading rate	15.00	g/m²/day				
(SALR) for BOD removal	202(1.12	2				
Required carrier surface	20261.12	m-				
Specific surface area of	600.00	m^{2}/m^{3}	freeboard	0.5	m	
carrier	000.00	111 / 111	necooalu	0.5	111	
Required carrier volume	33.77	m ³	depth of		m	
			base			
Volume of media required	35%		depth of		m	
			masonry			
	26.59	m ³	depth of		m	
		2	masonry			
Volume of tank required-	102.57	m^3	slab	0.35	m	
BOD loading rate/volume			thickness			
method	06.40	3	<u> </u>	0.45		
Volume of tank required-	96.48	m	offset to	0.45	m	
SALK Inctitiou	102 57	m ³	wall total beight	5.00	m	
	102.57	m	wall	0.30	m	
5 11 2	т.5	111	thickness	0.50	111	
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-	106.91	m ³	OK			
circular						
Actual capacity provided-	103.68	m ³	OK			
rectangular						
Fix capacity	103.68	m^3				
Actual volume of media	36.29	m ³				
obtained	01770 00	2				
Actual carrier surface area	21772.80	m²				
Volume of liquid in the	89.16	m				
Lank Hydraulic Retension Time	0.61	hours	26.7	minutes		
at design average flow	0.01	nouis	30.7	minutes		
Hydraulic Retension Time	0.24	hours	14 7	minutes		
at peak flow	0.24	nouis	17.7	minutes		
SARR for the given SALR	13.13	g/m²/day				
Estimated BOD removal	285.77	kg/day				
rate		0 7				

Actual BOD removal rate	94.03	BOD of effluent		5.19	mg/l	ok
70		emuent			area in m ²	39.69
	Desi	gn of pile foun	dation			
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	А	7.90	В	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				
	Blo	wer air require	ment			
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-NH3- 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	7142.14	m ³ /day				

Volume of air-NH ₃ -N	2448.98	m ³ /day			
loading					
Air transfer efficiency of	0.075				
diffuser		2			
Quantity of air required-	95228.54	m³/day			
BOD loading	22(52.0)	3/1			
NH ₂ N loading	32033.00	m ² /day			
Factor of saftey	1.20				
Volume of air required-	4761.43	m ³ /hour			
BOD loading					
Volume of air required-	1632.65	m ³ /hour			
NH ₃ -N loading		2			
Volume of equalisation	909.33	m ³			
tank	0.041	37			
Normal inflow	0.041	m ³ /sec			
Air requirement for	1.25	m ³ /m ³ /hour			
		2, 2,4			
Air requirement for sludge	3 00	$m^{3}/m^{3}/hour$			
Air requirement for sludge tank	3.00	m ³ /m ³ /hour			
Air requirement for sludge tank Volume of ET	3.00 909.33	m ³ /m ³ /hour			
Air requirement for sludge tank Volume of ET Volume of air required for	3.00 909.33 1136.66	m ³ /m ³ /hour m ³ m ³ /hour			
Air requirement for sludge tank Volume of ET Volume of air required for ET	3.00 909.33 1136.66	m ³ /m ³ /hour m ³ m ³ /hour			
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for	3.00 909.33 1136.66 27.29	m ³ /m ³ /hour m ³ /hour m ³ /hour			
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST	3.00 909.33 1136.66 27.29	m ³ /m ³ /hour m ³ /hour m ³ /hour			
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST Total air required	3.00 909.33 1136.66 27.29 7558.03	m ³ /m ³ /hour m ³ /hour m ³ /hour			
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST Total air required Capacity of blower	3.00 909.33 1136.66 27.29 7558.03 7558.00	m ³ /m ³ /hour m ³ /hour m ³ /hour m ³ /hour m ³ /hour			
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST Total air required Capacity of blower Number of blowers	3.00 909.33 1136.66 27.29 7558.03 7558.00 4.00	m ³ /m ³ /hour m ³ /hour m ³ /hour m ³ /hour m ³ /hour SB	1		
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST Total air required Capacity of blower Number of blowers working	3.00 909.33 1136.66 27.29 7558.03 7558.00 4.00	m ³ /m ³ /hour m ³ /hour m ³ /hour m ³ /hour SB	1		
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST Total air required Capacity of blower Number of blowers working Air required per blower	3.00 909.33 1136.66 27.29 7558.03 7558.00 4.00 1889.50	m ³ /m ³ /hour m ³ /hour m ³ /hour m ³ /hour SB m ³ /hour	1		
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST Total air required Capacity of blower Number of blowers working Air required per blower Pressure given	3.00 909.33 1136.66 27.29 7558.03 7558.00 4.00 1889.50 0.60	m ³ /m ³ /hour m ³ /hour m ³ /hour m ³ /hour SB m ³ /hour kg/cm ²	1 5.89	m	
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST Total air required Capacity of blower Number of blowers working Air required per blower Pressure given Volumetric efficiency	3.00 909.33 1136.66 27.29 7558.03 7558.00 4.00 1889.50 0.60 70%	m ³ /m ³ /hour m ³ /hour m ³ /hour m ³ /hour SB m ³ /hour kg/cm ²	1 5.89	m	
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST Total air required Capacity of blower Number of blowers working Air required per blower Pressure given Volumetric efficiency Power required for blower	3.00 909.33 1136.66 27.29 7558.03 7558.00 4.00 1889.50 0.60 70% 59.26	m ³ /m ³ /hour m ³ /hour m ³ /hour m ³ /hour SB m ³ /hour kg/cm ² HP	1 5.89 44.20	m	
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST Total air required Capacity of blower Number of blowers working Air required per blower Pressure given Volumetric efficiency Power required for blower motor	3.00 909.33 1136.66 27.29 7558.03 7558.00 4.00 1889.50 0.60 70% 59.26	m ³ /m ³ /hour m ³ /hour m ³ /hour m ³ /hour m ³ /hour SB m ³ /hour kg/cm ² HP	1 5.89 44.20	m	
Air requirement for sludge tank Volume of ET Volume of air required for ET Volume of air required for ST Total air required Capacity of blower Number of blowers working Air required per blower Pressure given Volumetric efficiency Power required for blower motor Fix power of blower motor	3.00 909.33 1136.66 27.29 7558.03 7558.00 4.00 1889.50 0.60 70% 59.26 60.00	m ³ /m ³ /hour m ³ /hour m ³ /hour m ³ /hour m ³ /hour SB m ³ /hour kg/cm ² HP	1 5.89 44.20	m	

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

	A 1		1_								
······	Alum	solution tar									
number of units	1	SB	1								
dosage of alum	25	ppm									
requirement for 8 hours	29.170	kg									
volume of solution at 10%	0.26	m									
strength/unit	1										
length of tank	1	m									
breadth of tank		m									
liquid depth	0.26	m									
total depth	1	3 /1				4 4 1					
solution flow rate	0.0325	m ³ /hour			area	4.41					
	т. [.]	1	1		in m-						
Lime solution tank											
number of units	15	SB	l								
	15	ppm									
requirement for 8 hours	1/.5	Kg									
volume of solution at 10%	0.16	m3									
strength/unit	1										
length of tank	1	m									
		m									
liquid depth	0.16	m									
	1	m				4 4 1					
solution flow rate	0.020	m ² /nour			area	4.41					
	Ch	amical store			111 111						
alum required for 3 months	7875.9	ka									
density of alum	1065	kg/m ²									
volume required	7.4	m3									
area required at a stacking	7.4	m ²									
height of 2 m	5.7	1112									
assuming 50% circulation	5 5 5	m2									
space total area	5.55	1112									
lime required for 3 months	4725	ko									
density of lime	1113	kg/m3									
volume required	4 25	m3									
area required at a stacking	2 125	m2									
height of 2 m	2.123	1112									
assuming 50% circulation	3.19	m2									
space total area	5.17										
total area required	8.74	m2									
length	3.5	m									
breadth	2.50	m	fix	3	area	24.44					
	2.0 3			5	$in m^2$						
Se	econdary Clarifi	er with Plate	e/Tube <u>Settle</u> 1	ſ							
Average output required from	3.50	145.83	m ³ /hour	40.51	LPS						
tube settler in MLD											
Number of batteries	1										
Average design flow as input	3.50	145.83	m ³ /hour	40.51	LPS						
in MLD/unit											
Width of plates in mm	1200	space betw	veen plates	75	mm	91.59					
Length of plates adopted in m	1.8	•									
	1.5										

Angle of inclination of tubes	55	0.96	rad			
adopted in deg.						
Relative length of settler	24.0		wall	0.3	m	
(dimensionless) $Lr = L/d$			thickness			
Relative length is changed by $L' = 0.058 \text{ x} [\text{Vo x d/v}]$			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	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	63.73	<	75	(due to dual clarification)		
SOR in m ³ /m ² /hour for	2.66	<	5	orannication)		
Trial volume in m ³ of one	153.79		volume of hopper in m ³		56.61	
Detention time in hours	1.05	in square m^3	0.67	in hopper	0.39	hours
Pix volume Performance parameter of tube settler $S = Vs/Vo x [sin\theta + L x cos\theta]$	173					

For laminar flow regime,						
critical performance						
parameter value for complete						
Critical value of nonformance	1 2 2 2	ainaulan				
critical value of performance	1.555	circular				
parameter, se –	1 275	sallara				
	1.575	parallel				
	1	plates				
Particle size in mm	0.025	Plates				
Settling velocity of particle in	0.0006	m/sec	48.08	m/d		
m/sec, V _s (laminar)						
Reynolds number, Nr	0.014					
Trial value of flow along	266					
plate settler V_o in m/day						
Shape of cross section of	plates	(square,				
tubes		circular,				
		or plates)				
Critical of performance	[(Vs/Vo) x					
parameter obtained, Sc	$(\sin\theta + L\cos\theta)$					
	1.26	2				
Plate entrance area/one unit	12.61	m²				
Number of modules of plates	2					
Number of plates	/0.05					
Figured/module	50					
racuired/module	50					
Length/module of trav	6500	mm				
holding plates	0500	11111				
Thickness of plate	2	mm				
Number of plates configured	70.45	OK				
in one module						
Height of plate module for	0.82					
1m length of tubes inclined:						
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	/0					
per module	55	de avec to				
Angle of inclination	33	degree to				
Contact area	302.4	m^2				
$\sum_{n=1}^{\infty} \frac{1}{(n^2/d_{n+1} + d_{n+1})} = \frac{1}{(n^2/d_{n+1} + d_{n+1})}$	11.00		40			
sort in m ⁻ /m ⁻ /day for plate	11.09		40			
Total plate entrance area	12 600	m ²				
A stud valasity of flow in	266.20	111		a ait.	0.000	60 00
_m/day	200.20	no	w correct vel	ochy	$\frac{1}{1}$ in m ²	00.89
	Design (of nile found	ation		111 111	
Number of nile grid-outer	2 Design C	single	3 48	m		
	5	span	5.40	111		
Number of pile grid-inner	3	single	1.875	m		
		0				

Outer piles	8					
Inner piles	8					
Pile cap side	1.1	m	depth	0.9	m	
	outer pile	inner pile				
Load from channels with	4.38	0				
water in Tonne						
Load from vertical wall in	7.30	0				
Tonne						
Load from hopper wall in	2.57	2.57				
Tonne	2.25	1.07				
Load from top beam in Tonne	2.35	1.27				
Load from column in Tonne	2.96	0.38				
Load from vertical water	5.92	12.18				
column in Tonne	2.02	1.50				
Load from grade beam in	2.93	1.58				
I onne	0.00	1 25				
	0.00	1.55				
Load from nile can in Tonne	2 72	2 72				
Number of piles per load	1.00	1.00				
noint	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.

	Chlorine	e 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	r 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
	Pressur	e 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				
	0.0					

4.8.1 UNIT OPERATIONS AND STRUCTURAL DESIGN

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	0.5	m	
Č			wall			
Operating pressure	4	Bar	wall	11	mm	
			thickness			
Filter media	Sand				area in	16.81
					m ²	
	Activated	l Carbon Filte	er			_
Number of units	2	2.4				
Average flow to one unit	1750	m³/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	3.24	m	fiv	3.5	m	
Height of the filter	3.54	m	offset to	0.5	m	
	5	111	wall	0.5	111	
Onerating pressure	4	Bar	wall	11	mm	
		Dur	thickness	11		
Filter media	Activated				area in	20.25
	Carbon				m^2	
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	145.83	m ³ /hour				
required						
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	0.3	m	
		2 1	wall			
Average flow	145.83	m ³ /hour	wall	0.3	m	
	1450	3	thickness	0.05		
Volume of the tank	145.8	m	slab	0.35	m	
	Λ		freekeerl	0.5	100	
Assumed fiquid depth	26.46	m^2	neeboard	0.5	m	
Area of the tank	50.40	III	~			
Number of tanks	1		tix	6.2	m	
	26.46	2	length	()		
Area of one tank	36.46	m-	IIX here dela	6.2	m	
Side of square tent	6.04	m	breadth			
Volume provided	153.76	m^3	OK			
	155.70	111	UK			
Administrative Bldg, lab, chemical	500.00					
$\frac{1}{12*12}$	144.00					
Transformer yard (12*12)	144.00					

	1 75					5176
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	n			
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	А	4.90	В	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						
	91							

BOD	263.13	mg/l				
Assumed TSS Sludge	30%	8				
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	12	m	
Volume of tank	9.10	m ³	slab	0.45	m	
			thickness			
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	9.6
	Pump for Slud	lge 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	< = 0					
1.110157	6.58	kwh				
	6.58 Slud	kwh ge Thickener				
Number of units	6.58 Slud 1	kwh ge Thickener				
Number of units Total sludge to one unit	6.58 Slud 1 742.34	kwh ge Thickener kg/day				
Number of units Total sludge to one unit Solids Loading Rate	6.58 Slud 1 742.34 40	kwh ge Thickener kg/day kg/m ² /day				
Number of units Total sludge to one unit Solids Loading Rate Thickening area required	6.58 Slud 1 742.34 40 18.56	kwh ge Thickener kg/day kg/m ² /day m ²				
Number of units Total sludge to one unit Solids Loading Rate Thickening area required Surface Loading Rate	6.58 Slud 1 742.34 40 18.56 12	kwh ge Thickener kg/day kg/m ² /day m ² m ³ /m ² /day				
Number of units Total sludge to one unit Solids Loading Rate Thickening area required Surface Loading Rate Thickening area required	6.58 Slud 1 742.34 40 18.56 12 6.06	kwh ge Thickener kg/day kg/m ² /day m ² m ³ /m ² /day m ²	freeboard	1.2	m	
Number of units Total sludge to one unit Solids Loading Rate Thickening area required Surface Loading Rate Thickening area required Maximum area	6.58 Slud 1 742.34 40 18.56 12 6.06 18.56	kwh ge Thickener kg/day kg/m ² /day m ² m ³ /m ² /day m ² m ²	freeboard slab thickness	1.2 0.45	m	
Number of units Total sludge to one unit Solids Loading Rate Thickening area required Surface Loading Rate Thickening area required Maximum area Area of distribution chamber	6.58 Slud 1 742.34 40 18.56 12 6.06 18.56 20%	kwh ge Thickener kg/day kg/m ² /day m ² m ³ /m ² /day m ² m ²	freeboard slab thickness offset to wall	1.2 0.45 0.45	m m m	
Number of units Total sludge to one unit Solids Loading Rate Thickening area required Surface Loading Rate Thickening area required Maximum area Area of distribution chamber Total area required	6.58 Slud 1 742.34 40 18.56 12 6.06 18.56 20% 22.27	kwh ge Thickener kg/day kg/m ² /day m ² m ³ /m ² /day m ² m ²	freeboard slab thickness offset to wall wall thickness	1.2 0.45 0.45 0.3	m m m m	

Thickening area available	22.90	m^2				
SWD	3	m				
Actual volume provided	68.71	m ³				
Thickened sludge	3%	of total				
consistency		sludge				
		volume				
Thickened sludge volume	22.27	m ³ /day			area in	47.61
					m ²	
	Pump for Sludg	ge transfer to	Centrifuge			
Type of pump set	Screw					
Number of numps	1 00	W	1	SD		
Volume of thickened sludge	22.27	m^3/day	1	50		
to be pumped	22.21	iii /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 Centrit	fuge and Dos	ing Tanks			
Number of centrifuges	1	SB	1			
Capacity of centrifuge	0.25	m ³ /hour				
Poly electrolyte dozing for	10%					
centrifuge & thickener						
Sludge volume	742.34	kg/day				
Dose	2	kg/1000				
	1.40	kg				
Quantity of Poly Electrolyte	1.48	kg/day				
Volume of tenks @ 24 hour	0.1	m ³				
volume of tanks @ 24 nour	1.40	111				
\$7.1	1484.67	litres				
Volume	61.86	litres/hour	2			
volume required for 8 hours	0.49	m	3			
Liquid depth of tank	1	m 2	<u> </u>	0.6		
Area required	0.49	m²	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:

Type of structure	Location	GPS Coordinates	Extent of land	Remarks
LS-2	Avikkulam Jn. Near Valiya Jaram Ponnani – Ward 35	10.77952529, 75.92065502	2 cents	
LS-6	Anappadi Jn. Near Highway Petroleum (IOCL) Pump – Ward 44	10.76092380, 75.92768594	2 cents	
	DRAIN INTER	CEPTORS		
OF-1	Marakkadavu, Ward 50	10.77538405, 75.91824301	1 cent	
OF-2	Khilar Palli, Ward 45	10.75711770, 75.92514773	1 cent	
OF-3	Puthanpalli, Ward 38	10.77349526, 75.92655573	1 cent	
OF-4	Near No.1 Bridge, Ward 35	10.78084880, 75.92323704	1 cent	
	Type of structure LS-2 LS-6 OF-1 OF-2 OF-3 OF-4	Type of structureLocationLIFTING ST.LS-2AvikkulamJn.NearValiyaJaramPonnani-Ward 35MappadiJn.NearLS-6AnappadiJn.NearHighwayPetroleum (IOCL)Pump – Ward 44DRAIN INTEROF-1Marakkadavu, Ward 50OF-2Khilar Palli, Ward 45OF-3Puthanpalli, Ward 38OF-4NearNo.1S5Near	Type of structureLocationGPS CoordinatesLIFTING ST-TIONSLS-2Avikkulam Jn. Near Valiya Jaram Ponnani – Ward 3510.77952529, 75.92065502LS-2Anappadi Jn. Near Highway Petroleum (IOCL) Pump – Ward 4410.76092380, 75.92768594COF-1Marakkadavu, Ward 5010.77538405, 75.91824301OF-2Khilar Palli, Ward 4510.77538405, 75.92514773OF-3Puthanpalli, Ward 3810.77349526, 75.9255573OF-4Near No.1 Bridge, Ward10.78084880, 75.92323704	Type of structureLocationGPS CoordinatesExtent of landLIFTING STATIONSLS-2Avikkulam Jn. Near Valiya Jaram Ponnani – Ward 3510.77952529, 75.920655022 centsLS-6Anappadi Jn. Near Highway Petroleum (IOCL) Pump – Ward 4410.76092380, 75.927685942 centsDRAIN INTERCEPTORSOF-1Marakkadavu, Ward 5010.77538405, 75.918243011 centOF-2Khilar Palli, Ward 4510.75711770, 75.925147731 centOF-3Puthanpalli, Ward 3810.77349526, 75.926555731 centOF-4Near No.1 Bridge, Ward

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

SIZI	SIZING OF STP UNITS						
SI.	COMPONENT	SIZING (m)		Nos.	METHOD OF		
No.						CONSTRUCTION	
	CIVIL CONSTRUCTION	ON UNITS	5				
		L	B	Н			
1	Receiving Chamber-	0.75	0.5	1.3	2	RCC	
	CTU						
2	Receiving Chamber-	5	5	3	1	RCC	
	STP						
3	Dilution Tank	4.7	4.7	3.0	2		
4	Oil and Grease Trap-	1	3.5	3.5	1	RCC	
	STP						
5	Manual Coarse Screen	2.5	1	1.5	2	RCC	
	Channel-STP						
6	Manual Fine Screen	2.50	1	1.5	2	RCC	
	Channel-STP						
7	Grit Separator	3.15	3.15	3.55	1	RCC	
			05				

Table 19 Dimensions and material of construction of sewage treatment system

8	Equalisation Tank	14.75	14.75	4.95	1	RCC	
9	Moving Bed Biofilm	10.90	10.90	5	1	RCC	
	Reactor-1						
10	Moving Bed Biofilm	12.15	12.15	5	1	RCC	
	Reactor-2						
11	Moving Bed Biofilm	7.75	7.75	5.25	1	RCC	
	Reactor-3						
12	Moving Bed Biofilm	4.8	4.8	5	1	RCC	
	Reactor-4						
13	Clarifier with Plate	6.5	6.5	2.8	1	RCC	
	Settler						
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	
SIZ	ING OF STP UNITS						
SI.	COMPONENT	Details			Nos.	METHOD OF	
No.						CONSTRUCTION	
	ELECTRO-MECHANI	CAL UNI	TS				

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 de	esign	PVC
5	MBBR carrier			As per de	esign	PVC/HDPE
6	Air Blowers	7558.03	m ³ /hour			Centrifugal
7	Plate Settlers			As per de	esign	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

	ABSTRACT OF COST					
SI. 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				

Table 20 Abstract of Cost

	Administrative/laboratory/chemical house /control room building/Security cabin/air blower room and control panel	
13	room/chlorination building/compound wall/internal roads/storm	₹ 2,16,78,220
	water drains/transformer building/dg room/centrifuge	
	building/sludge shed	
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
10	Control Room, Generator Room and Compound wall with gate	₹ 40.00.000
17	for Network	X 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 Executive Engineer PPD Regional Office PPD Regional Office Kerala Water Authority Kochi - 682011

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Superintending Engineer PPD Regional Office Kerala Water Authority Kochi - 682011



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.

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

Table 21 Control of odour by chemical addition

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.

	OPERATION & MAINTENANCE COSTS					
SI.	Item	Rate	Nos.	Unit	Expenditure	
No.						
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	

6.16 COST ANALYSIS

			_			
8	Fuel for				1.00.000	
	generator/month				1,00,000	
9	Fuel for	1000			20.000	
	vehicle/month@50	1000			30,000	
10	km/day				15 000	
10	Gas Chiorine/month				15,000	
11	Alum and Lime				15,000	
12	Chamicals for adour					
14	management/month				15,000	
13	Chemicals for lab					
10	tests/month				10,000	
14	Spares and					
	replacements/month				5,000	
15	Network routine	1.50/ 6 /				
	inspection, flushing,	1.5% of cost			2 01 00 4	
	cleaning including for	0I motruorly/yeen			3,81,094	
	manholes/month@	network/year				
	Total per month				25,71,943	
	Total per month					
	excluding power				7,96,094	
	charges					
	Annual Operation &				3,08,63,319	
	Maintenance Charge				, , ,	
	Annual Operation &					
	excluding power				95,53,127	
	charges					
	Treatment Cost per					
	Day				84,557	
	Unit Cost of					
	Treatment per Kilo				24	
	Litre					
	10 YEAR ANNUAL C	D&M COST C	ONSIE	DERING 8%	ANNUAL	
		CREASE EVE	RY YI	EAR	``	
	Including power c	charges (5% an	inual II	ncrease every	year)	
						Power Charges
1	1 st year				₹ 95,53,127	₹ 2,13,10,193
2	2 nd year				₹ 1,03,17,377	₹ 2,23,75,702
3	3 rd year				₹ 1,11,42,767	₹ 2,34,94,488
4	4 th year				₹ 1,20,34,188	₹ 2,46,69,212
5	5 th year				₹ 1,29,96,923	₹ 2,59,02,673
6	6 th year				₹ 1,40,36,677	₹ 2,71,97,806
7	7 th year				₹ 1,51,59,611	₹ 2,85,57,696
8	8 th year				₹ 1,63,72,380	₹ 2,99,85,581
9	9 th year				₹ 1,76,82,171	₹ 3,14,84,860
10	10 th 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
	0 -					



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. 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.

Priority	Plan
Ι	Preparation of a detailed engineering report

Table 22 Action plan for implementation

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

SI. 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											

Table 23 Implementation schedule

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:

Using solar energy sources and IoT For better performance of the For effective control From the feedback of of operation and based sensors for Re-use of the performance at initial system, testing of influent and effluent samples at regular intervals are to be operation of the plant, operational cost and recycled water for periods, process/unit gardening and toilet operations can be time for inspection of flushing is suggested. modified for quality at various optimum results be formed stages can be reduced

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.

REFERENCES

- 1. Wastewater Engineering, Treatment and Reuse, Metcalf & eddy, Inc.
- 2. The moving bed biofilm reactor, H. Odegaard, Faculty of Civil and Environmental Engineering, Norwegian University of Science and Technology, Trondheim, Norway
- Biological Wastewater Treatment Process Design Calculations Harlan, H. Bengtson, PE, PhD, Emeritus Professor of Civil Engineering Southern Illinois University Edwardsville
- 4. Moving Bed Biofilm Reactor Technology: Process Applications, Design, and Performance James P. McQuarrie, Joshua P. Boltz
- Design of MBBR Based Sewage Treatment Plant for an Educational Campus Ruksana T P, Priyanka T, Haneesh K R
- Manual on Sewerage and Sewage Treatment Systems, Ministry of Urban Development, New Delhi, CPHEEO Part A, Part B and Part C
- Indian Standard Code of Practice for Installation of Septic Tanks, Part I Design Criteria and Construction, IS 2470 (Part-1)-1985
- Indian Standard Code of Practice for Installation of Septic Tanks, Part 2 Secondary Treatment and Disposal of Septic Tank Effluent, IS 2470 (Part-2)-1985
- 9. Indian Standard Plain and Reinforced Concrete Code of Practice, IS 456:2000
- Indian Standard Concrete Structures for Storage of Liquids Code of Practice Part 1 General Requirements, IS 3370 (Part-1 to 4)
- 11. Indian Standard Code of Practice for High Density Polyethylene pipes for sewerage, with all amendments, IS 14333 -1996

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 FORM	IATION	1500000.07
35	PROVISION FOR PROVIDING AUTOMAT THE ENTIRE PLANT BY SCADA	2500000.11	
36	STAIR & WALK WAY	3758804.48	
	Т	otal 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
	<u>El</u> SA	Rounded Total(Rs)	110805282.3 8
	Rupees Eleven Crore Eight Lakh Five Thousa	and Two Hundred and	Eighty Two



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 INVESTIGA	ATION								
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 INVESTIGA	ATION								
		1	400.000				400.000			
	Total		-	2897-		-	400.000			
			16th	Te	otal Quantit	y in sqm	400.000			
1.002	56.1.a	_		New York	DR.					
	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 INVESTIGA	ATION	OF PUBL	KWORKS	MANAGENACI	(U)				
		1					1.000			
	Total						1.000			
				r	Fotal Quant	ity in set	1.000			
1.003	56.2.a									
	Setting up boring a equipment and ma bore hole location	at each bo terials of - For mac	re hole locat boring and fi hine boring.	ions includin eld tests and	g carrying al collection of	ll necessar f samples	ry plant, at each			
	SOIL INVESTIGA	ATION								
		4					4.000			
	Total						4.000			
				Total Qu	antity in Bo	re Holes	4.000			
1.004	56.3.a.1									
	Boring with rotary value less than 50 including conducti intervals - For ord	power dr excluding ng necess inary soil.	illing equipn hard rock, s ary S.P.T an	nent's i oft rock or m d recovery o	n - all types nedium rock f undisturbec	of soil hay for strata l soil sam	ving N upto 10m ples at 5m			
	SOIL INVESTIGA	ATION								
		1	40.000				40.000			
	Total						40.000			

EST No. :WRD/KWA-CESEWA/EST/4856/2023_27_1_1 (Edit Id : 1) (Dsor year : 2018,Cost Index (Place : Malappuram,Value : 136.44),GST : 18%

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
				Tot	al 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				
				Tot	al 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 INVESTIGA	ATION 1	40.000			E I	40,000				
	T-4-1	1	40.000	NG G2 Brow	0.5		40.000				
	1 otai		0		10		40.000				
1 007	560.11			101	al Quantity	in metre	40.000				
	Boring with rotary value less than 50 depth including co at 5m intervals - F	power dr excluding nducting or ordina	rilling equipr g hard rock, s necessary S. ry soil.	nent's i oft rock or n P.T and reco	n - all types nedium rock very of undis	of soil hay for strata sturbed so	ving N above 30m il samples				
	SOIL INVESTIGA	ATION	1		1						
		1	40.000				40.000				
	Total						40.000				
				Tot	al Quantity	in metre	40.000				
1.008	56.5.a										
	Boring through all using tungsten car	classes o bide drilli	f rock excluc ng bit - In la	ling hard roc nd	ks having N	value gre	ater than 50				
	SOIL INVESTIG	ATION									
		1	4.000				4.000				
	Total						4.000				
				Tot	al Quantity	in metre	4.000				
1.009	56.6										
	Recovering undist length internal dia depth including clo	urbed soi 500mm 1 earing the	l samples usi ength confor bore hole et	ng thin tube ming to relev c complete.	sampler of 7. vant IS Code	5mm.to 1 at any rec	00mm quired				
	<u>ISOIL INVESTIGA</u>	ATION									

EST No. :WRD/KWA-CESEWA/EST/4856/2023_27_1_1 (Edit Id : 1)	
(Dsor year : 2018,Cost Index (Place : Malappuram,Value : 136.44),GST : 18	%

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		1	54.000				54.000
	Total		·	·			54.000
				To	tal Quantit	y in each	54.000
1.010	56.7						
	Conducting standa	rd penetra	ation test in b	ore hole at a	ny depth.		
	SOIL INVESTIGA	ATION					
		1	106.000				106.000
	Total						106.000
				To	tal Quantit	y in each	106.000
1.011	56.8						
	Recovering disturt including waxing l	bed sampl labelling p	es and preser backing storin	ving the sam	ne in air tight cost of conta	t sample c ainers as p	ontainers per IS Code.
		1	106.000	28.97-			106.000
	Total		一個的	QAN		E	106.000
				To	tal Quantity	y in each	106.000
1.012	56.11.a						
	Compilation of all conducting necess	field data ary lab tes	with recomm st (report in tr	nendation fo riplicate) - M	or a suitable f Iachine borir	foundation	n after ore holes.
	SOIL INVESTIGA	ATION 1	1 000				1 000
	Total	1	1.000				1.000
					Fatal Quant	ity in got	1.000
	SITE DDEDED AT	ION			l otal Qualit	ity in set	1.000
2 001	2 22	IUN					
2.001	Clearing grass and	removal	of the rubbish	h up to a dist	ance of 50 n	n outside i	the
	periphery of the ar	ea clearec	l.				
	Clearing grass and	d removal	of rubbish				
	120 Cent	1	4855.200				4855.200
	Total						4855.200
				Te	otal Quantit	y in sqm	4855.200
2.002	2.33.3						
	Felling trees of the cutting of trunks as material and dispo including 240 cm s	e girth (me nd branch sal of uns girth	easured at a h es, removing erviceable ma	eight of 1 m the roots ar aterial.Beyor	above groun nd stacking of nd 120 cm g	nd level) i of servicea irth up to	ncluding ible and
	Felling trees	· · · · · ·				1	
	Tree Cutting	5					5.000

EST No. :WRD/KWA-CESEWA/EST/4856/2023_27_1_1 (Edit Id : 1) (Dsor year : 2018,Cost Index (Place : Malappuram,Value : 136.44),GST : 18%

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Total						5.000			
				To	tal Quantity	y in each	5.000			
2.003	50.2.26.1									
	Filling with contra exceeding 20 cm in watering, lead up t charge.	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 contra	actor own	earth							
		1	4855.200		1.000		4855.200			
	Total						4855.200			
				То	otal Quantit	y in cum	4855.200			
3	COLLECTION W	ELL 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 oper	n well exc	avation	NGB510-00	nk					
	cw at STP dia 4m	1	3.140	3.2*3.2	1.500		48.230			
	Total			< 11			48.230			
			CPLATE	To To	otal Quantit	y in cum	48.230			
3.002	100.3.6.2		or motor	AL YALANCA						
	Earthwork in open and up to 6.0m in o lead of 50m and lit	well exca ordinary r ft from 1.	avation (abov rock and conv 50m to 3.0m	ve water) for veying and do including ne	wells of dian epositing the at banking.	neter abor spoil wit	ve 3.5m hin initial			
	Eathwork in open	well exca	vation							
	cw at STP dia 4m	1	3.140	3.2*3.2	1.500		48.230			
	Total						48.230			
				То	otal Quantit	y 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 exc	avation							
	cw at STP dia 4m	1	3.140	3.2*3.2	1.500		48.230			
	Total						48.230			
				То	otal Quantit	y in cum	48.230			
3.004	100.3.6.14									
	Earthwork in open 3.5m and up to 6.0 initial lead of 50m	well exc m in ordi and lift f	avation (in or nary rock an rom 4.5m to	r under water d conveying 6.0m includi	 for wells o and depositing ng neat bank 	f diameter ng the spo ing.	r above il within			

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			
				Τα	otal Quantity	y 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 exc	avation							
	cw at STP dia 4m	1	3.140	3.2*3.2	1.500		48.230			
	Total						48.230			
				To	otal Quantity	y in cum	48.230			
	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.									
	cw at STP dia 4m	1	3.140	3.2*3.2	1.100		35.369			
	Total			< 1		10	35.369			
			C PLATED	Το	otal Quantity	y in cum	35.369			
3.007	100.6.1			for the state of the large						
	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									
	Providing steel sh	eet shorir	g to the sides	s of the trenc	hes					
	4m Dia well-8m depth	4	3.140	6.400	6.000		482.304			
	Total						482.304			
				To	otal Quantit	y in sqm	482.304			
3.008	100.6.S.1									
	Structural steel wo including cutting, steel primer all con	ork in sing hoisting, f nplete. (e work in s	le section, fix fixing in posi xcluding cost ingle section	xed with or v tion and app t of materials	vithout conno lying a primi	ecting pla ing coat o	te, f approved			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	4m Dia well-8m depth	4	3.140	6.400	6.000	0.3000 00	144.691			
	Total						144.691			
	Total Quantity in kilogram									
3.009	100.7.1									
	Bailing out water with 5HP engine and pump set including conveyance to the sit erecting, dismantling and taking back of engine and pump, cost of fuel lubricating 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			
				To	tal 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				1					
	CW at STP Dia 4m	1	5.000	4.000	30*0.746		447.600			
	Total		e PLATED	AN POR THE	MANAGEMEN	IT.	447.600			
			1000 AMARA 6	Tot	tal Quantity	' in Kwh	447.600			
3.011	4.1.6									
	Providing and layi of centering and sh sand : 6 graded sto	ng in posi nuttering - one aggreg	tion cement All work up gate 40 mm n	concrete of s to plinth lev ominal size)	pecified grad el:1:3:6 (1 c	le excludi cement : 3	ng the cost coarse			
	PCC 1:3:6									
	CW at STP Dia 4m	3.14	3.200	3.200	0.150		4.823			
	Total						4.823			
				To	tal Quantity	y in cum	4.823			
3.012	5.37.1									
	Providing and layi cement concrete w manufactured in fu transit mixer for al design of specified R.M.C. from trans finishing and reinf as per IS: 9103 to impairing strength Cement content co per design mix is p	ng in posi york, using ally autom l leads, ha l grade for it mixer to orcement accelerate and dural onsidered bayable/re	tion ready m g cement con natic batching aving continue r reinforced co o site of layin including co / retard settir bility as per co in this item is coverable set	ixed M-25 gr tent as per ap g plant and tra ious agitated cement concr ag, excluding st of admixtu- ng of concrete lirection of the s @330 kg/c parately.All	rade concrete proved designs ansported to mixer, many ete work inc the cost of c ures in recom- e, improve v the Engineer um. Excess / wiork upto p	e for reinf gn mix, site of wo afactured luding pu centering, mended p workabilit - in -charg /less ceme linth leve	orced ork in as per mix mping of shuttering proportions cy without ge. Note:- ent used as l			
Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
-------	---	---	--	--	---	--------------------------------------	-----------------------------------	--		
	Providing and l cement concrete w	aying in p ork	osition ready	y mixed M-2	5 grade conc	crete for re	einforced			
	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			
				Тс	otal Quantit	y in cum	70.343			
3.013	5.22.1									
	Steel reinforcement in position and bin steel bars	nt for R.C. Iding all c	C work inclu omplete upto	ding straigh plinth level	tening, cuttin Mild steel an	ng, bendir Id Mediur	ig, placing n Tensile			
	Steel reinforcer	nent for R	R.C.C work							
	Qty taken from item no-12 @ 120 Kg/m3	70.343	I.			120.00 0000	8441.160			
	Total									
	Total Quantity in kg									
3.014	t 5.34.1									
	Extra for providing specified cement c grade concrete ins in M-30 is @ 340	g richer m content use tead of Ma kg/cum).	ixes at all flo ed is payable -25 grade BM	oor levels. No / recoverable //C/RMC. (N	ote:- Excess/ e separately.I lote:- Cemen	less ceme Providing at content	nt over the M-30 considered			
	Extra for provid the specified ceme	ing richer	mixes at all	floor levels.	Note:- Exce	ss/less cer	nent over			
	Qty taken from item no-12	1	70.343				70.343			
	Total						70.343			
				Te	otal Quantit	y in cum	70.343			
3.015	4.12									
	Extra for providing doses by weight of	g and mix f cement a	ing water pro	ofing mater	ial in cement	concrete	work in			
	Extra for providi	ing and m	ixing water p	proofing mate	erial in ceme	nt concret	e work			
	Qty taken from item no-12 1 70.343 330.000									
	Total									
	Total Quantity in kg									
3.016	5.9.2									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Centering and shut thickness) including	ttering ind	cluding strutt d pilasters, b	ing, etc. and utteresses, pl	removal of f	orm for:W	Valls (any s etc.			
	Centering and shu	uttering ir	ncluding stru	tting						
	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			
				Te	otal Quantit	y in sqm	232.187			
3.017	5.9.20									
	Centering and shut floors, roofs, landi thick	ttering inc ngs, balco	cluding strutt	ing, etc. and ess platform	removal of f with water p	orm for:S proof ply 1	uspended 12 mm			
	Centering and shu	uttering in	ncluding strut	tting						
	For Cover Slab 1 3.140 2.45*2.45 18.848 Bottom 1 3.140 2.45*2.45 18.848									
	Cover Slab Side	-1	3.140	4.900	0.300		4.616			
	Total									
			e PLATES		otal Quantit	y in sqm	23.464			
3.018	22.23.1	_	OF POSO	C WISHING						
	Providing and app waterproofing trea water tanks, roof s / subway and bridg integral crystalline integral crystalline same from negativ shall meet the requ permeability of cor DIN 1048 and resi slurry shall be caps shall be carried ou engineerin- charge. The produce leakage.For vertica	lying inte tment to t labs, podi ge deck et slurry : 2 slurry : 1 re (interna irements ncrete by stant to 1 able of se t all comp ct perform al surface	gral crystalling the RCC structures, reserved c., prepared le parts water) part water) part water) part water) biside with t as specified more than 90 6 bar hydrost lf-healing of plete as per spenance shall ca two coats @	ne slurry of h ctures like re or, sewage & oy mixing in for vertical a for horizonta he help of sy in ACI-212-3 0% compared atic pressure cracks up to becification a arry guarante 0.70 kg per s	hydrophilic in taining walls water treatm the ratio of 5 surfaces and l surfaces and l surfaces and l surfaces and l surfaces and 3R-2010 i.e b l with contro on negative a width of 0, and the direct ee for 10 years agm	n nature for s of the bannent plant 5 : 2 (5 pa 3 : 1 (3 pa d applyin brush. The by reducin l concrete side. The .50mm. T tion of the rs against	or issement, issement, issement, iss issement, issements issement issement,			
	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									
				Te	otal Quantit	y in sqm	100.480			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
3.019	22.23.2									
	Providing and app waterproofing trea water tanks, roof s / subway and bridg integral crystalline integral crystalline same from negativ shall meet the requ permeability of co DIN 1048 and resi slurry shall be cap shall be carried ou engineerin- charge. The produ leakage.For horizo	lying inte tment to t labs, podi ge deck et slurry : 2 slurry : 1 e (interna irements ncrete by stant to 1 able of se t all comp ct perform ontal surfa	gral crystalling the RCC structures, reserving c., prepared b 2 parts water) 1 part water) 1 side with t as specified more than 90 6 bar hydrost lf-healing of plete as per spenance shall can be cone coat (ne slurry of h ctures like re or, sewage & oy mixing in for vertical for horizonta he help of sy in ACI-212 0% compared atic pressure cracks up to becification a arry guarante @ 1.10 kg per	hydrophilic in taining walls water treatreatreatreatreatreatreatreatreatrea	n nature for s of the bannent plant 5 : 2 (5 pa 3 : 1 (3 p d applyin brush. The by reducir of concrete side. The .50mm. The tion of the rs against	or isement, isement, its arts g the ne material ng e as per crystalline he work any			
	Providing and app waterproofing trea	lying inte tment	gral crystalli	ne slurry of l	ydrophilic ii	n nature f	or			
	CW at STP Dia 4m Horizontal Surface	1	3.140	2*2	DRA	FI	12.560			
	Total			3-11			12.560			
	Total Quantity in sqm									
3.020	13.7.1									
	12 mm cement pla cement : 3 fine sar 12 mm cement pl	ster finish d) aster finis	hed with a flo	bating coat of	f neat cement	t of mix:1	:3 (1			
	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									
	ļ			Т	otal Quantit	y in sqm	259.592			
3.021	13.65.1									
	Painting with black manufacture to give	k anti- con ve an ever	rrosive bitum shade:Two	astic paint of or more coat	f approved b s on new wo	rand and rk				

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
	Painting with bla	ack anti- c	corrosive bitu	mastic 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							
	Total Quantity in sqm							
3.022	100.36.1							
	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							
	4m	1	3.140	2*2	8.000		100.480	
	Total						100.480	
				Total (Quantity in l	Kilo litre	100.480	
3.023	100.41.34							
	Supplying and fix (low duty) charges	ing Rectar	ngular C.I. m g all cost, lab	anhole cover	etc., complet	10mm wit te.	th frame	
	Supplying and fix	ing Rectar	ngular C.I. m	anhole cover	<u></u>			
	CI Manhole cover	1					1.000	
	Total						1.000	
					Total Quant	tity 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 e	excavated	earth					
	CW at STP Dia	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			
				Τα	otal Quantit	y in cum	425.784			
3.025	19.16									
	Providing orange of as per IS: 10910 of cross section as 23 165 mm with mini top surface by ribb projections on tail stand the bend test manufactures pern fixing in manholes sand: 6 graded stor	colour saf n 12 mm of mm x 25 mum 112 bing or cho length on and chen nanent ide s with 30x ne aggreg	ety foot rest of dia steeel bar mm and ove mm space b equering besi 138 mm as p nical resistant entification m 20x15 cm ce ate 20 mm no	of minimum conforming er all minimu etween protr des necessar per standard ce test as per park to be vis ment concre ominal size)	6 mm thick p to IS:1786, 1 m length 265 uded legs ha y and adequa drawing and specificatio ible even aft te block 1:3: <u>Complete as</u>	plastic end having mi 3 mm and ving 2 mr ate anchor suitable t ns and hav er fixing i 6 (1ceme per desig	capsulated nimum width as n tread on ring o with ving including nt: 3 coarse n			
	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	- bh-t			121	25.000			
	Total			ALCONDOWN !!	mR.		25.000			
	Total Quantity in each 25.000									
4	DILUTION TANK AND RECIEVING CHAMBER - CTU									
4.001										
	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ling 30 cm of excava d and neat	mechanical in depth, 1.3 ated earth, lea ly dressed.A	means (Hydr 5 m in width ad up to 50 m Il kinds of so	raulic excava as well as 10 and lift up il	ator)/manu) sqm on j to 1.5 m, o	ual means plan) disposed			
	Earth work in exc	avation b	y 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			
				Τα	otal Quantit	y 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			
				Тс	otal Quantit	y in cum	10.356			
4.003	5.37.1									
	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 levelProviding and laying in position ready mixed M-25 grade concretePile cap P161.1001.00073.8500.4500.7509.096									
	Grade Beam	7	3.850	0.450	0.750		9.096			
	Dilution Tank base slab	1	11.050	6.100	0.350	ET	23.592			
	Total									
	Total Quantity in cum 39.948									
	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									
	Providing and la	ying in po	osition ready	mixed M-25	grade concr	ete				
	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									
				Тс	otal Quantit	y in cum	40.150			
4.005	5.34.1									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	Extra for providin specified cement c grade concrete ins in M-30 is @ 340	g richer m content us tead of M kg/cum).	ixes at all flo ed is payable -25 grade BM	oor levels. No / recoverable /IC/RMC. (N	ote:- Excess/ e separately.l lote:- Cemer	less ceme Providing at content	nt over the M-30 considered				
	Extra for providi	ng 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								
		y in cum	80.098								
4.006	4.12										
	Extra for providin doses by weight of	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 providi doses	ng and mi	xing water p	roofing mate	rial in ceme	nt concret	e work in				
	Quantity as per item No.3	1	39.948	330.000	DRI	FI	13182.84 0				
	Quantity as per item No.4	1	40.150	<mark>33</mark> 0.000	PF		13249.50 0				
	Total		e PLATEC	RM FOR THE	KANASEAND	47	26432.34 0				
				r.	Fotal Quant	tity in kg	26432.34 0				
4.007	OD244668/2022-2	2023									
	Extra for providin	g sulphate	e resistant cer	nent for the s	structures ab	ove plinth	level.				
	Extra for provid	ing sulpha	te resistant c	ement							
	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				
				Та	otal Quantit	y 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 Q	Quantity in l	kilogram	9611.760				
4.009	OD246798/2022-2	2023									
	Extra for providing	g epoxy c	oating for rei	nforcement l	oars.						
	Extra for providi	ng epoxy	coating for r	einforcemen	t 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 Quant	tity in kg	9611.760				
4.010	5.9.1										
	Centering and shur footings, bases of	Centering and shuttering including strutting, etc. and removal of form for:Foundations, cootings, bases of columns, etc for mass concrete									
	Centering and shu	entering and shuttering									
	Pile cap P1	24	1.100	Stores -	1.000	FI	26.400				
	Grade Beam	14	3.850	-	0.750		40.425				
	Dilution Tank base slab	2	6.100+11 .05	~ 11	0.350		12.005				
			at rates	Te	otal Quantit	y in sqm	78.830				
4.011	5.9.2										
	Centering and shut thickness) includir	ttering ind	cluding strutti d pilasters, b	ing, etc. and utteresses, pl	removal of f	form for:W	Valls (any s etc.				
	Centering and sh	uttering									
	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										
	Total Quantity in sqm 216.75										
4.012	5.9.3										
	Centering and shu floors, roofs, landi	ttering ind ngs, balco	cluding struttionies and acc	ing, etc. and ess platform	removal of f	orm for:S	uspended				
	Centering and shu	ittering									

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	
				Тс	otal Quantit	y in sqm	52.225	
4.013	13.7.1							
	12 mm cement pla cement : 3 fine sar	ster finish nd)	ed with a flo	ating coat of	neat cement	t of mix:1	:3 (1	
	12 mm cement pla	aster finis	hed					
	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	000	3.000		92.100	
	Partition Wall	2	4.700	22	3.000		28.200	
	Reciving chamber inside wall	2	1.750		1.150	FI	4.025	
	Reciving chamber out side wall	2	2.750		1.150	11 17	6.325	
	Top of wall	2	34.400	CWORKS	0.250		17.200	
	Total						260.580	
				Тс	otal Quantit	y in sqm	260.580	
4.014	13.52.2							
	Finishing with Epo per manufacturer& of surface, etc. cor	oxy paint z#39;s spe nplete.On	(two or more ecifications ir concrete wo	coats) at all cluding appr rk	locations propriate prim	epared and ning coat,	d applied as preparation	
	Finishing with Ep	oxy pain	t					
	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							
				Тс	otal Quantit	y in sqm	115.625	
4.015	22.23.1							

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Providing and app waterproofing trea water tanks, roof s tunnels / subway and bridg integral crystalline integral crystalline same from negativ shall meet the requ permeability of co DIN 1048 and resi slurry shall be cap shall be carried ou	lying inte timent to t labs, podi ge deck et slurry : 2 slurry : 1 re (interna uirements ncrete by stant to 1 able of se t all comp	gral crystalli the RCC stru tums, reservi 2 parts water) 1 part water) 1) side with t as specified more than 90 6 bar hydrost 1f-healing of plete as per sp	ne slurry of h ctures like re or, sewage & by mixing in for vertical for horizonta he help of sy in ACI-212- 0% compared catic pressure cracks up to pecification a	hydrophilic in etaining walls camp; water the ratio of surfaces and al surfaces and al surfaces and anthetic fiber 3R-2010 i.e I d with control on negative a width of 0 and the direct	n nature for s of the ba treatment 5 : 2 (5 pa 3 : 1 (3 p d applyin brush. The by reducin ol concrete side. The .50mm. T tion of the	or asement, plant, rts arts g the ne material ng e as per crystalline he work			
	engineerin- charge. The produ leakage.For vertica	ct perforn al surface	nance shall c two coats @	arry guarante 0.70 kg per s	ee for 10 yea sqm	rs against	any			
	Providing and app waterproofing trea	lying inte tment to t	gral crystalli he RCC	ne slurry of h	nydrophilic i	n nature f	or			
	Inside of walls	8	4.700	620	3.000		112.800			
	Reciving chamber inside wall	2	1.750		1.350	-	4.725			
	Total	1		< 1			117.525			
		_	C PLATE	T	otal Quantit	y in sqm	117.525			
	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 & amp; 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									
	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				
				Т	otal Quantit	y in sqm	44.930				
4.017	100.36.1										
	Filling water with of 5 km (average) height not less that and other applienc	5000 litre to the res n 3 m usin es and co	e tankers fited ervoir site an 1g 5 HP diese st of water et	l in lorry and d pumping tl el engine pur c. complete.	l conveying v he water into np set , hire f	water from the reserv for tanker	n a distance voir of lorry, tools				
	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										
	Providing orange	colour sa	fety foot rest	of minimum	6 mm thick	plastic en	capsulated				
	as per IS: 10910 of	n 12 mm	dia steeel bai	conforming	to IS:1786		1 < 0.00				
	T-4-1	2	8.000				16.000				
				Та	4al Owardit	. in an ab	16.000				
				10		in each	10.000				
5	RECEIVING CHE	EMBER									
5.001	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ing 30 cn of excava 1 and neat	mechanical n in depth, 1. ated earth, lea ly dressed.A	means (Hyd 5 m in width ad up to 50 n 11 kinds of sc	raulic excava as well as 10 n and lift up bil	ator)/man) sqm on to 1.5 m,	ual means plan) disposed				
	Earth work in ex means	xcavation	by mechanic	al means (H	ydraulic exca	avator)/m	anual				
	Pile Cap Pl	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			
		y in cum	18.298							
5.002	4.1.5									
	Providing and layi of centering and sl sand : 6 graded sto	ng in posi nuttering - one aggreg	ition cement of All work up gate 20 mm n	concrete of s to plinth lev ominal size)	pecified grac el:1:3:6 (1 c	le excludi ement : 3	ing the cost coarse			
	Providing and la	aying in p	osition ceme	nt 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								
		y 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 levelProviding and laying in position ready mixed M-25 grade concretePile Cap P141.1001.1000.4500.7505.670									
	Base Slab	1	6.200	6.200	0.450		17.298			
	Total		I	I			32.578			
				To	tal Quantity	y in cum	32.578			
5.004	5.37.2					· · ·				
	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									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Providing and	laying in	position read	y mixed M-2	25 grade con	crete				
	Wall	1	21.200	0.300	3.000		19.080			
	Total						19.080			
				To	tal Quantit	y in cum	19.080			
5.005	5.34.1									
	Extra for providin, specified cement of grade concrete ins in M-30 is @ 340	g richer m content use tead of M kg/cum).	iixes at all flo ed is payable -25 grade BM	or levels. No / recoverable IC/RMC. (N	ote:- Excess/ separately.H ote:- Cemen	less ceme Providing t content	nt over the M-30 considered			
	Extra for providin	g richer m	nixes	I		T				
	Quantity as per item No.3	1	32.578				32.578			
	Quantity as per item No.4	1	19.080				19.080			
	Total									
	Total Quantity in cum									
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	Nurthat Street	S.	10750.74 0			
	Quantity as per item No.4	1	19.080	330.000			6296.400			
	Total						17047.14 0			
				ŗ	Fotal Quant	ity in kg	17047.14 0			
5.007	5.22.6									
	Steel reinforcement in position and bin bars of grade Fe-5	nt for R.C nding all c 00D or m	.C work inclu omplete upto ore	ding straight plinth level	tening, cuttir Thermo - Me	ng, bendin echanicall	g, placing y Treated			
	Steel reinforceme	ent for R.C	C.C							
	From item no 3 @120 kg/m3	1			32.578	120.00 0000	3909.360			
	From item no 4 @120 kg/m3	1			19.080	120.00 0000	2289.600			
	Total						6198.960			
	Total Quantity in kilogram									
5.008	OD235090/2022-2	2023								
	Extra for providing	g sulphate	e resistant cen	nent for the s	structures ab	ove plinth	level.			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	Extra for providir	ig sulphat	e resistant ce	ment					
	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		
				Te	otal Quantit	y in cum	51.658		
5.009	5.9.1								
	Centering and shu footings, bases of	ttering inc columns,	cluding strutt etc for mass	ing, etc. and concrete	removal of f	form for:F	oundations,		
	Centering and shu	ittering							
	Pile Cap P1	16	1.100		1.000	1.000			
	Grade Beam	2	16.800		0.750		25.200		
	Total			242			42.800		
			65	Te	otal Quantit	y 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 shu	ittering		\leq					
	Inside of walls	4	5.000	DRM FOR THE	3.000	rr.	60.000		
	outside of walls	4	5.600	A TAPATAN	3.000		67.200		
	Total						127.200		
				Т	otal Quantit	y in sqm	127.200		
5.011	5.9.3								
	Centering and shu floors, roofs, landi	ttering inc ngs, balco	cluding strutt	ing, etc. and ess platform	removal of f	form for:S	uspended		
	Centering and shu	uttering							
	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		
				Т	otal Quantit	y 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 shu	ttering							
	Base Salb beam side	2	21.200	0.500			21.200		

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Total						21.200			
				Та	otal Quantity	y in sqm	21.200			
5.013	13.7.1									
	12 mm cement pla cement : 3 fine sam	ster finish 1d)	ned with a flo	ating coat of	neat cement	of mix:1	:3 (1			
	12 mm ceme	ent plaster	r finished wit	h a floating o	coat of neat c	ement 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									
	Total Quantity in sqm 166.									
5.014	13.52.2		100	Contraction of	nRP	AF B	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 Ep	ooxy pain	t (two or mor	e coats)	MANAGENMEN	iπ.				
	Base Slab beam side	4	5.750	n.4.02011-25	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			
				Τα	otal Quantity	y in sqm	85.060			
5.015	22.23.1									
	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	No	Length	Width	Depth	Cf	Quantity			
	Providing and app waterproofing trea	lying inte tment to t	gral crystallin he RCC	ne slurry of h	ydrophilic ii	n nature f	or			
	Inside of wall	4	5.000		3.000		60.000			
	Total						60.000			
				Тс	otal Quantit	y in sqm	60.000			
5.016	22.23.2									
	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 materia 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 crystallin 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									
	Providing and app waterproofing trea	lying inte tment	gral crystalli	ne slurry of h	ydrophilic ii	n nature f	or			
	Bottom of Tank	1	5.000	5.000	MANUACEDASCO	S	25.000			
	Total						25.000			
				Тс	otal Quantit	y 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 Q	Quantity in I	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 enclass per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having mill cross section as 23 mm x 25 mm and over all minimum length 263 mm and 165 mm with minimum 112 mm space between protruded legs having 2 mm top surface by ribbing or chequering besides necessary and adequate anchord projections on tail length on 138 mm as per standard drawing and suitable to stand the bend test and chemical resistance test as per specifications and have manufactures permanent identification mark to be visible even after fixing if fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1 ceme sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design. 								
	as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786								
	Total	8					8.000 8.000		
	Total Total Opentity in each								
6	MANNUAL COARSE SCREEN CHANNEL								
6.001									
	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 exca	avation by	mechanical	means	MANAGEMAN	10			
	Pile cap P1	2	1.400	1.400	1.150	S8	4.508		
	Grade Beam	1	1.350	0.650	0.850		0.746		
	Total						5.254		
				To	otal Quantit	y in cum	5.254		
6.002	4.1.5 Providing and lavi	ng in nos	ition comont	concrete of s	posified area	do oroludi	ng the cost		
	of centering and sh sand : 6 graded sto	nuttering - one aggreg	- All work up gate 20 mm r	to plinth lev to plinth lev	vel:1:3:6 (1 c	ement : 3	coarse		
	Providing and layi	ng in pos	ition 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								
				To	otal Quantit	y in cum	0.676		
6.003	5.37.1								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	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 layi	ng in posi	ition ready m	ixed M-25 g	rade concret	e					
	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										
	manufactured in fully automatic batching plant and transported 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										
	Providing and lay	ing in pos	sition ready n	nixed M-25	grade concret	te					
	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+1.5 5	2.000	0.300		3.360				
	Wall	4	2.500	1.500	0.250		3.750				
	Total						9.118				
				Тс	otal Quantit	y 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).										
	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									
6.006	4.12									
	Extra for providing doses by weight of	g and mix	ing water pro as per manufa	ofing mater acturer'	al in cement	concrete	work in			
	Extra for providing	g and mix	ing water pro	oofing mater	ial					
	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			
				,	Fotal Quant	tity in kg	3958.020			
6.007	OD244264/2022-2	2023	A	12 mar		-				
	Extra for providing	g sulphate	e resistant cer	ment for the	structures ab	ove plinth	level.			
	Extra for providing sulphate resistant cement									
	Quantity as per item No.3	1	2.876	21	-F		2.876			
	Quantity as per item No.3	1	9.118	NAM FOR THE	AANAGEARD	17.	9.118			
	Total						11.994			
				Тс	otal Quantit	y in cum	11.994			
6.008	5.22.6									
	Steel reinforcemer in position and bin bars of grade Fe-5	nt for R.C ding all c 00D or m	C work inclu omplete upto ore	ding straigh plinth level	tening, cuttin Thermo - Me	ng, bendin echanicall	ig, placing y Treated			
	Steel reinforcemer	nt 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 l	kilogram	1439.280			
6.009	OD246784/2022-2	2023								
	Extra for providing epoxy coating for reinforcement bars.									
	Extra for providing	g epoxy c	oating for rei	nforcement l	oars.	,				
	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										
6.010	5.9.1										
	Centering and shut footings, bases of	ttering inc	luding struttiet of the struttiet of the strutter of the strut	ing, etc. and concrete	removal of f	orm for:F	oundations,				
	Centering and shu	ttering									
	Pile cap P1	8	1.100		1.000		8.800				
	Grade Beam	2	1.350		0.750		2.025				
	Total						10.825				
				Т	otal Quantit	y in sqm	10.825				
6.011	5.9.2										
	Centering and shut thickness) includir	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	J.P.P.	0.450	1.250	ET	4.500				
	Inside of wall	4	2.500	1.500	mRI	AT_	15.000				
	Outside of walls	4	2.500	1.500		and the second se	15.000				
	Total	100		< 11			34.500				
			CPLATES	Te	otal Quantit	y in sqm	34.500				
6.012	5.9.3		OF PUBL	C WORKS							
	Centering and shu floors, roofs, landi	ttering inc ngs, balco	luding struttionies and acc	ing, etc. and ess platform	removal of f	orm for:S	uspended				
	Centering and shu	ttering									
	Base Slab	2	1.25+1.5 5	2.000			11.200				
	Total						11.200				
				Тс	otal Quantit	y in sqm	11.200				
6.013	5.9.5										
	Centering and shurbeams, plinth beam	ttering inc	luding strutti s bressumers	ing, etc. and and cantilev	removal of fers	orm for:L	intels,				
	Centering and shu	ttering									
	Base slab beam side24.4500.750										
	Base slab beam bottom	2	4.450		0.450		4.005				
	Total						10.680				
				To	otal Quantit	y in sqm	10.680				
6.014	13.7.1										

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
	12 mm cement pla cement : 3 fine sar	ster finish 1d)	ied with a flo	ating coat of	neat cement	of mix:1:	:3 (1	
	12 mm cement pla	aster finis	hed					
	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+1.5	2.000			11.200	
	Base Slab top	2	1.25+1.5	1.000			5.600	
	Base slab beam side	2	4.450		0.750		6.675	
	Total	57.975						
	Total Quantity in sqm							
6.015	13.52.2							
	Finishing with Epc per manufacturer& of surface, etc. cor	oxy paint z#39;s spe nplete.On	(two or more ecifications in concrete wo	coats) at all icluding appr rk	locations pre	epared and ing coat,	applied as preparation	
	Finishing with Ep	oxy paint		1	-			
	Column	8		0.450	1.250		4.500	
	Inside of wall	4	2.500	1.500	MANAGEMEN	0	15.000	
	Outside of walls	4	2.500	1.500			15.000	
	Base Slab bottom	2	1.25+1.5 5	2.000			11.200	
	Base slab top	2	1.25+1.5	1.000			5.600	
	Base slab beam side	2	4.450		0.750		6.675	
	Total							
				To	tal Quantit	y in sqm	57.975	
6.016	22.23.1							

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity					
	waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & amp; 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-											
	 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 PCC 											
	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											
	 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 & amp; 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. 											
	waterproofing treatment to the RCC											
	Base Slab top	2	1.25+1.5	1.000			5.600					
	Total 5.6											
	Total Quantity in sqm 5.6											
7	MANNUAL FINE	E SCREEI	N CHANNE	Ĺ								
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		1.860								
	Wall	4	2.500	1.500	0.250		3.750				
	Total 5.61										
	Total Quantity in cum 5.0										
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	g richer m	nixes	C WORKS							
	Quantity as per item No.1	1	5.610				5.610				
	Total						5.610				
				Тс	otal Quantit	y in cum	5.610				
7.003	4.12										
	Extra for providing doses by weight of	g and mix	ing water pro as per manufa	ofing materiacturer'	al in cement	concrete	work in				
	Extra for providing doses	g and mix	ing water pro	ofing materi	al in cement	concrete	work in				
	Quantity as per item No.1	1	5.610	330.000			1851.300				
	Total						1851.300				
				r	Fotal Quant	ity in kg	1851.300				
7.004	OD244422/2022-2	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				
				Тс	otal Quantit	y in cum	5.610				
7.005	5.22.6										
	Steel reinforcemer in position and bin bars of grade Fe-5	t for R.C ding all c 00D or m	.C work inclu omplete upto ore	ding straigh plinth level	tening, cuttin Thermo - Me	ng, bendir echanicall	ıg, placing y Treated				
	Steel reinforcemer	t for R.C	.C work								
	Quantity as per item No.1	1	5.610	120.000			673.200				
	Total						673.200				
				Total (Quantity in k	kilogram	673.200				
7.006	OD246785/2022-2	.023									
	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										
	Total 5.610										
	Total Quantity in kg 5.610										
7.007	5.9.2										
	Centering and shut thickness) includir	ttering ind	cluding strutt d pilasters, b	ing, etc. and utteresses, pl	removal of f inth and strin	orm for:W	Valls (any s etc.				
	Centering and shut	tering	OF POSO	C WEAKINGS							
	Inside of walls	4	1.55+1.5 5	1.500			18.600				
	Out side of walls	4	1.55+1.5 5	1.500			18.600				
	Total						37.200				
				Т	otal Quantit	y in sqm	37.200				
7.008	5.9.3										
	Centering and shut floors, roofs, landi	ttering ind ngs, balco	cluding strutt	ing, etc. and ess platform	removal of f	orm for:S	uspended				
	Centering and shu	tering									
	Base slab	1	1.55+1.5 5	2.000			6.200				
	Total 6.200										
	Total Quantity in sqm6.200										
7.009	13.7.1										
	12 mm cement pla cement : 3 fine sar	ster finish d)	ned with a flo	ating coat of	f neat cement	t of mix:1	:3 (1				
	12 mm cement pl	aster finis	shed								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Inside of walls	4	1.55+1.5 5	1.500			18.600			
	Out side of walls	4	1.55+1.5 5	1.500			18.600			
	Base Slab Bottom	2	1.55+1.5 5	2.000			12.400			
	Base Slab top	2	1.55+1.5 5	1.000			6.200			
	Total									
	Total Quantity in sqm									
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+1.5 5	1.500	-	ET	18.600			
	Out side of walls	4	1.55+1.5 5	1.500	DRA		18.600			
	Base Slab Bottom	2	1.55+1.5 5	2.000	ĽĿ	1	12.400			
	Base Slab top	2	1.55+1.5 5	1.000	RARIAGERAEJ	3	6.200			
	Total						55.800			
				Т	otal Quantit	y 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 & amp; 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 sem									
	Providing and app waterproofing trea	lying integ tment to t	gral crystallin	ne slurry of h	ydrophilic i	n nature f	or			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	Inside of walls	4	1.55+1.5 5	1.500			18.600		
	Total						18.600		
				Тс	otal Quantit	y in sqm	18.600		
7.012	22.23.2								
	waterproofing treatment to the RCC structures like retaining walls of the bar water tanks, roof slabs, podiums, reservior, sewage & amp; water treatment p tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 par integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 pa integral crystalline slurry : 1 part water) for horizontal surfaces and applying same from negative (internal) side with the help of synthetic fiber brush. Th shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducin permeability of concrete by more than 90% compared with control concrete DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The slurry shall be capable of self-healing of cracks up to a width of 0.50mm. Th 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 leakage.For horizontal surface one coat @1.10 kg per sqm.								
	Base Slab top	2	1.55+1.5 5	1.000	NAMAGENAD	Ð	6.200		
	Total						6.200		
				Тс	otal Quantit	y in sqm	6.200		
8	OIL & GREA	SE TRA	Р						
8.001	2.6.1								
	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ing 30 cm of excava <u>1 and neat</u>	mechanical in depth, 1.4 ited earth, lea ly dressed.Al	means (Hydr 5 m in width ad up to 50 m <u>ll kinds of so</u>	raulic excava as well as 10 and lift up il	ator)/man 0 sqm on to 1.5 m,	ual means plan) disposed		
	Pile can P1		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		
				Τα	otal Quantit	y in cum	37.785		
8.002	4.1.5								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Providing and layi of centering and sl sand : 6 graded sto	ng in posi nuttering - one aggreg	tion cement All work up gate 20 mm n	concrete of s to plinth lev cominal size)	pecified grad el:1:3:6 (1 c	de excludi ement : 3	ing the cost coarse			
	Providing and la	ying in po	osition cemer	nt 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									
8.003	5.37.1									
	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 lay	ying in po	sition ready	mixed M-25	grade concre	ete				
	Pile cap P1	4	1.100	1.100	1.000	23	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			
				To	tal Quantit	y 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									
	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		
				Te	otal Quantit	y in cum	15.214		
8.005	5.34.1								
	Extra for providing specified cement c grade concrete ins in M-30 is @ 340	g richer m content us tead of M kg/cum).	iixes at all flo ed is payable -25 grade BM	oor levels. No / recoverable MC/RMC. (N	ote:- Excess/ e separately.l lote:- Cemer	less ceme Providing t content	nt over the M-30 considered		
	Extra for providi	ing 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								
	Total Quantity in cum								
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	<mark>33</mark> 0.000	2		5036.130		
	Quantity as per item No.4	1	15.214	330.000		10 17	5020.620		
	Total		OF PUBL	IC WORKS			10056.75 0		
				,	Total Quant	tity in kg	10056.75 0		
8.007	OD244458/2022-2	2023							
	Extra for providing	g sulphate	e resistant cei	ment for the	structures ab	ove plinth	level.		
	Extra for providi	ng sulpha	te resistant co	ement					
	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		
				To	otal Quantit	y in cum	30.475		
8.008	5.22.6								
	Steel reinforcement in position and bin bars of grade Fe-5	nt for R.C ding all c 00D or m	.C work incluois ore	uding straigh plinth level	tening, cutti Thermo - Mo	ng, bendir echanicall	ng, placing y Treated		
	Steel reinforceme	ent 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 Q	Quantity in l	kilogram	3657.000		
8.009	OD246788/2022-2	2023							
	Extra for providing	g epoxy c	oating for rei	nforcement b	oars.				
	Extra for providi	ng epoxy	coating for r	einforcemen	t 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								
8.010	5.9.1			242					
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete								
	Centering and shu	Ittering	These a	AGGSIREN.	nR/	-			
	Pile cap P1	16	1.100	3-11	1.000		17.600		
	Grade Beam	8	2.700	\leq	0.750		16.200		
	Base Slab	4	4.900	AN FOR THE	0.350	rr.	6.860		
	Total	_	01 1000	C YYMHING			40.660		
				Тс	otal Quantit	y in sqm	40.660		
8.011	5.9.2								
	Centering and shut thickness) includir	ttering inc ng attache	cluding strutt d pilasters, b	ing, etc. and utteresses, pl	removal of f	form for:W	Valls (any s etc.		
	Centering and shu	Ittering							
	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								
	Total Quantity in sqm								
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 pl	aster finis	shed			T			
	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		
				Te	otal Quantit	y in sqm	119.070		
8.013	13.52.2								
	Finishing with Epo per manufacturer& of surface, etc. cor	oxy paint z#39;s spe nplete.On	(two or more cifications in concrete wo	e coats) at all ncluding app ork	locations propriate prim	epared and ning coat,	d applied as preparation		
	Finishing with E	poxy pain	1 100	2 250	_	-	52 200		
	Out side wall	4	4.100	3.250	-01		55.500		
	Wall top	1	15.200	0.300		-	4.300		
	side	2	3.500	~ ! !	0.750		5.250		
	Partition Wall bottom and top	2	3.500	0.150	NANAGENAG		1.050		
	Total						64.160		
				Te	otal Quantit	y 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 & amp; 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								
	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									
	waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & amp; 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	1		1	-		12.250			
				Тс	otal Quantit	y in sqm	12.250			
8.016	100.36.1		OF PUEU	CWORKS		82				
	Filling water with of 5 km (average) height not less that and other applienc	5000 litre to the rese n 3 m usin es and co	e tankers fited ervoir site an ng 5 HP diese st of water et	l in lorry and d pumping th el engine pun c. complete.	l conveying v ne water into np set , hire t	water from the reserve for tanker	n a distance voir of lorry, tools			
	Filling water									
	Tank	1	3.500	3.500	3.250		39.813			
	Total						39.813			
				Total (Quantity in l	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									
	as per IS: 10910 of	n 12 mm	dia steeel bar	conforming	to IS:1786	plastic en	capsulated			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
		9					9.000		
	Total						9.000		
				То	tal Quantity	y in each	9.000		
9	GRIT SEPARATO	OR							
9.001	2.6.1								
	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ing 30 cm of excava 1 and neat	mechanical in depth, 1.4 ated earth, lea ly dressed.Al	means (Hydi 5 m in width id up to 50 m ll kinds of so	raulic excava as well as 10 and lift up t il	ator)/manu) sqm on j to 1.5 m, o	ual means plan) disposed		
	Earth work in exca	avation 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								
	Total Quantity in cum								
9.002	4.1.5	1			_				
	Providing and layi of centering and sh sand : 6 graded sto	ng in posi nuttering - one aggreg	ition cement All work up gate 20 mm n	concrete of s to plinth lev ominal size)	pecified grad el:1:3:6 (1 c	le excludi ement : 3	ing the cost coarse		
	Providing and lay	ing in po	sition cemen	t 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		
				To	tal Quantit	y 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 layi	ng in posi	ition ready m	ixed M-25 g	rade concret	e			
	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			
				Το	tal Quantit	y in cum	14.636			
9.004	5.37.2									
	Providing and layi cement concrete w manufactured in fu transit mixer for a design of specified R.M.C. from trans finishing and reinf as per IS: 9103 to impairing strength Cement content co per design mix is p floor V level	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	-	CPLATE	AN FOR THE	MANAGERACI	TT.	24.297			
				To	tal Quantit	y in cum	24.297			
9.005	5.34.1 Extra for providing specified cement of grade concrete ins in M-30 is @ 340	g richer m content use tead of M kg/cum).	iixes at all flo ed is payable -25 grade BN	oor levels. No / recoverable //C/RMC. (N	ote:- Excess/ separately.I fote:- Cemen	less ceme Providing at content	nt over the M-30 considered			
	Extra for providin	g richer m	nixes							
	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			
				To	tal Quantit	y 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						12847.89 0			
				r	Fotal Quant	ity in kg	12847.89 0			
9.007	OD244602/2022-2	2023								
	Extra for providing	g sulphate	e resistant cer	ment for the s	structures ab	ove plinth	level.			
	Extra for providing	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			
				То	otal Quantit	y in cum	38.933			
9.008	5.22.6			-						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, in position and binding all complete upto plinth levelThermo - Mechanically T bars of grade Fe-500D or more									
	Steel reinforcemer	Steel reinforcement for R.C.C work								
	Quantity as per item No.3	1	14.636	120.000		1	1756.320			
	Quantity as per item No.4	1	24.297	120.000	KANIAGENMU	0	2915.640			
	Total						4671.960			
				Total Q	Quantity in I	kilogram	4671.960			
9.009	OD246796/2022-2	2023								
	Extra for providing	g epoxy c	oating for rei	nforcement b	oars.					
	Extra for providing	g epoxy c	oating for rei	nforcement b	oars.					
	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			
				r	Fotal Quant	tity 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				
				Το	otal Quantit	y in sqm	37.790				
9.011	5.9.2										
	Centering and shut thickness) includir	ttering inc ng attache	cluding strutti d pilasters, bi	ing, etc. and utteresses, pl	removal of f	orm for:Wng course	Valls (any s etc.				
	Centering and shut	ttering									
	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				
				To	otal Quantit	y in sqm	119.580				
9.012	5.9.3										
	Centering and shut floors, roofs, landi	Centering and shuttering including strutting, etc. and removal of form for:Suspended loors, roofs, landings, balconies and access platform									
	Centering and shut	ttering	JA P	O AL	-	ET	1				
	Channel slab	1	4.000	3.000	nRI		12.000				
	Total			2.10		-	12.000				
		100		Το	otal Quantit	y in sqm	12.000				
9.013	13.7.1	22	PLATED	RM FOR THE	MANAGERADA	17					
	12 mm cement pla cement : 3 fine sar	ster finish d)	ned with a flo	ating coat of	neat cement	t of mix:1	:3 (1				
	12 mm cement p	laster fini	shed								
	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				
				To	otal Quantit	y 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 Epo per manufacturer& of surface, etc. cor	oxy paint z#39;s spe nplete.On	(two or more ecifications in concrete wo	coats) at all cluding appr rk	locations pro ropriate prim	epared and ning coat,	d applied as preparation				

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										
9.015	22.23.1										
	waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & amp; 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										
	Providing and app waterproofing trea	olying inte tment to t	egral crystalli he RCC	ine slurry of	hydrophilic i	n nature f	or				
	Inside of walls	4	3.150		3.550		44.730				
	Channel	2	4.000		1.350		10.800				
	Total						55.530				
				Te	otal Quantity	y in sqm	55.530				
9.016	22.23.2										
Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
-------	--	--	--	---	---	---------------------------------------	---	--	--	--	--
	waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & amp; 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 app	lying inte	gral crystalli	ne slurry of h	ydrophilic i	n nature f	or				
	waterproofing treatment to the RCC										
	Base Slab top	1	3.150	3.150		ET	9.923				
	Channel Slab top	1	4.000	2.000	DR.	ALLE	8.000				
	Total		- D				17.923				
0.017	100.26.1				otal Quantit	<u>y in sqm</u>	17.925				
	Filling water with of 5 km (average) height not less that and other applienc	5000 litre to the reso n 3 m usin es and co	e tankers fited ervoir site an ng 5 HP diese st of water et	d in lorry and d pumping th el engine pur c. complete.	conveying whe water into a point of the set	water from the reser for tanker	n a distance voir of lorry, tools				
	Topk	1	3 150	2 150	3 550		25 225				
	Talik	1	5.150	5.150	5.550		35.225				
				Total ()uantity in l	Kilo litro	35 225				
0.018	10.16			IUtal			33.223				
2.010	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 of as per IS 10910 or	colour saf	ety foot rest	of minimum	6 mm thick	plastic en	capsulated				
	[as per 15, 10910 0.	10		comorning	015.1700		10.000				
	Total	10			l	1	10.000				

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
				To	tal Quantity	y in each	10.000			
10	EQUALISATION	I TANK								
10.00	2.6.1									
1	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ling 30 cm of excava l and neat	mechanical in depth, 1 ated earth, lea ly dressed.A	means (Hydr 5 m in width ad up to 50 n <u>ll kinds of so</u>	raulic excava as well as 10 n and lift up t il	ator)/man 0 sqm on to 1.5 m,	ual means plan) disposed			
	Earth work in ex	cavation	by mechanic	al 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	FI	35.935			
	Grade Beam	1	95.000	0.650	0.850		52.488			
	Total			3-11			1124.321			
				Т	otal Quantit	y in cum	1124.321			
10.00	4.1.5		C PLATEC	NAMPOR THE	MANAGEMEN	11				
2	Providing and layi of centering and sl sand : 6 graded sto	ng in posi nuttering - one aggreg	ition cement - All work up gate 20 mm n	concrete of s to plinth lev cominal size)	pecified grad vel:1:3:6 (1 c	de excludi ement : 3	ing the cost coarse			
	Providing and lay	ying in po	sition cemen	t 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									
10.00 3	5.37.1									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	Providing and layi cement concrete w manufactured in fu transit mixer for al design of specified R.M.C. from trans finishing and reinf as per IS: 9103 to impairing strength Cement content co per design mix is p	ng in posi vork, using ully auton ll leads, ha l grade fo it mixer to orcement accelerate and dura onsidered oayable/re	ition ready m g cement com natic batching aving continu r reinforced of o site of layin including co e/ retard settin bility as per of in this item i ecoverable se ition ready m	tixed M-25 g tent as per ag g plant and tr tous agitated cement concre- ng, excluding st of admixtr ng of concret direction of t s @330 kg/c parately.All tixed M-25 s	rade concret pproved desi ansported to mixer, many rete work inco the cost of oures in recon- te, improve the Engineer cum. Excess wiork upto p	e for reinf gn mix, site of wo ufactured luding pu centering, mended p workabilit - in -charg /less ceme <u>linth leve</u>	Forced ork in as per mix mping of shuttering proportions ty without ge. Note:- ent used as 1		
	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								
		_	-	Т	otal Quantit	y in cum	198.049		
4	Providing and layi cement concrete w manufactured in fu transit mixer for al design of specified R.M.C. from trans finishing and reinf as per IS: 9103 to impairing strength Cement content co per design mix is p floor V level Providing and lay C/C	ng in pos vork, using ally auton Il leads, ha I grade fo it mixer to orcement accelerate and dura onsidered oayable/re ving in po	ition ready m g cement com natic batching aving continu r reinforced of o site of layin including co e/ retard settin bility as per of in this item i ecoverable se sition ready to 4*15.35	ixed M-25 g tent as per a g plant and tr ious agitated cement concr ng, excluding ost of admixtung of concret direction of t s @ 330 kg/c parately.All mixed M-25 0.300	rade concret pproved desi ansported to mixer, many rete work inco the cost of our ures in recon the Engineer cum. Excess work above grade concret 4.950	e for reinf gn mix, site of wo ufactured luding pu centering, mended p workabilit - in -charg /less ceme plinth leve	Forced ork in as per mix mping of shuttering proportions ty without ge. Note:- ent used as el upto 91.179		
	Total						91.179		
				Te	otal Quantit	y in cum	91.179		
10.00 5	5.34.1 Extra for providin specified cement of grade concrete ins in M-30 is @ 340	g richer m content us tead of M kg/cum).	iixes at all flo ed is payable -25 grade BM	oor levels. No / recoverable MC/RMC. (N	ote:- Excess/ e separately.l lote:- Cemen	less ceme Providing t content	nt over the M-30 considered		
	Extra for providi	ng richer	mixes						
	Qty Vide Item No:3	1	198.049				198.049		

EST No. :WRD/KWA-CESEWA/EST/4856/2023_27_1_1 (Edit Id : 1)	
(Dsor year : 2018,Cost Index (Place : Malappuram,Value : 136.44),GST : 18	3%

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Qty Vide Item No:4	1	91.179				91.179			
	Total						289.228			
				Тс	otal Quantit	y in cum	289.228			
10.00	4.12									
6	Extra for providing doses by weight of	g and mix	ing water pro	ofing materi acturer's spec	al in cement	concrete	work in			
	Extra for providi	ng and mi	ixing water p	proofing mate	erial					
	Qty Vide Item No:3	1	198.049	330.000			65356.17 0			
	Qty Vide Item No:4	1	91.179	330.000			30089.07 0			
	Total									
			6		Fotal Quant	tity in kg	95445.24 0			
10.00	OD235084/2022-2023									
7	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	RALPOR THE	KANJAGERAD	er.	198.049			
	Qty Vide Item No:4	1	91.179				91.179			
	Total						289.228			
				Тс	otal Quantit	y in cum	289.228			
10.00	5.22.6									
8	Steel reinforcemer in position and bin bars of grade Fe-50	t for R.C. ding all co 00D or mo	C work inclu omplete upto ore	ding straigh plinth level	tening, cuttin Thermo - Me	ng, bendin echanicall	ig, placing y Treated			
	Steel reinforceme	ent for R.C	C.C work							
	Qty Vide Item No:3@120 kg/m3	1	198.049	120.000			23765.88 0			
	Qty Vide Item No:4@120 kg/m3	1	91.179	120.000			10941.48 0			
	Total						34707.36 0			
	Total Quantity in kilogram									
10.00	OD235085/2022-2	2023								
9	Extra for providing	g epoxy co	pating for rei	nforcement l	oars.					
	Extra for providi	ng epoxy o	coating for re	einforcement	bars.					

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Qty Vide Item No:3@120 kg/m3	1	198.049	120.000			23765.88 0			
	Qty Vide Item No:4@120 kg/m3	1	91.179	120.000			10941.48 0			
	Total						34707.36 0			
				r	Fotal Quant	tity in kg	34707.36 0			
10.01	5.9.1									
0	Centering and shut footings, bases of	ttering inc	luding strutti etc for mass o	ng, etc. and concrete	removal of f	orm for:F	oundations,			
	Centering and sh	uttering								
	Base slab	4	16.250		0.450		29.250			
	Pilecap P1	16	1.100		1.000		17.600			
	Pilecap P1a	48	1.200	120	1.200	-	69.120			
	Pilecap P2	18	2.180+1. 1	Q 1	1.000	FT	59.040			
	Grade Beam	2	95.000		0.750		142.500			
	Total	100		1	-		317.510			
			1. A	Тс	otal Quantit	y in sqm	317.510			
10.01	5.9.2		OF PUBLI	CWORKS	No Charles and	82				
I	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 shut	ttering								
	Inside of walls	4	14.750	4.950			292.050			
	outside of walls	4	15.350	4.950			303.930			
	Total						595.980			
				Тс	otal Quantit	y in sqm	595.980			
10.01	13.7.1									
2	12 mm cement pla cement : 3 fine sam	ster finish nd)	ed with a flo	ating coat of	neat cement	t of mix:1	:3 (1			
	12 mm cement p	laster fini	shed							
	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 som									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
10.01	13.52.2									
3	Finishing with Epo per manufacturer's surface, etc. comp	oxy paint specifica lete.On co	(two or more ttions includi oncrete work	e coats) at all ng appropria	locations pro	epared and bat, prepar	d applied as ration of			
	Finishing with	Ероху ра	int							
	outer wall	4	15.350		1.500		92.100			
	Wall top	1	60.200		0.300		18.060			
	Total						110.160			
				T	otal Quantity	y in sqm	110.160			
10.01	22.23.1									
	/ 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 lookage For vartical surface two costs ($@0, 70$ kg per sem									
	Providing and app waterproofing trea	olying into	egral crystall	ine slurry of	hydrophilic i	n nature f	for			
	inside wall	4	14.750		4.950		292.050			
	Total						292.050			
				T	otal Quantit	y in sqm	292.050			
10.01	22.23.2									
5	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 leak mer for a specific and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Providing and app waterproofing trea	lying inte tment	gral crystallin	ne slurry of h	ydrophilic i	n nature fo	or			
	Base Slab top	1	14.750	14.750			217.563			
	Total						217.563			
				Тс	otal Quantit	y in sqm	217.563			
10.01	100.36.1									
6	Filling water with of 5 km (average) height not less that and other applienc Filling water	5000 litre to the rese n 3 m usin es and co	e tankers fited ervoir site and ng 5 HP diese st of water et	in lorry and d pumping th d engine pun c. complete.	conveying value water into np set , hire t	water from the reserv for tanker	n a distance voir of lorry, tools			
	Faualisation tank	1	14 750	14 750	4 950		1076 934			
	Equalisation tank 1 14.750 14.750 4.950 1070.954 Total 1076.934 1076.934 1076.934 1076.934 1076.934									
	Total Quantity in Kilo litro 1076 034									
10.01	19.16									
	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 designProviding 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									
	Total						14.000			
				То	tal Quantity	y in each	14.000			
11	MBBR 1									
11.00	2.6.1									
1	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ing 30 cm of excava l and neat	v mechanical n in depth, 1.3 ated earth, lea ly dressed.Al	means (Hydi 5 m in width 1d up to 50 m 1 kinds of so	raulic excava as well as 10 and lift up il	ator)/manu 0 sqm on j to 1.5 m, c	ial means plan) disposed			
	Earth work in exc	avation b	y 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			
				Та	otal Quantit	y in cum	81.166			
11.00	4.1.5									
2	Providing and layi of centering and sl sand : 6 graded sto	ng in posi nuttering - ne aggreg	ition cement - All work up gate 20 mm n	concrete of s to plinth lev ominal size)	pecified grad el:1:3:6 (1 c	le excludi ement : 3	ng the cost coarse			
	Providing and la	ying in po	osition cemer	t 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			
				Та	otal Quantit	y in cum	27.044			
11.00	5.37.1									
	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									
	Providing and lay	ing in pos	sition ready n	nixed M-25 g	vrade concret	te				
	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									
11.00 4	5.37.2									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	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				
				Το	tal Quantit	y in cum	67.200				
11.00	5.34.1										
5	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	RM FOR THE CWORKS	KANAGENEN	0	115.270				
	Quantity as per item No.4	1	67.200				67.200				
	Total						182.470				
				To	tal Quantit	y in cum	182.470				
11.00	4.12										
6	Extra for providing doses by weight of	g and mix f cement a	ing water pro	oofing materi acturer'	al in cement	concrete	work in				
	Extra providing a	nd mixin	g water proof	ing material							
	Quantity as per item No.3	1	115.270	330.000			38039.10 0				
	Quantity as per item No.4	1	67.200	330.000			22176.00 0				
	Total										
	Total Quantity in kg										
11.00	OD243745/2022-2	2023									
7	Extra for providing	g sulphate	resistant cer	nent for the s	structures ab	ove plinth	level.				
	Extra for providi	ing sulpha	te resistant c	ement							

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			
				Το	tal Quantit	y in cum	182.470			
11.00	5.22.6									
8	Steel reinforcemer in position and bin bars of grade Fe-5	nt for R.C. Iding all co 00D or mo	C work inclu omplete upto ore	ding straigh plinth level	tening, cuttin Thermo - Me	ng, bendir echanicall	ig, placing y Treated			
	Steel reinforceme	ent for R.C	C.C							
	Quantity as per item No.3	1	115.270	120.000			13832.40 0			
	Quantity as per item No.4	1	67.200	120.000			8064.000			
	Total		1	0AN	1	ET	21896.40 0			
	Total Quantity in kilogram									
11.00	0 OD246773/2022-2023									
9	Extra for providing	g epoxy co	pating for rei	nforcement b	oars.	17				
	Extra for providing	g epoxy co	pating for rei	nforcement b	oars.	0.1				
	Quantity as per item No.3	1	115.270	120.000			13832.40 0			
	Quantity as per item No.4	1	67.200	120.000			8064.000			
	Total						21896.40 0			
				r	Fotal Quant	tity in kg	21896.40 0			
11.01	5.9.1									
0	Centering and shu footings, bases of	ttering inc columns, e	luding strutti etc for mass of	ing, etc. and concrete	removal of f	orm for:F	oundations,			
	Centering and s	huttering								
	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			
		v in sam	176.470							

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
11.01	5.9.2										
1	Centering and shut thickness) includir	ttering inc ng attache	luding strutti d pilasters, b	ng, etc. and utteresses, pl	removal of for inth and strip	orm for:W	Valls (any s etc.				
	Centering and shu	ttering									
	Inside of walls	4	10.900	5.000			218.000				
	Out side of walls	4	11.500	5.000			230.000				
	Total						448.000				
				Тс	otal Quantit	y in sqm	448.000				
11.01	5.9.3										
2	Centering and shu floors, roofs, landi	ttering inc ngs, balco	cluding struttionies and acc	ng, etc. and ess platform	removal of f	orm for:S	uspended				
	Centering and sh	uttering									
	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										
11.01	5.9.5	100		1	-						
3	Centering and shu beams, plinth bear	ttering inc ns, girder	luding strutti s bressumers	ing, etc. and and cantilev	removal of feers	orm for:L	intels,				
	Centering and shu	ttering		post and rece							
	Base Slab beam	2	44.800		0.550		49.280				
	Total						49.280				
				Тс	otal Quantit	y in sqm	49.280				
11.01	13.7.1										
4	12 mm cement pla cement : 3 fine sar	ster finish 1d)	ed with a flo	ating coat of	neat cement	of mix:1	:3 (1				
	12 mm cement p	laster fini	shed								
	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										
				To	otal Quantity	y in sqm	508.260				
11.01	13.52.2										
5	Finishing with Epo per manufacturer& of surface, etc. cor	oxy paint z#39;s spe nplete.On	(two or more cifications in concrete wo	coats) at all icluding app rk	locations pre ropriate prim	epared and ing coat,	d applied as preparation				

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Finishing with Epo	oxy 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 290.26									
6	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 & amp; 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 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 balance for 10 years against any									
	Providing and app waterproofing trea	lying inte tment to t	gral crystalli he RCC	ne slurry of h	ydrophilic ii	n nature f	or			
	Wall Inside	4	10.900	5.000			218.000			
	Total						218.000			
				Тс	otal Quantit	y in sqm	218.000			
11.01 7	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 & amp; 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 app waterproofing treater	lying inte tment to t	gral crystallii he RCC	ne slurry of h	ydrophilic i	n nature fo	or				
	Base Slab top	1	10.900	10.900			118.810				
	Total						118.810				
				Тс	otal Quantit	y in sqm	118.810				
11.01	100.36.1										
8	Filling water with of 5 km (average) height not less that and other applience	5000 litre to the reso n 3 m usin es and co	tankers fited ervoir site an ng 5 HP diese st of water et	l in lorry and d pumping th el engine pun c. complete.	conveying v ne water into np set , hire :	water from the reserve for tanker	n a distance voir of lorry, tools				
	Filling water										
	Tank		594.050								
	Total										
	Total Quantity in Kilo litre 59										
11.01	2.25	2.25									
9	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 e	xcavated e	earth	<		10 C					
	Base slab	1	10.750	10.750	0.550		63.559				
	Total		OF PUBU	C WORKS			63.559				
				То	otal Quantit	y in cum	63.559				
0	Providing orange of as per IS: 10910 of cross section as 23 165 mm with mini- top surface by ribb projections on tail stand the bend test manufactures pern fixing in manholes sand: 6 graded stor	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									
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steel bar conforming to IS:1786										
		14					14.000				
	Total						14.000				
				To	tal Quantit	y in each	14.000				
12	MBBR 2										
12.00 1	2.6.1										

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity					
	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ling 30 cm of excava l and neat	v mechanical n in depth, 1. ated earth, lea ly dressed.A	means (Hydi 5 m in width ad up to 50 m 11 kinds of so	raulic excava as well as 10 and lift up t il	ator)/man 0 sqm on to 1.5 m,	ual means plan) disposed					
	Earth work in ex	xcavation	by mechanic	cal 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											
	Total Quantity in cum											
12.00	4.1.5	l.1.5										
2	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 and : 6 graded stone aggregate 20 mm nominal size)											
	Providing and	d laying ir	n position cer	ment concrete	e	EL						
	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	n	3.783					
	Base Slab	1	12.050	12.050	0.150		21.780					
	Total						33.605					
				Τα	otal Quantity	y in cum	33.605					
12.00	5.37.1											
3	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 wierts wate plict used											
	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			
				Τα	tal Quantity	y in cum	151.425			
12.00	5.37.2									
4	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 la	aying in p	osition ready	mixed M-25	grade concr	rete	N			
	Wall	1	49.800	0.300	5.000	T ST	74.700			
	Total		200	A BEREAK	DR/	1	74.700			
				Το	tal Quantity	y in cum	74.700			
5	Extra for providing specified cement c grade concrete inst in M-30 is @ 340	g richer m ontent use tead of M kg/cum).	iixes at all flo ed is payable -25 grade BN	oor levels. No / recoverable //C/RMC. (N	ote:- Excess/ separately.F fote:- Cemen	less ceme Providing t content	nt over the M-30 considered			
	Extra for pro over the specified	viding ric	ther mixes at	all floor leve	els. Note:- Ex	cess/less	cement			
	Qty vide item 3	1	151.425				151.425			
	Qty vide item 4	1	74.700				74.700			
	Total						226.125			
				Τα	tal Quantity	y in cum	226.125			
12.00 6	4.12 Extra for providing doses by weight of	g and mix	ing water pro	oofing materi acturer's spec	al in cement ification .	concrete	work in			
	Extra for provi	ding and	mixing water	proofing ma	aterial					
	Qty vide item 3	1	151.425		330.000		49970.25 0			
	Qty vide item 4	1	74.700		330.000		24651.00 0			
	Total						74621.25 0			
				r	Fotal Quant	ity in kg	74621.25 0			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
12.00	OD235099/2022-2	2023								
7	Extra for providing	g sulphate	resistant cen	nent for the	structures abo	ove plinth	level.			
	Extra for provi	ding sulpl	hate resistant	cement	,					
	Qty vide item 3	1	151.425				151.425			
	Qty vide item 4	1	74.700				74.700			
	Total						226.125			
				Тс	otal Quantity	y in cum	226.125			
12.00	5.22.6									
8	Steel reinforcemer in position and bin bars of grade Fe-5	nt for R.C. Iding all co 00D or mo	C work inclu omplete upto ore	ding straigh plinth level	tening, cuttir Thermo - Me	ng, bendin echanicall	g, placing y Treated			
	Steel reinforcement for R.C.C work including straightening, cutting,									
	Qty vide item 3	1	151.425	00	120.000		18171.00 0			
	Qty vide item 4	1	74.700	820	120.000		8964.000			
	Total									
	Total Quantity in kilogram									
12.00	OD235100/2022-2	2023	PLATE	RM FOR THE	MANAGERAEA	гт				
9	Extra for providing	g epoxy co	pating for rei	nforcement	bars.					
	Extra for provi	ding epox	y coating for	reinforcem	ent bars.	r				
	Qty vide item 3	1	151.425		120.000		18171.00 0			
	Qty vide item 4	1	74.700		120.000		8964.000			
	Total						27135.00 0			
				,	Total Quant	ity in kg	27135.00 0			
12.01	5.9.1									
0	Centering and shur footings, bases of	ttering inc	luding strutti etc for mass o	ng, etc. and concrete	removal of f	orm for:F	oundations,			
	Centering and sh	uttering i	ncluding stru	tting, etc. an	d 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			
				Т	otal Quantity	y in sqm	194.820			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
12.01	5.9.2										
1	Centering and shu thickness) including	ttering inc	luding strutt d pilasters, b	ing, etc. and utteresses, pl	removal of fo	orm for:W	Valls (any s etc.				
	Centering and	shuttering	5								
	Inside	4	12.150		5.000		243.000				
	Outside	4	12.850		5.000		257.000				
	Total						500.000				
				Т	otal Quantity	y in sqm	500.000				
12.01	5.9.5										
2	Centering and shu beams, plinth bear	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			Sel.			7.770				
			AL A	T	otal Quantity	y in sqm	7.770				
12.01	13.7.1		1	CAROLES!	DR.P	AF S					
3	12 mm cement pla cement : 3 fine sar	uster finish nd)	ed with a flo	ating coat of	ent rement	of mix:1	:3 (1				
	12 mm cement	plaster fin	ished with a	floating coat	of neat ceme	ent of mix	:				
	Base slab beam	1	51.800	0.150	MANAGEMEN	9	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				
				Te	otal Quantity	y in sqm	583.560				
12.01	13.52.2										
4	Finishing with Epo per manufacturer's surface, etc. comp	oxy paint s specifica lete.On co	(two or more tions includin oncrete work	coats) at all ng appropria	locations pre te priming co	epared and bat, prepar	d applied as ration of				
	Finishing wit	h Epoxy r	aint (two or	more coats)	at all location	ns					
	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				
				Т	otal Ouantity	v in sam	107.613				

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity					
12.01	22.23.1											
5	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											
	Vaterproofing treatment											
	Total			CARDINE !!	ng.	A P A	243.000					
		Total Quantity in sqm 243.000										
6	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											
	Providing and ap waterproofing trea	plying in tment	tegral crysta	lline slurry of	f hydrophilic	in nature	for					
	Base slab	1	12.150	12.150			147.623					
	Total						147.623					
				Т	otal Quantit	y in sqm	147.623					
12.01 7	100.36.1 Filling water with	5000 litre	tankers fite	d in lorry and	conveying v	water from	n a distance					
	height not less that and other applienc	n 3 m usin es and co	ng 5 HP dies st of water et	el engine pur tc. complete.	np set , hire f	for tanker	lorry, tools					

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 Q	Quantity in H	Kilo litre	738.113				
12.01	19.16										
8	Providing orange of as per IS: 10910 of cross section as 23 165 mm with mini top surface by ribb projections on tail stand the bend test manufactures pern fixing in manholes sand: 6 graded stor	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	血			FI	14.000				
	Total	-		ACCESSION OF THE OWNER	10/20	1	14.000				
				To	tal Quantity	y in each	14.000				
13	MBBR 3					10					
13.00	2.6.1		OF PUBL	CWORKS	MANAGERAEA	C					
1	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ing 30 cm of excava 1 and neat	v mechanical n in depth, 1.3 ated earth, lea ly dressed.Al	means (Hydr 5 m in width ad up to 50 m ll kinds of so	raulic excava as well as 10 and lift up t il	ntor)/man) sqm on to 1.5 m, o	ial means plan) disposed				
	Earth work in	excavatio	n by mechani	ical 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				
				Τα	otal Quantity	y in cum	57.655				
13.00 2	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 1	aying in p	position ceme	ent 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										
13.00	5.37.1										
	Providing and layi cement concrete w manufactured in fu transit mixer for a design of specified R.M.C. from trans finishing and reinf as per IS: 9103 to impairing strength Cement content co per design mix is p Providing and lay Pile Cap P1 Pile Cap P1 Pile Cap P2 Grade Beam	ng in posi- vork, using ally autom il leads, ha il grade fo- it mixer to orcement accelerate and dura onsidered oayable/re ying in po 4 4 1	g cement com natic batching aving continue r reinforced of o site of layin including co e/ retard settin bility as per of in this item i coverable se sition ready to 1.100 1.200 2.180 33.420	tent as per aj g plant and tr ious agitated cement concr ng, excluding ost of admixtung of concret direction of t s @330 kg/c parately.All mixed M-25 1.100 1.200 1.100 0.450	rade concrete pproved designansported to mixer, manurete work incomposed to the cost of concrete in recomposed to the Engineer service in recomposed to the Engineer service in the Engineer service in the the en	e for reinfi gn mix, site of wo ifactured luding pu centering, mended p workabilit - in -charg /less ceme linth leve	torced ork in as per mix mping of shuttering proportions ty without ge. Note:- ent used as 1 4.840 6.912 2.398 11.279				
	Base Slab	1	9.550	9.550	0.350		31.921				
	Total	I					57.350				
				Тс	otal Quantity	y in cum	57.350				
13.00 4	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										
	Wall	1 ng m po	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					
				Τα	otal Quantit	y in cum	66.156					
13.00	5.34.1											
5	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content conside 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											
			65	Τα	otal Quantity	y in cum	123.506					
13.00	4.12		14		501	- 1						
6	Extra for providing doses by weight of	g and mix f cement a	ing water pro	o <mark>ofing</mark> materi acturer'	al in cement s specification	concrete	work in					
	Extra for providin	g and mix	king water pi	oofing mater	ial	10						
	Quantity as per item No.3	1	57.350	330.000	KANIAGENNEN	0	18925.50 0					
	Quantity as per item No.4	1	66.156	330.000			21831.48 0					
	Total						40756.98 0					
				r	Fotal Quant	ity in kg	40756.98 0					
13.00	OD243859/2022-2	2023										
7	Extra for providing	g sulphate	resistant cer	ment for the s	structures ab	ove plinth	level.					
	Extra for providin	g sulphat	e resistant ce	ment								
	Quantity as per item No.3	1	57.350				57.350					
	Quantity as per item No.4	1	66.156				66.156					
	Total											
	Total Quantity in cum 123.50											
13.00	5.22.6											
8	Steel reinforcement in position and bin bars of grade Fe-5	nt for R.C. Iding all c 00D or me	C work inclusion or construction of the constr	uding straigh plinth level	tening, cuttir Thermo - Me	ng, bendir echanicall	ig, placing y Treated					

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Steel reinforceme	nt for R.C	L.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						14820.72 0			
				Total ()uantity in l	kilogram	14820.72 0			
13.00	OD246775/2022-2	2023								
9	Extra for providing	g epoxy c	pating for rei	nforcement l	oars.					
	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				DRA	FI	14820.72 0			
			0	31	Total Quant	tity in kg	14820.72 0			
13.01	5.9.1			DAA BUDD THE	RADIA COLATI	100				
0	Centering and shu footings, bases of	ttering inc	luding strutti etc for mass of	ing, etc. and concrete	removal of f	form for:F	oundations,			
	Centering and shu	ittering								
	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			
				Te	otal Quantit	y in sqm	110.700			
13.01	5.9.2									
1	Centering and shu thickness) includir	ttering inc	luding strutti d pilasters, b	ing, etc. and utteresses, pl	removal of f	Form for:W	/alls (any s etc.			
	Centering and shu	ttering		· •						
	Inside of wall	4	7.750	5.250			162.750			
	Out side of walls	4	8.350	5.250			175.350			
	Total						338.100			
				Te	otal Quantit	y in sqm	338.100			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
13.01	5.9.3									
2	Centering and shu floors, roofs, landi	ttering inc ngs, balco	cluding strutt	ing, etc. and ess platform	removal of f	orm for:S	uspended			
	Centering and shu	ttering								
	Top slab	1	7.750	7.750			60.063			
	Top slab side	4	8.350		0.200		6.680			
	Total						66.743			
				Τα	otal Quantit	y in sqm	66.743			
13.01	5.9.5									
3	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									
			FI A	To	otal Quantit	y in sqm	9.185			
13.01	13.7.1			CONTRACTOR OF	nRA	AL S	2			
4	12 mm cement pla cement : 3 fine sar	ster finish nd)	ed with a flo	ating coat of	neat cement	t of mix:1	:3 (1			
	12 mm cement	plaster fin	ished			10				
	Base slab	4	9.550	C WORKS	0.350	S	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			
				Тс	otal Quantit	y in sqm	521.909			
13.01	13.52.2									
5	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										
13.01	22.23.1										
	water tanks, roof s tunnels / subway and bridg integral crystalline integral crystalline same from negativ shall meet the requ permeability of co DIN 1048 and resi slurry shall be cap shall be carried ou engineerin- charge. The produ- leakage.For vertica	labs, podi ge deck et e slurry : 2 e slurry : 1 re (interna airements ncrete by stant to 1 able of se t all comp ct perform al surface	ums, reservie c., prepared l parts water) part water) 1) side with t as specified more than 90 6 bar hydrost lf-healing of blete as per sp nance shall ca two coats @	or, sewage & by mixing in for vertical s for horizonta he help of sy in ACI-212-1 0% compared atic pressure cracks up to pecification a arry guarante 0.70 kg per s	the ratio of 5 surfaces and l surfaces and l surfaces and nthetic fiber 3R-2010 i.e to with contro on negative a width of 0 and the direct e for 10 year agm	treatment 5 : 2 (5 pa 3 : 1 (3 p d applyin brush. Th by reducir l concrete side. The .50mm. T tion of the rs against	plant, arts arts g the material ng e as per crystalline the work e any				
	с	[
	Inside of walls	4	7.750		5.250		162.750				
	Total						162.750				
				To	otal Quantit	y in sqm	162.750				
7	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 & amp; 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 som										

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	Providing and app waterproofing treater	lying inte tment	gral crystalli	ne slurry of l	hydrophilic i	n nature fo	or				
	Base slab	1	7.750	7.750			60.063				
	Total						60.063				
				Т	otal Quantit	y in sqm	60.063				
13.01	100.36.1										
8	Filling water with of 5 km (average) height not less tha and other applienc	5000 litre to the rese n 3 m usin tes and co	e tankers fite ervoir site an ng 5 HP dies st of water e	d in lorry and d pumping t el engine pur tc. complete.	d conveying whe water into mp set , hire t	water from the reserve for tanker	n a distance voir of lorry, tools				
	Filling water										
	Tank		315.328								
	Total 315.328										
	Total Quantity in Kilo litre 315.328										
13.01	100.41.34										
9	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 fix	ing Rectar	ngular C.I. m	anhole cove	r						
		2		<			2.000				
	Total		CPLATE	NAM FOR THE	MANAGERAU	NT.	2.000				
		-	OP PUBL	IC WORKS	Total Quant	tity in no	2.000				
13.02 0	19.16 Providing orange of as per IS: 10910 of cross section as 23 165 mm with mini- top surface by ribb projections on tail stand the bend test manufactures permi- fixing in manholes sand: 6 graded sto Providing orange of as per IS: 10910 of	colour saf n 12 mm x 25 imum 112 bing or ch- length on t and chen nanent ide s with 30x ne aggreg colour saf n 12 mm	ety foot rest dia steeel bas mm and ove mm space b equering bes 138 mm as nical resistan entification n 20x15 cm ce ate 20 mm n ety foot rest dia steeel bas	of minimum r conforming er all minimu etween protri ides necessar per standard ice test as per nark to be vis ement concre ominal size) of minimum r conforming	6 mm thick to IS:1786, im length 26 ruded legs ha ry and adequ drawing and r specificatio sible even aft the block 1:3: Complete as 6 mm thick to IS:1786	plastic end having mi 3 mm and ving 2 mr ate anchor suitable t ns and hav er fixing i 6 (1ceme per desig plastic end	capsulated nimum width as n tread on ring o with ving including ent: 3 coarse n capsulated 15.000				
	Total						15.000				
				Т	otal Quantit	y in each	15.000				
14	MBBR 4										
14.00 1	2.6.1										

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ing 30 cm of excava 1 and neat	v mechanical n in depth, 1. ated earth, lea ly dressed.A	means (Hyd 5 m in width ad up to 50 n 11 kinds of sc	raulic excava as well as 10 and lift up bil	ator)/man 3 sqm on to 1.5 m, o	ual means plan) disposed			
	Earth work in ex	xcavation	by mechanic	cal 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									
14.00	4.1.5									
2	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 la	aying in p	osition ceme	nt concrete		-				
	Base slab pcc	1	6.600	6.600	0.150	ET	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	100		<			8.898			
			CPLATES	Te	otal Quantit	y in cum	8.898			
14.00	5.37.1		OF PUEU	IC WORKS						
5	Providing and layi cement concrete w manufactured in fu transit mixer for al design of specified R.M.C. from trans finishing and reinf as per IS: 9103 to impairing strength Cement content co per design mix is p	ng in pos- ork, using illy auton il leads, ha l grade fo it mixer to orcement accelerate and dura onsidered payable/re	ition ready m g cement com natic batching aving continu r reinforced of o site of layin including co by retard setting bility as per of in this item i ecoverable se	tixed M-25 g attent as per ap g plant and tr aous agitated cement concr ng, excluding ost of admixtung of concret direction of t s @330 kg/c parately.All	rade concrete pproved desi- ansported to mixer, many rete work inc the cost of cures in recom- e, improve whe Engineer cum. Excess wiork upto p	e for reinf gn mix, site of we ufactured luding pu centering, mended j workabilit - in -charg /less ceme linth leve	orced ork in as per mix mping of shuttering proportions by without ge. Note:- ent used as l			
	Providing and la	ying in po	osition ready	mixed M-25	grade concr	ete				
	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			
				Te	otal Quantit	y in cum	26.069			
14.00	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										
	Wall	1 ng m	20 400	5 000	0.300		30,600				
	Total 30.600										
				Тс	otal Quantity	v in cum	30,600				
14.00	5.34.1										
5	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 providi	ng richer	mixes								
	Qty vide item 3	1	26.069	C WORKS	MANAGENAER	0	26.069				
	Qty vide item 4	1	30.600				30.600				
	Total						56.669				
				To	otal Quantity	y in cum	56.669				
14.00	4.12										
0	Extra for providing doses by weight of	g and mix f cement a	ing water pro as per manufa	ofing materiated acturer's spec	ial in cement	concrete	work in				
	Extra for provi	ding and	mixing water	r proofing m	aterial						
	Qty vide item 3	1	26.069		330.000		8602.770				
	Qty vide item 4	1	30.600		330.000		10098.00 0				
	Total						18700.77 0				
				,	Fotal Quant	ity in kg	18700.77 0				
14.00	OD235088/2022-2023										
7	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				
				Тс	otal Quantity	y in cum	56.669				
14.00	5.22.6										
8	Steel reinforcemer in position and bin bars of grade Fe-50	nt for R.C ding all c 00D or m	.C work inclu omplete upto ore	ding straigh plinth level	tening, cuttir Thermo - Me	ng, bendir echanicall	ig, placing y Treated				
	Steel reinforceme	ent 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 Q	Quantity in k	kilogram	6800.280				
14.00	OD235089/2022-2	2023									
9	Extra for providing epoxy coating for reinforcement bars.										
	Extra for providi	Extra for providing epoxy coating for reinforcement bars.									
	Qty vide item 3	1	26.069	0411	120.000	ET	3128.280				
	Qty vide item 4	1	30.600	MESIER.	120.000		3672.000				
	Total 6800.2										
		100			Total Quant	ity in kg	6800.280				
14.01	5.9.1		CPLATES	AM FOR THE	MANAGERAN	IT.					
0	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete										
	Centering and shu	ttering									
	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				
				То	otal Quantit	y in sqm	55.260				
14.01	5.9.2										
1	Centering and shut thickness) includir	ttering inc ng attache	cluding strutt d pilasters, b	ing, etc. and utteresses, pl	removal of f	orm for:W	√alls (any s etc.				
	Centering and shu	uttering									
	Inside of walls	4	4.800		5.000		96.000				
	Outside of walls	4	5.400		5.000		108.000				
	Total										
	Total Quantity in sqm 204.00										
14.01	13.7.1										
2	12 mm cement pla cement : 3 fine sam	ster finish 1d)	ned with a flo	ating coat of	f neat cement	t of mix:1	:3 (1				

12 mm cement plaster finishedBase Slab side14.0006.3000.3508.820Inside of walls44.8005.00096.000Outside of walls45.4005.000108.000Top of wall120.4000.3006.120Base slab offset123.4000.45010.530TotalUse of the state of t	Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
Base Slab side14.0006.3000.3508.820Inside of walls44.8005.00096.000Outside of walls45.4005.000108.000Top of wall120.4000.3006.120Base slab offset123.4000.45010.530TotalUse of the state of the stat		12 mm cement p	laster fini	shed					
Inside of walls44.8005.00096.000Outside of walls45.4005.000108.000Top of wall120.4000.3006.120Base slab offset123.4000.45010.530TotalUse of the state of th		Base Slab side	1	4.000	6.300	0.350		8.820	
Outside of walls45.4005.000108.000Top of wall120.4000.3006.120Base slab offset123.4000.45010.530Total229.470Total229.470Image: State of the s		Inside of walls	4	4.800		5.000		96.000	
Top of wall120.4000.3006.120Base slab offset123.4000.45010.530Total229.470Total Quantity in sqm229.47013.52.2Finishing 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 workOut side wall121.6005.000108.000Total102.04000.3006.120Total114.120Total Quantity in sqm114.120Total Quantity in sqm114.120Providing and applying integral crystalline slurry of hydrophilic in nature for water tarks, 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 : 1 part water) for horizontal surfaces and 3 : 1 (3 parts integ		Outside of walls	4	5.400		5.000		108.000	
Base slab offset 1 23.400 0.450 10.530 Total IDENTIFY CONTINUES IN TABLE INTO A STATE I		Top of wall	1	20.400	0.300			6.120	
Total 229.470 14.01 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 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 1 21.600 5.000 Total 108.000 Total 114.120 Total Quantity in sqm 14.01 22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature for water trans, 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 vortical 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 carable of slf-healing of cracks up to a width of 0.500m. The work shall be carable of slf-healing of cracks up to a width of 0.500mm		Base slab offset	1	23.400	0.450			10.530	
Total Quantity in sqm 229.470 14.01 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 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 108.000 Top of wall 1 21.600 5.000 6.120 Total Total 114.120 114.120 Total Quantity in sqm 114.120 Total Quantity in sqm 114.120 14.00 0.300 6.120 Total Quantity in sqm 114.120 Total Quantity in sqm 114.120 14.00 0.300 6.120 Total Quantity in sqm 114.120 Total Quantity in sqm 114.120 14.00 0.300 6.120 Verviding and applying integral crystalline slurry of hydrophilic in nature for water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratiol of 5 : 2 (5 parts integral crystalline slurry : 1 p		Total						229.470	
14.01 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 Total Quantity in sqm 114.120 Total Quantity in sqm 14.01 22.23.1 Total Quantity in sqm 114.120 14.01 22.23.1 Total Quantity in sqm					Тс	otal Quantity	y in sqm	229.470	
3 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 Total Quantity in sqm 114.120 14.01 22.23.1 Total Quantity in sqm 114.120 4 Providing and applying integral crystalline slurry of hydrophilic in nature for water roofing 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 horizontal 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 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	14.01	13.52.2							
Top of wall 1 20.400 0.300 6.120 Total 114.120 Total Quantity in sqm 114.120 14.01 4 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 vertical 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 14.01 22.23.2		per manufacturer's surface, etc. comp Finishing with Out side wall	specifica lete.On co Epoxy pa	tions including increte work int (two or m 21.600	ore coats) at 5.000	all locations	pared and bat, prepar	108.000	
Total 114.120 14.01 22.23.1 114.120 4 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 vortical 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 carpable 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 14.01 122.23.2		Top of wall	1	20.400	0.300		100	6.120	
14.01 22.23.1 Image: Construction of the second secon		Total							
14.01 22.23.1 4 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 carpable 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 14.01 22.23.2					To	otal Quantity	y in sqm	114.120	
14.01 22 23 2	4	Providing and app waterproofing trea water tanks, roof s / subway and bridg integral crystalline same from negative shall meet the requ permeability of co DIN 1048 and resi slurry shall be cap shall be carried ou engineerin- charge. The produ leakage.For vertica Providing and app waterproofing trea MBBR 4 Total	lying integ the shurry is the	gral crystallin he RCC structums, reserved c., prepared b parts water) part water) 1) side with t as specified is more than 90 5 bar hydrost lf-healing of blete as per sp nance shall ca two coats @ gral crystallin 4.800	he slurry of h ctures like re or, sewage & oy mixing in for vertical s for horizonta he help of sy in ACI-212-3 0% compared atic pressure cracks up to becification a arry guarante 0.70 kg per s he slurry of h	hydrophilic ir taining walls water treatm the ratio of 5 surfaces and l surfaces and l surfaces and l surfaces and muthetic fiber 3R-2010 i.e b l with contro on negative a width of 0. and the direct e for 10 year and hydrophilic ir 5.000	n nature for of the banent plant 5 : 2 (5 pa 3 : 1 (3 pa d applyin brush. The by reducin l concrete side. The 50mm. The ion of the rs against n nature for v in som	or sement, tunnels rts arts g the he material g as per crystalline he work any or <u>96.000</u> 96.000	
	14.01	22 23 2			10		y 111 SQ111	20.000	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity					
	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 app waterproofing trea	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment										
	Base Slab top	1	4.800	4.800			23.040					
	Total		JU?	6 ALL	_	ET	23.040					
			100	T	otal Quantit	y in sqm	23.040					
14.01	100.36.1				Con-	-						
6	Filling water with of 5 km (average) height not less that and other applience	5000 litre to the rese n 3 m usin es and co	e tankers fited ervoir site an ng 5 HP dies st of water et	d in lorry and d pumping th el engine pur tc. complete.	l conveying y ne water into np set , hire :	water from the reserve for tanker	n a distance voir of lorry, tools					
	Filling water	r										
	MBBR 4	1	4.800	4.800	5.000		115.200					
	Total						115.200					
				Total (Quantity in l	Kilo litre	115.200					
14.01	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											
				Τα	tal Quantit	v in each	14.000					

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity					
15	SECONDARY CLARIFIER WITH PLATE SETTLER											
15.00	2.6.1											
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	excavatio	on by mechan	ical 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					
				Тс	otal Quantit	y in cum	176.277					
15.00	4.1.5		6	Carlon I								
	of centering and laying in position cement concrete of specified grade excluding the cost sand : 6 graded stone aggregate 20 mm nominal size)											
	Pile cap P1	12	1.400	1.400	0.150	17	3.528					
	Grade Beam	1	35.004	0.650	0.100	22	2.275					
	Base Slab pcc	1	39.240		0.150		5.886					
	Total						11.689					
				Тс	otal Quantit	y in cum	11.689					
15.00	5.37.1											
3	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 Base slab- inverted beams	1	8.300	0.450	0.450		31.001					

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				
				Тс	otal Quantit	y in cum	60.413				
15.00	5.37.2										
4	Providing and layi cement concrete w manufactured in fu transit mixer for al design of specified R.M.C. from trans finishing and reinf as per IS: 9103 to impairing strength Cement content co per design mix is p floor V level	ng in posi york, using ally autom Il leads, ha I grade for it mixer to forcement accelerate and dural posidered payable/re	ition ready m g cement com natic batching aving continuer r reinforced of o site of layin including co / retard settin bility as per of in this item in coverable se	tixed M-25 g tent as per ap g plant and tr aous agitated cement concr ng, excluding of admixtung of concret direction of th s @330 kg/c parately.All	rade concrete oproved desi ansported to mixer, many ete work inc the cost of correst in recom- e, improve whe Engineer oum. Excess work above p	e for reinf gn mix, site of we ufactured luding pu centering, mended p workabilit - in -charg /less ceme plinth leve	Forced ork in as per mix mping of shuttering proportions by without ge. Note:- ent used as el upto				
	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		27.200	0.300	2.800		22.848				
	Clarifier-hopper container	4	9.900	0.300		50C	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				
				Тс	otal Quantit	y in cum	50.540				
15.00 5	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										
				Тс	tal Quantit	y in cum	110.953				

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
15.00	4.12								
6	Extra for providing doses by weight of	g and mix f cement a	ing water pro as per manufa	ofing mater acturer's spec	ial in cement	concrete	work in		
	Extra for providing	g and mix	ing water pro	oofing mater	ial				
	Quantity as per item No.3	1	60.413			340.00 0000	20540.42 0		
	Quantity as per item No.4	1	50.540			340.00 0000	17183.60 0		
	Total						37724.02 0		
				,	Total Quant	tity in kg	37724.02 0		
15.00	OD235095/2022-2	2023							
7	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	041		FT	60.413		
	Qty taken from item no-4	1	50.540	3-11			50.540		
	Total			≤ 1			110.953		
			CPLATE	TTC	otal Quantit	y in cum	110.953		
15.00	5.22.6		COLUMN DE						
8	Steel reinforcement in position and bin bars of grade Fe-5	nt for R.C ding all c 00D or m	.C work inclu omplete upto ore	ding straigh plinth level	tening, cuttin Thermo - Me	ng, bendir echanicall	ig, placing y Treated		
	Steel reinforcemer	nt 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						13314.36 0		
	Total Quantity in kilogram								
15.00	OD235096/2022-2023								
9	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						13314.36 0			
				I	Total Quant	tity in kg	13314.36 0			
15.01	5.9.1									
0	Centering and shut footings, bases of	ttering ind columns,	cluding strutt etc for mass	ing, etc. and concrete	removal of f	orm for:F	oundations,			
	Centering and sh	uttering in	ncluding stru	tting						
	Base slab-raft beam slab type	4	8.300		0.450		14.940			
	Total						14.940			
				Т	otal Quantit	y in sqm	14.940			
15.01	5.9.2									
1	Centering and shuttering including strutting, etc. and removal of form for:Walls (any hickness) including attached pilasters, butteresses, plinth and string courses etc.									
	Centering and shu	ttering	J.A.P.	0411		ET	1			
	Top channels	2	30.800	CODSIBER I	1.650		101.640			
	Inside Walls	4	6.500		2.800		72.800			
	Outside Walls	4	7.100	<	2.800		79.520			
	Total		CPLATES	DRM FOR THE	MANAGEMEN	IT.	253.960			
		-	OF PUEU	T	otal Quantit	y in sqm	253.960			
15.01	5.9.3									
2	Centering and shut floors, roofs, landi	ttering ind ngs, balco	cluding strutt	ing, etc. and ess platform	removal of f	orm for:S	uspended			
	Centering and shu	ttering								
	Clarifier-hopper container	4	4.750	2.500			47.500			
	Total						47.500			
				Т	otal Quantit	y in sqm	47.500			
15.01	5.9.5									
3	Centering and shut beams, plinth beam	ttering ind ns, girder	cluding strutt s bressumers	ing, etc. and and cantilev	removal of f	orm for:L	intels,			
	Centering and shuttering									
	Base slab- inverted beams211.4000.600									
	Total									
	Total Quantity in sqm 13.680									
15.01	5.9.6									
4	Centering and shut Pillars, Piers, Abut	ttering ind tments, Po	cluding strutt	ing, etc. and ts	removal of f	orm for:C	olumns,			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
	Centering and shut	tering						
	Columns-long	16		0.450	2.200		15.840	
	Columns-short	16		0.450	0.750		5.400	
	Total						21.240	
				Τα	tal Quantit	y in sqm	21.240	
15.01	13.7.1							
5	12 mm cement pla cement : 3 fine sar	ster finish d)	ed with a flo	ating coat of	neat cement	of mix:1	:3 (1	
	12 mm cement	olaster fini	shed with a	floating coat	of neat ceme	ent of mix	X:	
	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	242	1.650		101.640	
	Base slab inside	1	3.300	3.300			10.890	
	Hopper Top and Bottom	8	4.750	2.500	DRI	FI	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	CPLATES	0.450	0.750	in .	5.400	
	Top of wall	1	27.200	0.300			8.160	
	Total						546.490	
				Τα	tal Quantit	y in sqm	546.490	
15.01	13.52.2							
6	Finishing with Epo per manufacturer's surface, etc. compl	oxy paint (specificat lete.On co	two or more tions including	coats) at all ng appropriat	locations pre e priming co	epared and bat, prepa	d applied as ration of	
	Finishing with H	Epoxy pair	nt (two or me	ore coats) at a	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							
				Τα	tal Quantit	y in sqm	351.040	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
15.01	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 som								
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment								
	Bottom slab inside	1	3.300	3.300	-01	FT	10.890		
	Total						10.890		
		1		T	otal Quantit	y in sqm	10.890		
8	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, tunnel / 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 mater 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 crystal slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The worl 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 som								
	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		
------------	---	--	--	---	---	--------------------------------------	--------------------------------	--	--
15.01	100.36.1								
9	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 H	Kilo litre	174.706		
15.02	19.16								
	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								
		8		- comorning			8.000		
	Total						8.000		
				To	tal Ouantity	y in each	8.000		
16	SLUDGE SUMP			-	<u> </u>				
16.00	2.6.1								
1	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ing 30 cm of excava 1 and neat	w mechanical n in depth, 1.3 ated earth, lea ly dressed.A	means (Hyd 5 m in width ad up to 50 n ll kinds of so	raulic excava as well as 10 n and lift up t il	ator)/man) sqm on to 1.5 m, (ual means plan) disposed		
	Earth work in	excavatio	on by mechan	ical means					
	Base slab	1	3.140	1.550*1.5 50	4.2+0.45 0		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		
				То	otal Quantity	y in cum	46.615		
16.00 2	4.1.5								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	Providing and layi of centering and sl sand : 6 graded sto	ng in posi nuttering - one aggreg	ition cement - All work up gate 20 mm n	concrete of s to plinth lev cominal size)	pecified grad el:1:3:6 (1 c	de excludi ement : 3	ing the cost coarse		
	Providing and lay	ying in po	sition cemen	t 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								
				Τα	otal Quantit	y in cum	1.605		
16.00 3	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								
	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*1.5 50	0.450		3.395		
	Total						9.683		
				Τα	otal Quantit	y in cum	9.683		
16.00	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 la	ying in po	osition ready	mixed M-25	grade concr	ete			
	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				
				Τα	otal Quantit	y in cum	7.876				
16.00	5.34.1										
5	Extra for providing specified cement c grade concrete inst in M-30 is @ 340	g richer m ontent use tead of M kg/cum).	ixes at all flo ed is payable, -25 grade BM	or levels. No / recoverable IC/RMC. (N	ote:- Excess/ e separately.H lote:- Cemen	less ceme Providing t content	nt over the M-30 considered				
	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	20			7.876				
	Total										
	Total Quantity in cum 17.559										
16.00	4.12										
6	Extra for providing doses by weight of	g and mix cement a	ing water pro	ofing materi cturer's spec	al in cement	concrete	work in				
	Extra for providi	ng and mi	xing water pi	roofing mate	rial	er.					
	Quantity as per item No.3	1	9.683	for the second second	330.000		3195.390				
	Quantity as per item No.4	1	7.876		330.000		2599.080				
	Total						5794.470				
				r	Fotal Quant	ity in kg	5794.470				
16.00	5.22.6										
7	Steel reinforcement in position and bin bars of grade Fe-50	t for R.C. ding all c 00D or me	C work inclu omplete upto ore	ding straigh plinth level	tening, cuttir Thermo - Me	ng, bendin echanicall	ng, placing y Treated				
	Steel reinforceme	ent for R.C	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										
				Total Q	Quantity in k	cilogram	2107.080				
16.00	OD235093/2022-2	2023									
8	Extra for providing	g epoxy c	oating for rei	nforcement b	oars.						
	Extra for providi	ng sulpha	te resistant c	ement							

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			
				r	Fotal Quant	tity in kg	2107.080			
16.00	OD235094/2022-2	2023								
9	Extra for providing	g sulphate	resistant cen	nent for the s	structures ab	ove plinth	level.			
	Extra for providi	ng epoxy	coating for re	einforcement	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			
			-	То	otal Quantit	y in cum	17.559			
16.01	5.9.1		내내	041	1	TET				
0	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete									
	Centering and sh	uttering			-					
	Pile cap P1	16	1.100		1.000		17.600			
	Grade Beam	2	4.290	C WORKS	0.750	Si	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			
				Тс	otal Quantit	y in sqm	29.207			
16.01	5.9.2									
1	Centering and shu thickness) includir	ttering inc	luding strutti d pilasters, b	ing, etc. and utteresses, pl	removal of f	form for:W	Valls (any s etc.			
	Centering and shu	ttering inc	luding strutti	ng, etc. and	removal of f	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			
				Тс	otal Quantit	y in sqm	59.346			
16.01	5.9.3									
2	Centering and shu floors, roofs, landi	ttering inc ngs, balco	luding struttionies and acc	ing, etc. and ess platform	removal of f	form for:S	uspended			
	Centering and shu	ittering	,	,						
	Cover slab	3.14	1.000	1.000			3.140			
	Total						3.140			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
				To	tal Quantity	v in sqm	3.140		
16.01	13.7.1								
3	12 mm cement pla cement : 3 fine san	ster finish d)	ned with a floa	ating coat of	neat cement	of mix:1	:3 (1		
	12 mm cement	plaster fi	nished						
	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.								
	Total Quantity in sqm 74.41								
16.01									
	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								
	outside of wells	роху ран 1	2*2.14	1 250	4 200	÷	22.070		
	Top of wall	1	2*3.14	1.230	0.250		1 766		
	Top of wall	1	2 3.140	1.123	0.230		34 736		
	Total			То	tal Auantity	in sam	34 736		
16.01	22.23.1			10	tai Quantity	/ III SqIII	54.750		
5	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 app waterproofing trea	tment		ne slurry of h	ydrophilic ir	n nature f	for		
	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				
				Т	otal Quantit	y in sqm	26.376				
16.01	22.23.2										
0	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	er	-	3.140				
	Total	100		< 1			3.140				
		_	CPLATES	Ter son Mai	otal Quantit	y in sqm	3.140				
16.01	100.36.1	_	01-1000	A AAPSANCE							
	Filling water with of 5 km (average) height not less that and other applienc	5000 litre to the reso n 3 m usin es and co	tankers fited ervoir site an ng 5 HP diese st of water et	l in lorry and d pumping th el engine pur c. complete.	l conveying v he water into np set , hire f	water from the reservent for tanker	n a distance voir of lorry, tools				
	Filling water										
	Tank	3.14	1.000	1.000	4.200		13.188				
	Total						13.188				
				Total (Quantity in I	Kilo litre	13.188				
16.01	100.41.34										
8	Supplying and fixi (low duty) charges	ng Rectar	ngular C.I. m g all cost, lab	anhole cover	t 455mm x 6 etc., complet	10mm wi e.	th frame				
	Supplying and fixi	ng Rectar	ngular C.I. m	anhole cover	r 455mm x 6	10mm wi	th frame				
		1					1.000				
	Total						1.000				
				,	Total Quant	ity in no	1.000				
16.01 9	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											
	Total						12.000					
	Total Quantity in each 12.000											
17	SLUDGE THICKNER											
17.00	2.6.1											
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	Ð	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					
				Te	otal Quantit	y in cum	41.470					
17.00	4.1.5											
2	Providing and layi of centering and sl sand : 6 graded sto	ng in pos nuttering one aggreg	ition cement - All work up gate 20 mm r	concrete of so to plinth leve cominal size)	pecified grad vel:1:3:6 (1 c	de excludi ement : 3	ing the cost coarse					
	Providing and lay	ing in pos	sition 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					
				Т	otal Quantit	y in cum	5.975					
17.00	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 lay	ing in pos	ition ready n	nixed M-25 g	grade concre	te					
	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			242			29.161				
			65	Te	otal Quantit	y in cum	29.161				
17.00	5.37.2		141	Stories .		FI	1				
	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										
	Providing and lay cement concrete w	ying in po ork, using	sition ready i g cement	mixed M-25	grade concre	ete for rein	nforced				
	Wall	6.28	2.850	0.300	4.200		22.551				
	Total						22.551				
				Тс	otal Quantit	y in cum	22.551				
17.00	5.34.1										
5	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 providi	ng 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			
				Te	otal Quantit	y in cum	51.712			
17.00	4.12									
6	Extra for providing doses by weight of	g and mix	ing water pro	oofing materi acturer's spec	ial in cement	t concrete	work in			
	Extra for providi	ng and mi	xing water p	roofing mate	rial	1				
	Qty Vide Item No: 3	1	29.161			340.00 0000	9914.740			
	Qty Vide Item No: 4	1	22.551			340.00 0000	7667.340			
	Total	17582.08 0								
		17582.08 0								
17.00	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		F		29.161			
	Qty Vide Item No: 4	1	22.551	DRAM POR THE	NANAGENE	100 100	22.551			
	Total		OF POBO	AL YVIJHICH			51.712			
				Тс	otal Quantit	y in cum	51.712			
17.00	5.22.6									
8	Steel reinforcemer in position and bin bars of grade Fe-5	nt for R.C ding all c 00D or m	C work inclu omplete upto ore	ding straigh plinth level	tening, cutti Thermo - Mo	ng, bendir echanicall	ng, placing y Treated			
	Steel reinforceme	ent for R.C	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 l	kilogram	6205.440			
17.00	OD235098/2022-2	2023								
9	Extra for providing	g epoxy c	oating for rei	nforcement l	oars.					
	Extra for providi	ng epoxy	coating for re	einforcement	bars.	1				
	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		
				r	Fotal Quant	ity in kg	6205.440		
17.01	5.9.1								
0	Centering and shur footings, bases of	ttering ind columns,	cluding strutt	ing, etc. and concrete	removal of f	orm for:F	oundations,		
	Centering and shu	ttering in	cluding strut	ting					
	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		
				Тс	otal Quantit	y in sqm	60.695		
17.01	5.9.2		113	(a)	_				
1	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 shu	Ittering							
	Inside of walls	3.14	5.400	\sim	4.200	10	71.215		
	Out side of walls	3.14	6.000	AN FOR THE	4.200	(T)	79.128		
	Total		0.003447022				150.343		
				Тс	otal Quantit	y in sqm	150.343		
17.01	13.7.1								
2	12 mm cement pla cement : 3 fine sar	ster finish 1d)	ned with a flo	ating coat of	neat cement	t of mix:1	:3 (1		
	12 mm cement p	laster fini	shed						
	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		
				To	otal Quantit	y in sqm	174.576		
17.01	13.52.2								
3	Finishing with Epo per manufacturer's surface, etc. comp	oxy paint specifica lete.On co	(two or more tions includit	coats) at all ng appropria	locations protections protection for the second sec	epared and bat, prepa	d applied as ration of		
	Finishing with E	poxy pair	nt						
	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									
				Te	otal Quantit	y in sqm	84.497			
17.01	22.23.1									
4	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									
	waterproofing treatment to the RCC									
	Total	3.14	5.400	<u> </u>	4.200		71.213			
		-	OF PUBL	T	tal Quantit	v in sam	71 215			
17.01	22.23.2				in Quantity	<u>y moqm</u>	/ 1,210			
5	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									
	Providing and approved and approved and approximately and approximately	olying inte	egral crystalli	ne slurry of	hydrophilic i	in nature f	ìor			
	Base Slab top	3.14	2.700	2.700			22.891			
	Total	·					22.891			
				To	otal Quantit	y in sqm	22.891			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
17.01	100.36.1									
6	Filling water with of 5 km (average) height not less that and other applience	5000 litre to the reso n 3 m usir ses and cos	tankers fited ervoir site an ng 5 HP diese st of water et	d in lorry and d pumping th el engine pur c. complete.	l conveying v ne water into np set , hire f	water from the reser- for tanker	n a distance voir of lorry, tools			
	Filling water with distance of 5 km	5000 litro	e tankers fite	d in lorry and	d conveying	water from	m a			
	Tank	3.14	2.700	2.700	4.200		96.141			
	Total						96.141			
	Total Quantity in Kilo litre 96.14									
17.01	19.16									
	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									
	as per 13. 109100	12	and steech bal	comorning	10 15.1700		12.000			
	Total						12.000			
				Τα	tal Quantity	y in each	12.000			
18	FILTER FEED TA	ANK								
18.00	2.6.1									
1	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ling 30 cm of excava d and neat	mechanical in depth, 1. ited earth, lea ly dressed.A	means (Hyd 5 m in width ad up to 50 n 11 kinds of sc	raulic excava as well as 10 and lift up t il	ntor)/man) sqm on to 1.5 m,	ual means plan) disposed			
	Earth work in exca	avation 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			
				Te	otal Quantity	y in cum	40.052			
18.00	4.1.5									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Providing and layi of centering and sl sand : 6 graded sto	ng in posi nuttering - one aggreg	tion cement All work up gate 20 mm n	concrete of s to plinth lev ominal size)	pecified grad el:1:3:6 (1 c	de excludi ement : 3	ing the cost coarse			
	Providing and lay	ing in pos	ition 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			
				To	tal Quantity	y in cum	4.147			
18.00	5.37.1									
	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 layi	ng in posi	tion ready m	ixed M-25 g	rade concret	e				
	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			
	1 otal			T	. 10	•	15.812			
				10	tal Quantit	y in cum	15.812			
4	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									
	Providing and lay	ing in pos	ition ready n	nixed M-25 g	rade concret	te				
	wall	1	16.000	3.850	0.250		15.400			
	Total						15.400			
				Το	tal Quantit	y in cum	15.400			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
18.00	5.34.1								
5	Extra for providing specified cement c grade concrete ins in M-30 is @ 340	g richer m content us tead of M kg/cum).	nixes at all flo ed is payable -25 grade BM	oor levels. No / recoverable MC/RMC. (N	ote:- Excess/ e separately.l lote:- Cemen	less ceme Providing at content	ent over the M-30 considered		
	Extra for providin	ig richer r	nixes						
	Qty Vide Item No:3	1	15.812				15.812		
	Qty Vide Item No:4	1	15.400				15.400		
	Total						31.212		
				Тс	otal Quantit	y in cum	31.212		
18.00	4.12								
6	Extra for providing doses by weight of	g and mix f cement a	ing water pro	oofing mater	ial in cement	concrete	work in		
	Extra for providing and mixing water proofing material								
	Quantity as per item No.3115.812330.000								
	Quantity as per item No.4115.400330.000								
	Total		C PLATE	WORKS	AANAGEME	4T	10299.96 0		
				,	Total Quant	tity in kg	10299.96 0		
18.00	OD235101/2022-2	2023							
7	Extra for providing	g sulphate	e resistant cei	ment for the	structures ab	ove plinth	n level.		
	Extra for providin	ig sulphat	e resistant ce	ment					
	Qty Vide Item No:3	1	15.812				15.812		
	Qty Vide Item No:4	1	15.400				15.400		
	Total						31.212		
				Te	otal Quantit	y in cum	31.212		
18.00	5.22.6								
8	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 reinforceme	nt for R.C	C.C work			· · · · · · · · · · · · · · · · · · ·	1		
	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 Q)uantity in l	kilogram	3745.440			
18.00	OD235102/2022-2	2023								
9	Extra for providing	g epoxy c	oating for rei	nforcement b	oars.					
	Extra for providin	ig epoxy c	coating for re-	inforcement	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									
	Total Quantity in kg									
18.01	5.9.1									
0	Centering and shu footings, bases of	ttering inc columns,	cluding strutti etc for mass of	ing, etc. and concrete	removal of f	form for:F	oundations,			
	Centering and shu	Centering and shuttering								
	Base slab 4 4.850 0.300									
	Pile cap P1	8	1.100		1.000	8.800				
	Grade Beam	2	11.600	1	0.750		17.400			
	Total		1			10	32.020			
			OF PUBL	Te	otal Quantit	y in sqm	32.020			
18.01	5.9.2									
1	Centering and shu thickness) includir	ttering inc ng attache	cluding strutti d pilasters, b	ing, etc. and utteresses, pl	removal of f	form for:W	Valls (any s etc.			
	Centering and shu	ttering								
	Inside of walls	4	3.750	3.850			57.750			
	Out side of walls	4	4.250	3.850			65.450			
	Total						123.200			
				Te	otal Quantit	y in sqm	123.200			
18.01	13.7.1									
2	12 mm cement pla cement : 3 fine sar	ster finish nd)	ned with a flo	ating coat of	neat cemen	t of mix:1	:3 (1			
	12 mm cement pl	laster finis	shed							
	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									
18.01	13.52.2									
3	Finishing with Epo per manufacturer's surface, etc. comp	oxy paint specifica lete.On co	(two or more tions includi oncrete work	e coats) at all ng appropria	locations protections protections protections and the second seco	epared and bat, prepar	d applied as ration of			
	Finishing with E	ooxy pain	t							
	Out side wall	4	4.250	3.850			65.450			
	Top of wall	1	16.000	0.250			4.000			
	Total						69.450			
				Тс	otal Quantit	y in sqm	69.450			
18.01	22.23.1									
	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									
	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									
				Te	otal Quantit	y in sqm	57.750			
18.01 5	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	(Sector)	501	1-1	14.063			
				T	otal Quantit	y in sqm	14.063			
	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 () uantity in l	Kilo litre	54.141			
18.01 7	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 of as per IS: 10910 or	colour saf	ety foot rest dia steeel ba	of minimum	6 mm thick to IS:1786	plastic en	capsulated			
		11		B			11.000			
	Total						11.000			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
				To	tal Quantit	y in each	11.000			
19	PSF/ACF FOUND	DATION								
19.00	2.6.1									
1	Earth work in exca over areas (exceed including disposal earth to be levelled	avation by ling 30 cm of excava l and neat	/ mechanical n in depth, 1. ated earth, lea tly dressed.A	means (Hyd 5 m in width ad up to 50 n 11 kinds of sc	raulic excava as well as 10 n and lift up il	ator)/man 0 sqm on to 1.5 m, o	ual means plan) disposed			
	Earth work in exca	avation by	mechanical	means						
		2	9.300	4.800	0.450		40.176			
	Total						40.176			
	Total Quantity in cum									
19.00	4.1.5									
2	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 and : 6 graded stone aggregate 20 mm nominal size) Providing and laying in position cement concrete									
	1 TOVICING and Tay	$\frac{110}{2}$		4 800	0.150		13 302			
	Total		9.300	4.800	0.130	100	13.392			
		1.11		Т	tal Quantit	v in oum	12 202			
10.00	5 27 1									
3	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 without plant havel									
	Providing and lay	ing in pos	sition ready r	nixed M-25 §	grade concre	te	24 200			
	Tatal	2	9.000	4.500	0.300		24.300			
	1 otal					•	24.300			
				Te	otal Quantit	y in cum	24.300			
19.00 4	5.22.6 Steel reinforcemer in position and bin bars of grade Fe-5	nt for R.C ding all c 00D or m	.C work inclusion or complete up to ore	uding straigh plinth level	tening, cuttin Thermo - Mo	ng, bendir echanicall	ng, placing y Treated			
	Steel reinforcem	ent 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 Q	Quantity in k	kilogram	2916.000			
19.00	5.9.1									
5	Centering and shut footings, bases of a	ttering inc	cluding strutt etc for mass	ing, etc. and concrete	removal of f	orm for:F	oundations,			
	Centering and shu	ttering								
		4	9+4.5		0.300		16.200			
	Total						16.200			
				Te	otal Quantit	y in sqm	16.200			
20	CHLORIN CONT	ACT TAI	NK							
20.00	2.6.1									
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 exca	vation by	mechanical	means		FI				
	Pile Cap	4	1.400	1.400	1.150		9.016			
	Grade Beam	1	16.800	0.650	0.850		9.282			
	Total					10	18.298			
			CE PURU	To	otal Quantity	y in cum	18.298			
20.00 2	4.1.5 Providing and layi of centering and sh sand : 6 graded sto	ng in posi nuttering - ne aggreg	tion cement All work up gate 20 mm n	concrete of s to plinth lev ominal size)	pecified grad vel:1:3:6 (1 c	de excludi ement : 3	ing the cost coarse			
	Providing and lay	ving in po	sition cemen	t 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			
				To	otal Quantity	y in cum	5.796			
20.00	5.37.1									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	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										
	Providing and layi	ng in pos	ition ready m	nixed M-25 g	rade concret	e					
	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										
4	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										
	Wall	$\frac{1}{1}$	21 200	0 300	rade concret	e	21 306				
	Total	1	21.200	0.000	0.000		21.306				
				Т	otal Quantit	v in cum	21.306				
20.00	5.34.1			1	Zumili	J III CUIII					
5	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 providin	g richer m	nixes		1						
	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		
				Та	otal Quantit	y in cum	51.714		
20.00	4.12								
6	Extra for providin doses by weight of	g and mix f cement a	ing water pro	ofing materi cturer'	al in cement	concrete	work in		
	Extra for providin	g and mix	ing water pro	ofing materi	ial				
	Quantity as per item No.3	1	30.408		330.000		10034.64 0		
	Quantity as per item No.4	1	21.306		330.000		7030.980		
	Total		17065.62 0						
		ity in kg	17065.62 0						
20.00	OD243546/2022-2023								
7	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	RM FOR THE	AANIAGEAMER	1 T	30.408		
	Quantity as per item No.4	1	21.306				21.306		
	Total						51.714		
				То	otal Quantit	y in cum	51.714		
20.00	5.22.6								
8	Steel reinforcement in position and bir bars of grade Fe-5	nt for R.C ding all c 00D or m	.C work inclu omplete upto ore	ding straigh plinth level	tening, cuttin Thermo - Me	ng, bendin echanicall	ng, placing y Treated		
	Steel reinforcement	nt 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 Q	Quantity in k	kilogram	6205.680		
20.00	OD246779/2022-2	2023							
9	Extra for providin	g epoxy c	oating for rei	nforcement b	oars.				
	Extra for providin	g epoxy c	oating for rei	nforcement b	oars.				
	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			
				r	Fotal Quant	ity in kg	6205.680			
20.01	5.9.1									
0	Centering and shu footings, bases of	ttering inc	luding strutt	ing, etc. and concrete	removal of f	orm for:F	oundations,			
	Centering and sh	uttering								
	Pile Cap	16	1.100		1.000		17.600			
	Grade Beam	2	16.800		0.750		25.200			
	Total									
				Te	otal Quantit	y in sqm	42.800			
20.01	5.9.2									
1	Centering and shu thickness) includir	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	1	3.350		75.040			
	Total					10	142.040			
			OF PUBL	To	otal Quantit	y in sqm	142.040			
20.01	5.9.3									
2	Centering and shu floors, roofs, landi	ttering inc ngs, balco	luding strutt	ing, etc. and ess platform	removal of f	orm for:S	uspended			
	Centering and sh	uttering								
	Base Slab side	4	6.200		0.350		8.680			
	Base Slab offset	1	23.600	0.300			7.080			
	Total						15.760			
				Тс	otal Quantit	y in sqm	15.760			
20.01	5.9.5					· · · · ·				
3	Centering and shube beams, plinth bear	ttering inc	luding strutt	ing, etc. and and cantilev	removal of f ers	orm for:L	intels,			
	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			
				Te	otal Quantit	y in sqm	46.640			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
20.01	5.9.6									
4	Centering and shu Pillars, Piers, Abu	ttering inc tments, Po	luding strutti osts and Strut	ing, etc. and a	removal of f	orm for:C	columns,			
	Centering and shu	ittering								
	Base slab column	16		0.450	0.300		2.160			
	Total						2.160			
				To	tal Quantit	y in sqm	2.160			
20.01	13.7.1									
5	12 mm cement pla cement : 3 fine sar	ster finish nd)	ed with a flo	ating coat of	neat cement	of mix:1	:3 (1			
	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	Sel.	0.350		8.680			
	Base slab offset	1	23.600	0.300	_	1	7.080			
	Base slab beam	1	23.000	All	0.650		14.950			
	beam bottom	1	23.000	0.450		-	10.350			
	Base slab Column	16	0.450	< 1	0.300	1	2.160			
	Top of wall	1	21.200	0.300	MANAGEMEN	0	6.360			
	Total						191.620			
				To	tal Quantit	y in sqm	191.620			
20.01	13.52.2									
6	Finishing with Epo per manufacturer& of surface, etc. cor	oxy paint (z#39;s spe nplete.On	(two or more cifications ir concrete wo	coats) at all cluding appr rk	locations pre opriate prim	epared and ing coat,	d applied as preparation			
	Finishing with E	poxy pain	Ţ	Γ						
	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			
				Τα	tal Quantity	y in sqm	191.890			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity					
20.01	22.23.1											
	waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & amp; 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											
	leakage.For vertical surface two coats @0.70 kg per sqm Providing and applying integral crystalline slurry of hydrophilic in nature for											
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC											
	Inside of walls	4	5.000	CARSING ST	3.350	AF a	67.000					
	Total 67.000											
					otal Quantit	y in sqm	67.000					
8	Providing and app waterproofing trea water tanks, roof s tunnels / subway and bridg integral crystalline integral crystalline same from negativ shall meet the requ permeability of co DIN 1048 and resi slurry shall be cap shall be carried ou engineerin- charge. The produce leakage.For horizon	lying inte tment to t labs, podi ge deck et slurry : 2 slurry : 1 e (interna irements ncrete by stant to 1 able of se t all comp ct perform ontal surfa	gral crystalli the RCC stru tums, reservi c., prepared 2 parts water) 1 part water) 1) side with t as specified more than 96 6 bar hydros 1f-healing of olete as per spenance shall c ace one coat	ne slurry of h ctures like re or, sewage & by mixing in o for vertical for horizonta he help of sy in ACI-212 0% compared tatic pressure cracks up to pecification a arry guarante @1.10 kg per	hydrophilic in staining walls camp; water to the ratio of 3 surfaces and al surfaces and al surfaces and control of 0 and the direct end the direct end the direct end the direct end the direct end the direct	n nature for s of the ba treatment 5 : 2 (5 pa 3 : 1 (3 pa d applyin brush. The by reducir of concrete side. The .50mm. T tion of the rs against	or sement, plant, rts arts g the he material g as per crystalline he work any					
	Providing and app	lying inte	gral crystalli	ne slurry of h	nydrophilic i	n nature f	or					
	Rottom Slab top	unent to t	<u>.ne KCC</u> 5 000	5 000			25 000					
	Total	1	5.000	5.000		<u> </u>	25.000					
				T	otal Quantit	y in sqm	25.000					
20.01 9	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 of 5 km (average) to the reservoir site and pumping the water into the reservoir height not less than 3 m using 5 HP diesel engine pump set, hire for tanker loand other appliences and cost of water etc. complete.										
	Filling water										
	Tank	1	5.000	5.000	3.350		83.750				
	Total						83.750				
				Total Q	Quantity in l	Kilo litre	83.750				
20.02	2.25										
0	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.										
	inning under base		4 950	4.950	0.050		22.246				
	Total	1	4.830	4.830	0.930		22.340				
			0.2	(6) /) m	4.10	-	22.540				
20.02	10.1.6		161	10	otal Quantit	y in cum	22.346				
	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										
	•	9					9.000				
	Total			ł			9.000				
				To	tal Quantity	y in each	9.000				
21	TREATED WATI	ER TANK									
21.00	2.6.1										
1	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 exc	avation b	y 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			
				Τα	otal Quantit	y in cum	59.660			
21.00	4.1.5									
2	Providing and layi of centering and sl sand : 6 graded sto	ng in posi nuttering - one aggreg	ition cement - All work up gate 20 mm n	concrete of s to plinth lev ominal size)	pecified grad vel:1:3:6 (1 c	de excludi ement : 3	ing the cost coarse			
	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									
			- ALA	To	otal Quantit	y in cum	9.634			
3	Providing and layi cement concrete w manufactured in fu transit mixer for al design of specified R.M.C. from trans finishing and reinf as per IS: 9103 to impairing strength Cement content co per design mix is t	ng in posi ork, using illy autom il leads, ha l grade for it mixer to orcement accelerate and dural onsidered	ition ready m g cement con hatic batching aving continu r reinforced co o site of layir including co / retard settin bility as per co in this item is	ixed M-25 g tent as per ap g plant and tr ious agitated cement concr ag, excluding st of admixtung of concret lirection of th s @330 kg/c parately All	rade concret proved desi ansported to mixer, many ete work inc the cost of c ures in recorr e, improve w he Engineer cum. Excess	e for reinf gn mix, site of wo ufactured luding pu centering, mended j workabilit - in -charg /less ceme linth leve	Forced ork in as per mix mping of shuttering proportions y without ge. Note:- ent used as			
	Providing and lavi	ng in posi	ition ready m	ixed M-25 g	rade concret	e	-			
	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			
				То	otal Quantit	y in cum	39.214			
21.00	5.37.2									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Providing and laying in position ready mixed M-25 grade concrete for rein cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of w transit mixer for all leads, having continuous agitated mixer, manufactured design of specified grade for reinforced cement concrete work including pl R.M.C. from transit mixer to site of laying, excluding the cost of centering finishing and reinforcement including cost of admixtures in recommended as per IS: 9103 to accelerate/ retard setting of concrete, improve workabil impairing strength and durability as per direction of the Engineer - in -char Cement content considered in this item is @330 kg/cum. Excess /less cem per design mix is payable/recoverable separately.All work above plinth lev 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			
				To	otal Quantit	y in cum	35.100			
21.00	5.34.1		10	25.5	-					
5	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 providin	g richer n	nixes			10				
	Quantity as per item No.3	1	39.214	C WORKS	KANIAGENNEN	<u>0</u>	39.214			
	Quantity as per item No.4	1	35.100				35.100			
	Total						74.314			
				То	otal Quantit	y in cum	74.314			
21.00	4.12									
6	Extra for providing doses by weight of Extra for providing	g and mix cement ang and mi	ing water pro as per manufa xing water pr	oofing materi acturer's spec roofing mate	al in cement ification . rial in cemen	t concrete	work in e work in			
	doses by weight of	cement a	is per manufa	acturer'	S					
	Quantity as per item No.3	1	39.214	330.000			12940.62 0			
	Quantity as per item No.4	1	35.100	330.000			11583.00 0			
	Total						24523.62 0			
				r	Fotal Quant	ity in kg	24523.62 0			
21.00	OD235081/2022-2	2023								
7	Extra for providing	g sulphate	resistant cer	nent for the s	structures ab	ove plinth	level.			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Extra for providir	ng sulphat	e resistant ce	ment for the	structures at	ove plint	h 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			
				Т	otal Quantit	y in cum	74.314			
21.00	5.22.6									
8	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 reinforceme	nt for R.C	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		141	MODE.		FI	8917.680			
	Total Quantity in kilogram									
21.00	OD235082/2022-2	2023		1	-					
9	Extra for providin	g epoxy c	oating for rei	nforcement	oars.	10				
	Extra for providi	ng epoxy	coating for re	einforcement	bars.	41				
	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 Quant	tity in kg	8917.680			
21.01	5.9.1									
0	Centering and shu footings, bases of	ttering inc columns,	cluding strutti etc for mass	ing, etc. and concrete	removal of f	orm for:F	oundations,			
	Centering and shu	ttering								
	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			
				T	otal Quantit	y in sqm	89.720			
21.01	5.9.2									
1	Centering and shu thickness) including	ttering inc	cluding strutti d pilasters, b	ing, etc. and utteresses, p	removal of f	form for:W	Valls (any s etc.			

Centering and shut Inside of walls Out side of walls Total 13.7.1 12 mm cement pla	ttering 4 4	6.200 6.800		4.500 4.500		<u>111.600</u> 122.400				
Inside of walls Out side of walls Total 13.7.1 12 mm cement pla	4	6.200 6.800		4.500 4.500		<u>111.600</u> 122.400				
Out side of walls Total 13.7.1 12 mm cement pla coment : 3 fine ser	4	6.800		4.500		122,400				
Total 13.7.1 12 mm cement pla						122,100				
13.7.1 12 mm cement pla						234.000				
13.7.1 12 mm cement pla			То	tal Quantity	' in sqm	234.000				
12 mm cement pla	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (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 pla	aster finish	ed								
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										
		2880 B	To	tal Quantity	in sqm	260.680				
13.52.2										
Finishing with Epo per manufacturer's surface, etc. compl	oxy paint (specificat lete.On co	two or more ions includin ncrete work	coats) at all l g appropriate	ocations pre e priming co	pared and at, prepar	l applied as ation of				
Out side wall		6 800		4 500		122 400				
Top of wall	1	26,000	0 300	4.500		7 800				
Top of wan	1	20.000	0.500			130 200				
10tai			То	təl Quantity	in sam	130.200				
22.22.1			10	tai Quantity	m sym	130.200				
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										
	12 mm cement pla cement : 3 fine sam 12 mm cement pla nside Wall Dutside Wall Base Slab Base Slab Base slab offset Fop of wall 13.52.2 Finishing with Epoper manufacturer's surface, etc. comple Fusion with Epoper manufacturer's surface, etc. comple Finishing with Epoper manufacturer's surface, etc. comple Providing and app Waterproofing treat water tanks, roof s 'subway and bridge ntegral crystalline ntegral crystalline same from negative shall meet the reque permeability of complexity of complexity shall be carried outer Shall be	12 mm cement plaster finish 12 mm cement plaster finish nside Wall 4 Dutside Wall 4 Base Slab 4 Base Slab 4 Base Slab 4 Base slab offset 1 Fop of wall 1 I Image: Complete Structure Structur	12 mm cement plaster finished with a float 12 mm cement plaster finished nside Wall 4 12 mm cement plaster finished nside Wall 4 6.200 Dutside Wall 4 6.200 Base Slab 4 7.400 Base Slab 4 7.400 Base slab offset 1 28.400 Fop of wall 1 26.000 Fotal 13.52.2 Finishing with Epoxy paint (two or more one one manufacturer's specifications includin surface, etc. complete.On concrete work Finishing with Epoxy paint Dut side wall 4 6.800 Fop of wall 1 26.000 Fotal 22.23.1 Providing and applying integral crystalline waterproofing treatment to the RCC struct water tanks, roof slabs, podiums, reservior 's ubway and bridge deck etc., prepared by ntegral crystalline slurry : 2 parts water) for same from negative (internal) side with the shall meet the requirements as specified in permeability of concrete by more than 900 DIN 1048 and resistant to 16 bar hydrosta slurry shall be carable of self-healing of c shall be carried out all complete as per specimineerin- charge. The product performance shall	12 mm cement plaster finished nside Wall 4 12 mm cement plaster finished nside Wall 4 6.200 Dutside Wall 4 6.800 Base Slab 4 7.400 Base Slab 4 7.400 Base Slab 4 7.400 Base Slab offset 1 28.400 0.300 Fop of wall 1 26.000 0.300 Fotal To To 13.52.2 Finishing with Epoxy paint (two or more coats) at all J Deer manufacturer's specifications including appropriate surface, etc. complete.On concrete work Finishing with Epoxy paint Dut side wall 4 0.4 6.800 Cop of wall 1 26.000 0.300 To 22.23.1 Providing and applying integral crystalline slurry of h water tanks, roof slabs, podiums, reservior, sewage & 's ubway and bridge deck etc., prepared by mixing in t same from negative (internal) side with the help of syrshall mee	12 mm cement plaster finished 12 mm cement plaster finished inside Wall 4 6.200 4.500 Dutside Wall 4 6.800 4.500 Base Slab 4 7.400 0.350 Base Slab 4 7.400 0.300 Fop of wall 1 26.000 0.300 Fotal Total Quantity 13.52.2 Finishing with Epoxy paint (two or more coats) at all locations preper manufacturer's specifications including appropriate priming cosurface, etc. complete.On concrete work Finishing with Epoxy paint Dut side wall 4 6.800 4.500 Cop of wall 1 26.000 0.300 Decement Quantity Dut side wall 4 6.800 4.500 For of wall 1 26.000 0.300 Fotal Total Quantity 22.23.1 Providing and applying integral crystalline slurry of hydrophilic in waterproofing treatment to the RCC structures like retaining walls water tranks, roof slabs, podiums, reservior, sewage & water treatm 's userfaces and 'n tegral crystalline slurry : 1 part water) for vertical surfaces and 'n tegral crystalline slurry : 2 parts water) for vertical surfaces and 'n tegral crystalline slurry : 2 parts water) for vertical surfaces and 'n tegral crystalline slurry : 1 p	12 mm cement plaster missed with a floating coat of heat cement of mixit is sement : 3 fine sand) 12 mm cement plaster finished nside Wall 4 6.200 4.500 Dutside Wall 4 6.800 4.500 Base Slab 4 7.400 0.350 Base Slab offset 1 28.400 0.300 Fop of wall 1 26.000 0.300 Fotal Total Quantity in sqm 13.52.2 Finishing with Epoxy paint (two or more coats) at all locations prepared and ser manufacturer's specifications including appropriate priming coat, preparsurface, etc. complete.On concrete work Finishing with Epoxy paint Dut side wall 20 to side wall 4 6.800 4.500 Fop of wall 1 26.000 0.300 Fotal Total Quantity in sqm 22.23.1 Total Quantity in sqm 22.23.1 Total surfaces and a plying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the ba water tanks, roof slabs, podiums, reservior, sewage & water treatment plant 'subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 pain tegral crystalline slurry :				

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	Inside of walls	4	6.200		4.500		111.600				
	Total						111.600				
				Тс	otal Quantit	y in sqm	111.600				
21.01	22.23.2										
5	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		CPLATES	RM FOR THE	MANJAGONANA	17.	38.440				
			OF PUBL	To	otal Quantit	y in sqm	38.440				
21.01	100.36.1										
6	Filling water with of 5 km (average) height not less that and other applienc	5000 litre to the rese n 3 m usin es and co	tankers fited ervoir site and ng 5 HP diese st of water et	l in lorry and d pumping th el engine pun c. complete.	conveying v ne water into np set , hire f	water from the reser- for tanker	n a distance voir of lorry, tools				
	Filling water										
	Tank	1	6.200	6.200	4.500		172.980				
	Total						172.980				
				Total Q	Quantity in H	Kilo litre	172.980				
21.01	19.16										
	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										

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity					
	Providing orange of as per IS: 10910 of	colour safe n 12 mm e	ety foot rest dia steeel bar	of minimum conforming	6 mm thick to IS:1786	plastic end	capsulated					
		13					13.000					
	Total						13.000					
				Τα	otal Quantity	y in each	13.000					
22	PILE FOUNDATI	ON										
22.00	20.2.3											
1	Boring, providing grade M-25 of spe load not less than s cost of boring, wit setting out and ren cap etc. all comple (Length of pile for piles	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	Boring, providing and installing bored cast-in-situ reinforced cement concrete piles										
	Equalisation tank	22	18.000	044	1		396.000					
	MBBR-1	12	18.000	KURSHER.	R		216.000					
	MBBR-2	20	18.000				360.000					
	MBBR-3	6	18.000	< 1			108.000					
	Secondary Clarifier with Plate/Tube Settler	16	18.000	DRAM FOR THE C WORKS	EAANAGEARD		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					
				Tot	al Quantity	in metre	1800.000					
22.00 2	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 600mm Dí	and instal a pile	ling bored ca	ast-in-situ rei	nforced cem	ent concre	ete piles					

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				
				Tot	al Quantity	in metre	666.000				
22.00	20.6.1.1										
	installation of load and dismantling of direction of engine Single pile upto 50	stallation of loading platform and preparation of pile head or construction of test cap nd dismantling of test cap after test etc. complete as per specification & amp; the irection of engineer -in-Charge. ingle pile upto 50 tonne capacityInitial test									
	Vertical load testir	tical load testing of piles in accordance with IS 2911(Part IV)									
	Vertical load testing of piles in accordance with IS 2911(Part IV)	2	P	21	DR		2.000				
	Total		2011/100		*ADMARTINATI	1	2.000				
	Total Quantity in per test										
			OF PUBL	Total	Quantity ir	n per test	2.000				
22.00	20.6.2.1	-	OF PUBU	Total	Quantity in	n per test	2.000				
22.00 4	20.6.2.1 Vertical load testir installation of load and dismantling of direction of engine Single pile above 5	ng of piles ling platfo f test cap a eer -in-Ch 50 tonne a	in accordan orm and preparties tetc. arge. and upto 100	Total ce with IS 29 aration of pi complete as tonne capac	Quantity in 911(Part IV) le head or co per specifica ityInitial test) including nstruction ation & am	2.000 g of test cap np; the				
22.00 4	20.6.2.1 Vertical load testin installation of load and dismantling of direction of engine Single pile above 5 Vertical load testin	ng of piles ling platfo f test cap a cer -in-Ch 50 tonne a ng of piles	in accordan orm and prepa fter test etc. arge. and upto 100 in accordan	Total ce with IS 29 aration of pi complete as tonne capac ce with IS 29	Quantity in P11(Part IV) le head or co per specifica ityInitial test P11(Part IV)) including nstruction ation & arr	2.000 g of test cap p; the				
22.00	20.6.2.1 Vertical load testin installation of load and dismantling of direction of engine Single pile above 5 Vertical load testin Vertical load testing of piles in accordance with IS 2911(Part IV)	ng of piles ling platfo f test cap a eer -in-Ch 50 tonne a ng of piles 2	in accordan orm and prepa after test etc. arge. and upto 100 in accordan	Total ce with IS 29 aration of pi complete as tonne capac ce with IS 29	Quantity in P11(Part IV) le head or co per specifica ityInitial test P11(Part IV)) including nstruction ation & arr	2.000 g of test cap pp; the 2.000				
22.00	20.6.2.1 Vertical load testin installation of load and dismantling of direction of engine Single pile above 5 Vertical load testin Vertical load testing of piles in accordance with IS 2911(Part IV) Total	ng of piles ling platfo f test cap a eer -in-Ch 50 tonne a ng of piles 2	in accordan orm and prepa after test etc. arge. and upto 100 in accordan	Total ce with IS 29 aration of pil complete as tonne capac ce with IS 29	Quantity in P11(Part IV) le head or co per specifica ityInitial test P11(Part IV)) including nstruction ation & am	2.000 g of test cap p; the 2.000 2.000				
22.00	20.6.2.1 Vertical load testir installation of load and dismantling of direction of engine Single pile above 4 Vertical load testir Vertical load testing of piles in accordance with IS 2911(Part IV) Total	ng of piles ling platfo f test cap a eer -in-Ch 50 tonne a ng of piles 2	in accordan orm and preparter test etc. arge. and upto 100 in accordan	Total ce with IS 29 aration of pi complete as tonne capac ce with IS 29	Quantity in P11(Part IV) le head or co per specifica ityInitial test P11(Part IV)) including nstruction ation & am	2.000 g of test cap np; the 2.000 2.000 2.000				
22.00 4 22.00	20.6.2.1 Vertical load testir installation of load and dismantling of direction of engine Single pile above 5 Vertical load testir Vertical load testing of piles in accordance with IS 2911(Part IV) Total 20.6.2.2	ng of piles ling platfo f test cap a cer -in-Ch 50 tonne a ng of piles 2	a in accordan orm and prepa after test etc. arge. and upto 100 a in accordan	Total ce with IS 29 aration of pi complete as tonne capac ce with IS 29 Total	Quantity in P11(Part IV) le head or co per specifica ityInitial test P11(Part IV)	per test) including nstruction ation & am	2.000 g of test cap pp; the 2.000 2.000 2.000				
22.00 4 22.00 5	20.6.2.1 Vertical load testir installation of load and dismantling of direction of engine Single pile above 2 Vertical load testir Vertical load testir Vertical load testir IS 2911(Part IV) Total 20.6.2.2 Vertical load testir installation of load and dismantling of direction of engine	ng of piles ling platfo f test cap a eer -in-Ch 50 tonne a ng of piles 2 ng of piles ling platfo f test cap a eer -in-Ch 50 tonne a	in accordant orm and preparative test etc. arge. and upto 100 in accordant in accordant orm and preparative test etc. arge. and upto 100	Total ce with IS 29 aration of pi complete as tonne capac ce with IS 29 Total ce with IS 29 aration of pi complete as tonne capac	Quantity in P11(Part IV) le head or co per specifica ityInitial test P11(Part IV) Quantity in P11(Part IV) le head or co per specifica ityRoutine te	per test) including nstruction ation & am) n per test) including nstruction ation & am	2.000 g of test cap p; the 2.000 2.000 2.000 2.000 g of test cap p; the				

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	n per test	5.000			
22.00	OD246261/2022-2	2023								
6	Extra over charges piling works	s for core	cutting of 30	cm depth in	the rock strat	ta while d	oing the			
	Extra over charges	for core	cutting of 30	cm depth						
	450 mm dia pile	100			0.300		30.000			
	600 mm dia pile	37			0.300		11.100			
	Total									
	Total Quantity in metre									
22.00	OD252171/2022-2023									
7	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 ste	el reinfor	cement for R	. <mark>C.C</mark>	5					
	450 mm dia Pile	100	3.140	.225*.225	18.000	125.00 0000	35766.56 3			
	600 mm dia Pile	37	3.140	.3*.3	18.000	$\begin{array}{c} 125.00\\0000\end{array}$	23526.45 0			
	Total						59293.01 3			
				,	Fotal Quant	ity in kg	59293.01 3			
23	ADMINISTRATI BUILDING	VE/LAB(ORATORY/O	CHEMICAL	HOUSE / C	ONTROL	ROOM			
23.00	OD251949/2022-2	2023								
1	Administrative / L	aboratory	/ Chemical]	House / Cont	rol Room Bu	uilding				
	Administrative / L	aboratory	/ Chemical]	House / Cont	rol Room Bu	uilding				
		1					1.000			
	Total						1.000			
				,	Total Quant	tity in no	1.000			
24	SECURITY CAB	IN								
24.00	OD251957/2022-2	2023								
1	Security Cabin									
	Security Cabin	[]				,				
		1					1.000			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Total						1.000			
		ity in no	1.000							
25	AIR BLOWER RO	DOM AN	D CONTRO	L PANEL R	OOM					
25.00	OD251962/2022-2	2023								
1	Air Blower room a	and contro	ol panel room	1						
	Air Blower room a	and control	ol panel room	1						
		1					1.000			
	Total						1.000			
		1.000								
26	CHLORINATION BUILDING									
26.00	OD251969/2022-2	2023								
1	Chlorination Build	ling								
	Chlorination Build	ling		191						
		1	118	(a)			1.000			
	Total		14	(Sector)	501	1 - 1	1.000			
					Total Quant	ity in no	1.000			
27	COMPOUND WA			2 11	-	6				
27.00	2.8.1				CARDING THE REAL PROPERTY OF					
1	Earth work in exca in foundation trend including dressing out the excavated s of 50 m.All kinds	vation by thes or dr of sides a soil and d of soil	v mechanical ains (not exc and ramming isposal of sur	means (Hyd eeding 1.5 m of bottoms, rplus excavat	raulic excava in width or lift up to 1.5 ted soil as din	ator) /man 10 sqm or m, includ rected, wi	ual means 1 plan), ing getting thin a lead			
	Earth work in ex	cavation	by mechanic	al means						
		1	275.000	0.700	0.400		77.000			
	Total						77.000			
				Тс	otal Quantit	y in cum	77.000			
27.00	4.1.8									
2	Providing and layi of centering and sh sand : 8 graded sto	ng in posi nuttering - one aggres	ition cement - All work up gate 40 nomi	concrete of so to plinth lev nal size)	pecified grad vel:1:4:8 (1 c	de excludi ement : 4	ng the cost coarse			
	Providing and la	ying in po	osition cemei	nt concrete						
		1	275.000	0.700	0.200		38.500			
	Total						38.500			
				То	otal Quantit	y in cum	38.500			
27.00 3	5.37.1									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	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									
	Providing and la	aying in p	osition ready	mixed M-25	grade conci	ete	22.000			
	Strip Footing	l	275.000	0.600	0.200		33.000			
	Strip Beam	1	275.000	0.250	0.300		20.625			
	1 otal			T			53.625			
				To	tal Quantity	y in cum	53.625			
4	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 reinforcem	ent for R.	C.C work	<						
	Quantity as per item No.3	1	53.625	WORKS	100.000		5362.500			
	Total						5362.500			
				Total Q	uantity in k	ilogram	5362.500			
27.00	5.9.1									
5	Centering and shut footings, bases of	ttering ind columns,	cluding strutt	ing, etc. and concrete	removal of f	orm for:F	oundations,			
	Centering and sh	uttering								
	Strip Footing	2	275.000		0.200		110.000			
	Strip Beam	2	275.000		0.300		165.000			
	Total						275.000			
				Тс	otal Quantity	y in sqm	275.000			
27.00	50.6.7.2									
6	Laterate masonry in cement mortar 1 including all cost of	with neatl 6 for sup of materia	y dressed late per structure a ls, labour cha	erate stone of above plinth arges etc.	f size 40x20x level up to fl	15cm or oor two le	nearest size evel			
	Laterate mason size	y with ne	atly dressed	laterate stone	of size 40x2	20x15cm	or nearest			
	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			
				Та	tal Quantit	y in cum	155.900			
27.00	10.25.2									
7	Item Shifted to Sul Item Shifted to hea Steel work welded in position and app etc. as required.In similar works	b head 14 ad 14 as it in built u blying a p gratings,	as item 14.7 em 14.74 p sections/fra riming coat of frames, guard	3 amed work, i f approved s l bar, ladder,	ncluding cu teel primer u railings, bra	tting, hois using struc ackets, gat	ting, fixing ctural steel tes and			
	Item Shifted to Su	b head 14	as item 14.7	73 Item Shift	ed to head 1	4 as item	14.74			
	Gate	1	5.000	2.400	40.000		480.000			
	Total						480.000			
				r	Fotal Quant	tity in kg	480.000			
27.00	13.83.2									
8	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	1010		12.000			
	Total									
	Total Quantity in sqm 12.000									
27.00	13.1.1		OF PUEL	C WORKS	KAANJAIGERAEP	NT.				
9	12 mm cement pla	ster of mi	x:1:4 (1 cem	nent : 4 fine s	and)					
	12 mm cement pla	aster finis	hed			1				
	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			
				To	otal Quantit	y in sqm	1529.360			
27.01	13.48.1									
0	Finishing with Del primer as per manu ltr/10 sqm over and	uxe Mult ufacturers d includin	i surface pair specification g one coat of	t system for ns:Two or mo f special prin	interiors and ore coats app ner applied (d exteriors blied on w @ 0.75 ltr	s using alls @ 1.25 /10 sqm			
	Finishing with De primer as per many	luxe Mul	ti surface pai specification	nt system for	interiors an	d exterior	s using			
	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			
------------	--	------------	--------------	------------------	--------------	------------	-----------	--	--	--
				T	otal Quantit	y in sqm	1529.360			
28	INTERNAL ROADS									
28.00	16.91.2									
1	in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength, thickness & amp; size/ shape, made by table vibratory method using PU mould, laid in required colour & amp; 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 la	ying facto	ory made cha	mfered edge	Cement Cor	ncrete pav	er blocks			
	5m wide road	1	270.000	5.000			1350.000			
	Total		-	All and a second		-	1350.000			
			J.P.P.	T	otal Quantit	y in sqm	1350.000			
2	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 & amp; 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 & amp; 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									
	Manufacturing, supplying and fixing retro reflective sign boards									
	Tatal	2					2.000			
28.00 3	16.59.2			10		y in each	2.000			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	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 & amp; 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 & amp; 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, su	pplying a	nd fixing ret	o reflective	sign boards	1 - 1	2			
		2					2.000			
	Total 2.00									
				Τα	tal Quantity	y in each	2.000			
28.00 4	16.63 Providing, laying a concrete 1:3:6 (1 o size) over 75 mm l consolidated and g complete and as pe	and makin cement : 3 bed of dry grouted wi er directio	ng kerb chan 3 coarse sand 7 brick ballas 10 fine sand, 10 Engineer -	nel 30 cm wi c 6 graded s t 40 mm non including fin in-Charge.	de and 50 mi tone aggrega ninal size, we nishing the to	m thick w te 20 mm ell ramme op smooth	ith cement nominal d and etc.			
	Providing, laying concrete 1:3:6	and mak	ing kerb cha	nnel 30 cm w	vide and 50 n	nm thick v	with cement			
	5m wide road	2	270.000	0.300			162.000			
	Total						162.000			
				Te	otal Quantit	y in sqm	162.000			
28.00 5	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			
				Te	otal Quantit	y in cum	32.400			
29	STORM WATER DRAINS									
29.00	2.8.1									
1	Earth work in exca in foundation trend including dressing out the excavated s of 50 m.All kinds	avation by ches or dr of sides a soil and d of soil	v mechanical ains (not exc and ramming isposal of su	means (Hyd eeding 1.5 m of bottoms, rplus excava	raulic excava in width or lift up to 1.5 ted soil as dir	ator) /man 10 sqm or m, incluc rected, wi	ual means 1 plan), ling getting thin a lead			
	Earth work in exc	cavation b	y mechanica	l means						
	Drainage	1	250.000	0.800	0.600		120.000			
	Total 120.00									
	Total Quantity in cum 120.000									
29.00	4.1.8									
2	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 la	ying in po	osition cemei	nt concrete	nR!		<i>~</i>			
	Draina Base	1	250.000	0.800	0.100		20.000			
	Total	1		< 1			20.000			
		_		To	otal Quantit	y in cum	20.000			
3	4.1.5 Providing and layi of centering and sh sand : 6 graded sto Providing and lay	ng in posi nuttering - one aggress	ition cement - All work up gate 20 mm r	concrete of s to plinth lev nominal size)	pecified grad vel:1:3:6 (1 c	de excludi ement : 3	ng the cost coarse			
	Side wall	2 2 2	250 000	0.150	0 500		37 500			
	Total		230.000	0.120	0.200		37.500			
				Тс	otal Ouantit	v in cum	37.500			
29.00	4.1.3				<u> </u>	<u>, 0 0</u>				
4	Providing and layi of centering and sh (zone-III) : 4 grade	ng in posi nuttering - ed stone a	ition cement - All work up ggregate 20	concrete of s to plinth lev mm nominal	pecified grad vel:1:2:4 (cer size)	de excludi nent : 2 c	ng the cost parse sand			
	Providing and la	ying in po	osition cemei	nt concrete						
	Wearing coat	1	250.000	0.500	0.050		6.250			
	Total 6.250									
	Total Quantity in cum6.250									
29.00 5	5.9.2 Centering and shut thickness) includir	ttering ind ng attache	cluding strutt d pilasters, b	ing, etc. and outteresses, pl	removal of f linth and strip	form for:W	Valls (any s etc.			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	wall	4	250.000		0.500		500.000				
	Total						500.000				
				Т	otal Quantit	y in sqm	500.000				
30	TRANSFORMER	BUILDI	NG								
30.00	OD251973/2022-2	2023									
1	Transformer Build	ing									
	Transformer Build	ing				T					
		1					1.000				
	Total						1.000				
				,	Total Quant	ity in no	1.000				
31	DG ROOM										
31.00	OD251974/2022-2	2023									
1	DG Room		-	AN AN		-					
	DG Room		<u>[]</u>	QAN	-	ET	1				
		1	100	SARAN .	nR.	1	1.000				
	Total			-			1.000				
		-		< 1	Total Quant	ity in no	1.000				
32	CENTRIFUGE BU	CENTRIFUGE BUILDING									
32.00	OD251983/2022-2	2023	OF POSO	of Antheorem							
	Centrifuge Buildin	<u>ig</u>									
	Centrifuge Buildin	ig 1					1 000				
	Total	1					1.000				
				,	Total Quant	ity in no	1.000				
22					Total Qualit		1.000				
33.00	$\frac{\text{SLUDUE SHED}}{\text{OD251001/2022}}$	0023									
1	OD231991/2022-2 Sludge Shed	.025									
	Sludge Shed										
	Bludge Blied	1					1 000				
	Total	1					1.000				
				,	Total Ouant	ity in no	1.000				
34	LANDSCAPING	AND GR	EEN BELT I	FORMATIO	N	-, 110	20000				
34.00	OD252102/2022-7	2023									
1	Landscaping and green belt formation										
	Landscaping and g	green belt	formation								
		1					1.000				

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Total						1.000			
				r	Fotal Quant	ity in no	1.000			
35	PROVISION FOR PLANT BY SCAI	R PROVII	DING AUTO	MATED SY	STEM TO T	THE ENT	IRE			
35.00	OD252007/2022-2	2023								
1	Provision for prov	iding auto	mated system	m to the entir	e plant by S	CADA				
	Provision for prov	iding auto	mated system	m to the entir	e plant by S	CADA				
		1					1.000			
	Total						1.000			
		ity in no	1.000							
36	STAIR & WA									
36.00	5.9.3									
1	Centering and shuttering including strutting, etc. and removal of form for:Suspend floors, roofs, landings, balconies and access platform									
	MANNUAL COA	RSE SCF	REEN CHAN	INEL	-	ET				
	Walk way	2	3.300	1.000	nRA	1	6.600			
	side	2	3.300		0.100	-	0.660			
	Total	N.		< 11			7.260			
	MANNUAL FINE	E SCREE	N CHANNE	NAM FOR THE	MANJAGENASA	17				
	Walk way	2	3.300	1.000	0.100		0.660			
	side	2	3.300		0.100		0.660			
	Total						1.320			
	OIL &ar	np; GRE	ASE 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 CI	LARIFIEI	2							
	Walk way	1	24.300	1.000			24.300			
	side	1	24.300	0.100			2.430			
	Total						26.730			
	Channel	F								
	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 SEPERATO)R					
	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	-	ET	4.905
	Total		200	ABORTON C	nRP	-	- 53.955
	RECEIVING CHA	AMBER					
	Walk way	1	19.800	1.000			19.800
	walk way side	1	19.800	0.100	ANASSIA		1.980
	Total		OF PUBLIC	WORKS			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 THICK	NER					
	Walk way	1	15.000	1.000			15.000
	side	1	15.000	0.100			1.500
	Total						16.500
	MBBR 4			I	T		
	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 CON	TACT TA	ANK						
	Walk way	1	19.800	1.000			19.800		
	side	1	19.800	0.100			1.980		
	Total						21.780		
	TREATED WATE	ER 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		15	23.20		_	17.325		
			- Mate	To	tal Quantit	y in sqm	409.035		
36.00	5.9.5								
2	Centering and shuttering including strutting, etc. and removal of form for:Lin beams, plinth beams, girders bressumers and cantilevers								
	Channel		C.PLATED	AM FOR THE	AANAGENAEA	er.			
	Cantilever beams	12	1.000	0.250			3.000		
	side	4	0.250	0.250			0.250		
	Total						3.250		
	MANNUAL COA	RSE SCR	EEN CHAN	NEL					
	Cantilever beams	12	1.000	0.250			3.000		
	side	4	0.250	0.250			0.250		
	Total						3.250		
	RECEIVING CHA	MBER							
	Cantilever beams	24	1.000	0.250			6.000		
	side	8		0.250	0.250		0.500		
	Total						6.500		
	MANNUAL FINE	SCREEN	N CHANNEI						
	Cantilever beams	12	1.000	0.250			3.000		
	side	4	0.250	0.250			0.250		
	Total						3.250		
	OIL &ar	np; GREA	ASE 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 SEPERATC	R								
	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			10.00			6.500			
	SECONDARY CL	ARIFIER	10	1200						
	Cantilever beams	24	1.000	0.250		FI	6.000			
	side	8	0.250	0.250	JOL SA	200	0.500			
	Total			3-11			6.500			
	MBBR 4			< 11						
	Cantilever beams	24	1.000	NAM FOR THE	0.250	10	6.000			
	Cantilever beams	8	0.250	- 1914101-2	0.250		0.500			
	Total						6.500			
	TREATED WATE	ER TANK								
	Cantilever beams	24	1.000		0.250		6.000			
	side	8	0.250		0.250		0.500			
	Total						6.500			
	FILTER FEED TA	NK								
	Cantilever beams	24	1.000	0.250			6.000			
	side	8	0.250	0.250			0.500			
	Total						6.500			
	SLUDGE THICK	NER								
	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			
				To	tal Quantity	y in sqm	78.000			
36.00	5.9.7									
3	Centering and shut (excluding landing	ttering inc	luding strutti t spiral - stair	ng, etc. and a cases)	removal of fo	orm for:S	tairs,			
	SLUDGE THICK	NER								
	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	O.S.N		TEN	0.518			
	Stair-Waist	1	7.300	1.000	0.120		0.876			
	side	1	7.300	0.120	PE		0.876			
	Stair-landing	1	1.000	1.000	0.120		0.120			
	side	1	1.000	0.120	MANAGEMEN		0.120			
	Total	-	OP PUBU	C WORKS		00	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		r						
	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 CI	ARIFIER	ł				
	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		一個也	19.11		FI	28.110
	FILTER FEED TA	ANK		Jon States	JO KA		
	Stair-step	20		.5*.3*.15			0.450
	side	2	1.000	0.450			0.900
	Stair-Waist	1	6.370	1.000	MANAGERAER	IT.	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 WATE	ER TANK		I			
	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 CON	TACT TA	NK	I			
	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			
				Τα	otal Quantit	y in sqm	190.947			
36.00	5.37.2									
4	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 WATE	ER TANK	A	28.50-		-				
	Walk way	1	23.400	1.000	0.100	ET	2.340			
	Cantilever beams	8	1.000	0.250	0.250	-	0.500			
	Stair-step	30	1.000	.5 <mark>*</mark> .3*.15	PE		0.675			
	Stair-Waist	1	9.750	1.000	0.120		1.170			
	Stair-landing	1	1.000	1.000	0.120	in .	0.120			
	CCT - TWT	1	2.000	2.000	0.100		0.400			
	Total						5.205			
	SECONDARY CL	ARIFIEF	<u></u>							
	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 THICK	NER					
	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 CON	TACT TA	NK				
	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	FI	0.120
	Total		_	Section 1	10,150	-	4.504
	GRIT SEPERATO	OR					
	Walk way	1	13.250	1.000	0.100		1.325
	Cantilever beams	8	1.000	0.250	0.250	0	0.500
	Total			induction to the			1.825
	RECEIVING CH	AMBER		T			
	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 & GRE	ASE TRA	P				
	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 CO	ARSE SC	REEN CHA	NNEL			
	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 FIN	E SCREE	N CHANNE	L ,	I		
	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	-	ET	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	1.1		<			6.898
	MBBR 2		CPLATED	DAA FOR THE	AANAGGAMA		
	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 TA	NK					
	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
				To	tal Quantity	in cum	60.240
36.00 5	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 reinforceme	Steel reinforcement for R.C.C work						
	Quantity as per item No.4	1	60.240	120.000			7228.800	
	Total						7228.800	
				Total Q	Quantity in l	kilogram	7228.800	
36.00	5.34.1							
6	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	g richer m	nixes					
	Quantity as per item No.4	1	60.240	Also-			60.240	
	Total		一個也			FI	60.240	
				Та	otal Quantit	y in cum	60.240	
36.00	OD254074/2022-2	2023		3				
7	Extra for providing	g epoxy c	oating for rei	nforcement b	oars.	10		
	Extra for providin	ig epoxy c	coating for re	inforcement	bars.	41		
	Quantity as per item No.4	1	60.240	120.000			7228.800	
	Total						7228.800	
				r	Fotal Quant	tity in kg	7228.800	
36.00	OD254073/2022-2	2023						
8	Extra for providing	g sulphate	e resistant cer	ment for the s	structures ab	ove plinth	level.	
	Extra for providing	g sulphate	resistant cer	nent				
	Quantity as per item No.4	1	60.240				60.240	
	Total						60.240	
				Та	otal Quantit	y in cum	60.240	
36.00	4.12							
9	Extra for providing doses by weight of	g and mix f cement a	ing water pro	ofing materi acturer'	al in cement	t concrete	work in	
	Extra for providing	g and mix	ing water pro	oofing materi	ial			
	Quantity as per item No.4	1	60.240	330.000			19879.20 0	
	Total						19879.20 0	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
				r	Fotal Quant	ity in kg	19879.20 0	
36.01	13.52.2							
0	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 Epo	oxy paint						
	Quantity as per item No.10	1	677.982				677.982	
	Total		677.982					
				Тс	otal Quantit	y in sqm	677.982	
36.01	13.7.1	13.7.1						
1	12 mm cement pla cement : 3 fine sar	ster finish d)	ed with a flo	ating coat of	neat cement	t of mix:1	:3 (1	
	RECEIVING C	HAMBE	2	Sala -		-	S	
	Walk way	1	19.800	1.000	-	ET	19.800	
	walk way side	1	19.800	0.100	nRA		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	MANAGERACA	17	10.350	
	side	23	.5*.3*.15	C WORKS			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 THICK	NER						
	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 WAT	ER TANF	K					

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 C	LARIFIE	R	25.20			1
	Walk way	1	24.300	1.000		FI	24.300
	side	1	24.300	0.100	UD KSP		2.430
	Cantilever beams	24	1.000	0.250			6.000
	side	8	0.250	0.250			0.500
	Stair-step	31	C PLATES	.5*.3*.15	NANAGENAEN	er.	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		11.7	641	-	ET	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	MANAGERAN	11 11	6.000
	side	8	0.250	0.250	3.40 Y 1.1 Y 1	000	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 T	ANK					
	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	1	.5*.3*.15		-	0.878
	Stair-Waist	39	1.000	0.450		FI	17.550
	Stair-Waist	1	12.750	1.000	10,15%		12.750
	side	1	12.750	0.120			1.530
	Stair-landing	2	1.000	1.000		10	2.000
	side	2	1.000	0.100	MANAGERAES	11	0.200
	Total						82.658
	GRIT SEPERAT	OR					
	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 CO.	ARSE SC	REEN CHA	NNEL			
	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 FIN	E SCREE	N CHANNE	L			
	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		La la	10.050	
	side	1	10.050	Service and	0.120		1.206	
	Stair-landing	1	1.000	1.000			1.000	
	side	1	1.000	0.120			0.120	
	Total		e-PLATED	RM FOR THE	MANAGERAEN	1	43.028	
				То	tal Quantit	y in sqm	677.982	
36.01	50.10.1							
2	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							
	of approved steel petc. complete	ing cutting primer, inc	bular (round g, hoisting,fiz cluding weldi	, square or re xing in positi ing and bolte	ectangular he on and apply d with speci	ollow tube ying a pri al shaped	es etc.) ming coat washers	
	of approved steel <u>petc.</u> complete Steel work in buil	t up G I tu ing cuttin primer, ind	bular (round g, hoisting,fiz cluding weldi 	, square or re king in positi ing and bolte d, square or r	ectangular he on and apply d with speci ectangular h	ollow tube ying a pri al shaped ollow tub	es etc.) ming coat washers es etc.)	
	of approved steel p etc. complete Steel work in buil RECEIVING CHAMBER	t up G I tu primer, ind t up G I tu	bular (round g, hoisting,fiz cluding weldi ibular (round 45.000	, square or re xing in positi ing and bolte d, square or r	ectangular he on and apply d with speci ectangular h	ollow tube ying a pri al shaped ollow tub 10.000 000	es etc.) ming coat washers es etc.) 450.000	
	of approved steel p etc. complete Steel work in buil RECEIVING CHAMBER MANNUAL COARSE SCREEN CHANNEL	t up G I tu t up G I tu 1	bular (round g, hoisting,fiz cluding weldi ibular (round 45.000 3.300	, square or re xing in positi ing and bolte d, square or r	ectangular ho on and apply d with speci ectangular h	ollow tube ying a pri- al shaped ollow tub 10.000 000 10.000 000	es etc.) ming coat washers es etc.) 450.000 66.000	
	russes etc., includ of approved steel <u>p</u> etc. complete Steel work in buil RECEIVING CHAMBER MANNUAL COARSE SCREEN CHANNEL MANNUAL FINE SCREEN CHANNEL	t up G I tu primer, ind t up G I tu 1 2	bular (round g, hoisting,fi: cluding weldi ibular (round 45.000 3.300 3.300	, square or re xing in positi ing and bolte d, square or r	ectangular ho on and apply d with speci	bllow tube ying a pri- al shaped 0llow tub 10.000 000 10.000 000	es etc.) ming coat washers es etc.) 450.000 66.000	
	russes etc., includ of approved steel p etc. complete Steel work in buil RECEIVING CHAMBER MANNUAL COARSE SCREEN CHANNEL MANNUAL FINE SCREEN CHANNEL OIL & GREASE TRAP	t up G I tu t up G I tu 1 2 2 2	bular (round g, hoisting,fiz cluding weldi ibular (round 45.000 3.300 3.300 5.100	, square or re xing in positi ing and bolte d, square or r	ectangular ho on and apply d with speci ectangular h	ollow tube ying a pri- al shaped ollow tub 10.000 000 10.000 000 10.000 000 10.000 000 10.000 000 10.000 000	es etc.) ming coat washers es etc.) 450.000 66.000 66.000 102.000	
	trusses etc., includ of approved steel p etc. complete Steel work in buil RECEIVING CHAMBER MANNUAL COARSE SCREEN CHANNEL MANNUAL FINE SCREEN CHANNEL OIL & GREASE TRAP Channel	t up G I tu ing cuttin primer, ind t up G I tu 1 2 2 2 2 2	bular (round g, hoisting,fi: cluding weldi ibular (round 45.000 3.300 3.300 5.100 4.000	, square or re xing in positi ing and bolte d, square or r	ectangular ho on and apply d with speci ectangular h	billow tube ying a pri- al shaped ollow tub 10.000 000 10.000 000 10.000 000 10.000 000	es etc.) ming coat washers es etc.) 450.000 66.000 66.000 102.000 80.000	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	EQUALIZATIO N TANK	1	62.000			10.000 000	620.000
	MBBR 1	1	79.000			10.000 000	790.000
	MBBR 2	1	60.000			10.000 000	600.000
	MBBR 3	1	42.000			10.000 000	420.000
	MBBR 4	1	58.000			10.000 000	580.000
	SECONDARY CLARIFIER	1	57.000			10.000 000	570.000
	FILTER FEED TANK	1	38.000			10.000 000	380.000
	CHLORINE CONTACT TANK	1	52.000	Allen-		10.000 000	520.000
	TREATED WATER TANK	1	60.000	Q.L.	201	10.000 000	600.000
	SLUDGE THICKNER	-1	45.000	3-11	Pr	10.000 000	450.000
	Total					10	6426.500
			OF PUBL	C WORKS	Total Quant	tity in kg	6426.500

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	100				
	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	12	-			
	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 ed value less than 50 excluding hard ro including conducting necessary S.P. intervals - For ordinary soil.	quipment' ock, soft rock or .T and recovery	s in - all types of soi medium rock for str of undisturbed soil	l having N cata upto 10m samples at 5m		
	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 ec value less than 50 excluding hard ro and upto a depth of 30m including c undisturbed soil samples at 5m inter	uipment' ock, soft rock or conducting nece vals - For ordir	s in - all types of soi medium rock for str ssary S.P.T and reco nary soil.	l having N rata next 10m overy of		
	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 ed value less than 50 excluding hard ro 30m depth including conducting ne- samples at 5m intervals - For ordina	quipment' ock, soft rock or cessary S.P.T a ary soil.	s in - all types of soi medium rock for stind nd recovery of undis	l having N ata above turbed soil		
	Net Total	40.000metre	@1100.00/metre	44000.00		
1.008	56.5.a					
	Boring through all classes of rock e 50 using tungsten carbide drilling b	xcluding hard r it - In land	ocks having N value	greater than		
	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	TREAT.				
	Conducting standard penetration tes	st in bore hole a	t any depth.	-		
	Net Total	10 <mark>6.000</mark> each	@203.00/each	21518.00		
1.011	56.8		_			
	Recovering disturbed samples and p including waxing labelling packing Code.	preserving the s storing includin	ame in air tight samp ng cost of containers	ole containers as per IS		
	Net Total	106.000each	@63.00/each	6678.00		
1.012	56.11.a					
	Compilation of all field data with re conducting necessary lab test (report	commendation rt in triplicate) -	for a suitable founda Machine boring for	ation after 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 reperiphery of the area cleared.	ubbish up to a d	listance of 50 m outs	ide the		
	Net Total	4855.200sqm	@7.57/sqm	36753.86		
2.002	2.33.3					
	Felling trees of the girth (measured cutting of trunks and branches, reme material and disposal of unserviceal including 240 cm girth	at a height of 1 oving the roots ble material.Bey	m above ground lev and stacking of serv yond 120 cm girth up	el) including iceable to and		
	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 (e exceeding 20 cm in depth, consolid watering, lead up to 50 m and lift up charge.	xcluding rock) ating each depo p to 1.5 m as pe	in open areas in layer sited layer by rammi r direction of site En	rs not ng and gineer-in-				
	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 and up to 6.0m in ordinary rock and lead of 50m and lift up to 1.5m incl	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 and up to 6.0m in ordinary rock and lead of 50m and lift from 1.50m to	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		10 C					
	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 3.5m and up to 6.0m in ordinary roo initial lead of 50m and lift from 4.5	(in or under wa ck and conveyin m to 6.0m inclu	ter) for wells of diam ng and depositing the ding neat banking.	eter above spoil within				
	Net Total	48.230cum	@1866.44/cum	90018.40				
3.005	100.3.6.15							
	Earthwork in open well excavation 3.5m and up to 6.0m in ordinary roo initial lead of 50m and lift from 6.0	(in or under wa ck and conveyir m to 7.50m incl	ter) for wells of diam ig and depositing the luding neat banking.	eter above spoil within				
	Net Total	48.230cum	@2009.99/cum	96941.82				
3.006	100.3.6.16							
	Earthwork in open well excavation 3.5m and up to 6.0m in ordinary roo initial lead of 50m and lift from 7.5	(in or under wa ck and conveyir 0m to 9.0m incl	ter) for wells of diam ig and depositing the uding neat banking.	eter above spoil within				
	Net Total	35.369cum	@2153.58/cum	76169.97				
3.007	100.6.1							
	Providing steel sheet shoring to the but not exceeding 6.00m using 6 m 50 mm x 50mm x 6 mm M.S. angle another in lines and levels with suit	sides of the tren m M.S. sheet 0. s driving down able pile driving	nches to depths of ab 50 M wide stiffen on vertically on either s g equipments and acc	ove 4.00 m edges with ide one after cessories 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	144.691kilogr am	@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	131	E			
	Bailing out water with engine and p conveyance to the site, erecting, dis cost of fuel lubricating oil and other	bump set above mantling and ta r stores pay of s	20HP up to 30HP ind king back of engine taff etc., complete.	cluding and pump,		
	Net Total	447.600Kwh	@6.19/Kwh	2770.64		
3.011	4.1.6					
	Providing and laying in position cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	ment concrete o ll work up to pl ate 40 mm nom	f specified grade exc inth level:1:3:6 (1 co inal size)	cluding the ement : 3		
	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					
2.012		/0.343cuIII	@ 774 / .70/Culll	10./0		
5.015	Steel reinforcement for P.C.C. work	including strai	abtening cutting ba	nding placing		
	Steel lennorcement for K.C.C WOIK	menuumig siral	gmennig, cutting, be	nung, 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 specified cement content used is pa grade concrete instead of M-25 grad in M-30 is @ 340 kg/cum).	all floor levels. yable/ recoveral de BMC/RMC.	Note:- Excess/less co ble separately.Provid (Note:- Cement cont	ement over the ling M-30 ent considered
	Net Total	70.343cum	@82.60/cum	5810.33
3.015	4.12			
	Extra for providing and mixing wat doses by weight of cement as per m	er proofing mat anufacturer's sp	erial in cement conc	rete work in
	Net Total	23213.190kg	@1.35/kg	31337.81
3.016	5.9.2			
	Centering and shuttering including thickness) including attached pilast	strutting, etc. ar ers, butteresses,	nd removal of form form form form form	or:Walls (any arses etc.
	Net Total	232.187sqm	@721.70/sqm	167569.36
3.017	5.9.20		and the second	
	Centering and shuttering including floors, roofs, landings, balconies an thick	strutt <mark>ing, e</mark> tc. ar d access platfor	nd removal of form form form with water proof	or:Suspended ply 12 mm
	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			
3.019	22.23.2		2 - · · · · · · · · · · · · · · · · · ·	
2.017	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re / subway and bridge deck etc., prep	stalline slurry o C structures like servior, sewage ared by mixing	f hydrophilic in natu retaining walls of th & water treatment p in the ratio of 5 : 2 (re for e basement, blant, tunnels 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 cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1
	Net Total	259.592sqm	@403.74/sqm	104807.67
3.021	13.65.1	DAGAN		F
	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
5.022	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 (low duty) charges including all cos	C.I. manhole cov st, labour charge	ver 455mm x 610mm es etc., complete.	n with frame
	Net Total	1.000no	@2815.71/no	2815.71
3.024	2.25			
	Filling available excavated earth (ex foundation etc. in layers not exceed layer by ramming and watering, lea	xcluding rock) i ing 20 cm in de d up to 50 m an	n trenches, plinth, si pth, consolidating ea d lift up to 1.5 m.	des of ach deposited
	Net Total	425.784cum	@260.18/cum	110780.48
3.025	19.16 Providing orange colour safety foot as per IS: 10910 on 12 mm dia steed cross section as 23 mm x 25 mm an 165 mm with minimum 112 mm spi top surface by ribbing or chequering projections on tail length on 138 mi stand the bend test and chemical res	rest of minimu el bar conformin d over all minin ace between pro g besides necess n as per standar sistance test as r	m 6 mm thick plastic ng to IS:1786, having num length 263 mm otruded legs having 2 sary and adequate an of drawing and suital per specifications and	c encapsulated g minimum and width as 2 mm tread on choring ole to with d 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 RECIE	VING CHAMI	BER - 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 cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	nent concrete o ll work up to pl ate 20 mm nom	f specified grade exc inth level:1:3:6 (1 ce inal size)	eluding the ment : 3
	Net Total	10.356cum	@7413.74/cum	76776.69
4.003	5.37.1		101	
	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			
	Net Total	39.948cum	@9947.98/cum	397401.91
4.004	5.37.2 Providing and laying in position reacement concrete work, using cement manufactured in fully automatic bat transit mixer for all leads, having condesign of specified grade for reinfort R.M.C. from transit mixer to site of finishing and reinforcement includi proportions as per IS: 9103 to accel workability without impairing strent - in -charge. Note:- Cement content /less cement used as per design mix plinth level upto floor V level	ady mixed M-25 at content as per traching plant and ontinuous agitat reced cement con Taying, excludi ng cost of admi erate/ retard set gth and durabil considered in t is payable/reco	b grade concrete for r approved design mi l transported to site of ed mixer, manufactu- ncrete work including ng the cost of center xtures in recommend ting of concrete, im- ity as per direction of his item is @330 kg overable separately.A	reinforced x, f work in red as per mix g pumping of ing, shuttering led prove f the Engineer /cum. Excess .ll work above
	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 wat doses by weight of cement as per m	er proofing mat anufacturer	erial in cement conc 39;s specification.	rete work in	
	Net Total	26432.340kg	@1.35/kg	35683.66	
4.007	OD244668/2022-2023				
	Extra for providing sulphate resistant	nt cement for th	e structures above pl	inth level.	
	Net Total	80.098cum	@1899.46/cum	152142.95	
4.008	5.22.6	1000			
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	including straig upto plinth lev	ghtening, cutting, be elThermo - Mechani	nding, placing cally Treated	
	Net Total	961 <mark>1.760</mark> kilo gram	<mark>@98.92/kilogram</mark>	950795.30	
4.009	OD246798/2022-2023				
	Extra for providing epoxy coating f	or reinforcemen	it bars.		
	Net Total	9611.760kg	@2.32/kg	22299.28	
4.010	5.9.1				
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. an columns, etc for	nd removal of form r mass concrete		
	Net Total	78.830sqm	@337.42/sqm	26598.82	
4.011	5.9.2				
	Centering and shuttering including thickness) including attached pilaster	strutting, etc. an ers, butteresses,	d removal of form form form form form form and string cou	or:Walls (any urses etc.	
	Net Total	216.750sqm	@721.70/sqm	156428.48	
4.012	5.9.3				
	Centering and shuttering including floors, roofs, landings, balconies an	strutting, etc. and access platfor	nd removal of form form	or:Suspended	
	Net Total	52.225sqm	@820.86/sqm	42869.41	
4.013	13.7.1				
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1	
	Net Total	260.580sqm	@403.74/sqm	105206.57	
4.014	13.52.2				
	Finishing with Epoxy paint (two or	more coats) at a	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 & amp; 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				
	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 som				
	Net Total	11 <mark>7.525</mark> sqm	@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 & amp; 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.				
4.017	100.36.1	TT.7505QIII	е т <i>2.30/</i> зүш	17072.34	
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 stope aggregate 20 mm nominal size) Complete as per design				
	Net Total	16.000each	@548.45/each	8775.20	
		Starker .	Heading Total(Rs)	2627878.21	
5	RECEIVING CHEMBER		COAF		
5.001	2.6.1		100		
	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 cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg Net Total	ment concrete o ll work up to pl ate 20 mm nom 2.268cum	f specified grade exc inth level:1:3:6 (1 ce inal size) @7413.74/cum	Pluding the ment : 3	
5.003	5.37.1				
	Providing and laying in position reacement concrete work, using cemer manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includi proportions as per IS: 9103 to accel workability without impairing stren - in -charge. Note:- Cement content /less cement used as per design mix plinth level	ady mixed M-25 at content as per tching plant and ontinuous agitat reed cement cor laying, excludi ng cost of admit erate/ retard set gth and durabilit considered in t	b grade concrete for a approved design mi transported to site of ed mixer, manufactu- nerete work including ng the cost of center xtures in recommend ting of concrete, im- ity as per direction of his item is @330 kg overable separately.	reinforced x, of work in red as per mix g pumping of ing, shuttering led prove f the Engineer c/cum. Excess	
	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 specified cement content used is pagrade concrete instead of M-25 grad in M-30 is @ 340 kg/cum).	all floor levels. yable/ recovera de BMC/RMC.	Note:- Excess/less co ble separately.Provid (Note:- Cement cont	ement over the ling M-30 ent considered
	Net Total	51.658cum	@82.60/cum	4266.95
5.006	4.12	- SANGERSIDAS	LOKA	
	Extra for providing and mixing wat doses by weight of cement as per m	er proofi <mark>ng</mark> mat anufacturer's sp	erial in cement concr pecification .	rete work in
	Net Total	17047.140kg	@1.35/kg	23013.64
5.007	5.22.6	UBLIC WORKS		
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	t including strai e upto plinth lev	ghtening, cutting, be relThermo - Mechani	nding, placing cally Treated
	Net Total	6198.960kilo gram	@98.92/kilogram	613201.12
5.008	OD235090/2022-2023			
	Extra for providing sulphate resistant	nt cement for th	e structures above pl	inth level.
	Net Total	51.658cum	@1899.46/cum	98122.30
5.009	5.9.1			
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. ar columns, etc fo	nd removal of form r mass concrete	
	Net Total	42.800sqm	@337.42/sqm	14441.58
5.010	5.9.2			
	Centering and shuttering including thickness) including attached pilaster	strutting, etc. ar ers, butteresses,	nd removal of form form form form form	or:Walls (any arses etc.
	Net Total	127.200sqm	@721.70/sqm	91800.24
5.011	5.9.3			
	Centering and shuttering including floors, roofs, landings, balconies an	strutting, etc. ar d access platfor	nd removal of form form	or:Suspended

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 cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1	
	Net Total	166.180sqm	@403.74/sqm	67093.51	
5.014	13.52.2				
	Finishing with Epoxy paint (two or as per manufacturer's specifications of surface, etc. complete.On concre	more coats) at a including approtection of the second second second second second second second second second s	all locations prepared opriate priming coat	d and applied , preparation	
	Net Total	85.060sqm	@224.33/sqm	19081.51	
5.015	22.23.1	all and		3	
	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				
5.016		00.000sqiii	@375.04/sqiii	54450.40	
5.010	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re / subway and bridge deck etc., prepa integral crystalline slurry : 2 parts w integral crystalline slurry : 1 part wa same from negative (internal) side w shall meet the requirements as speci permeability of concrete by more th DIN 1048 and resistant to 16 bar hy crystalline slurry shall be capable of self-healing shall be carried out all complete as p	stalline slurry o structures like servior, sewage ared by mixing vater) for vertica ater) for horizon vith the help of ified in ACI-212 an 90% compar drostatic pressu- ng of cracks up per specification	f hydrophilic in natu retaining walls of th & water treatment p in the ratio of 5 : 2 (al surfaces and 3 : 1 ntal surfaces and app synthetic fiber brush 2-3R-2010 i.e by red red with control condu- ire on negative side. to a width of 0.50mm n and the direction of	re for e basement, olant, tunnels 5 parts (3 parts lying the h. The material lucing crete as per The n. The work f 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				
	Net Total	8.000each	@548.45/each	4387.60	
	OF P	UBLIC WORKS	Heading Total(Rs)	1610303.03	
6	MANNUAL COARSE SCREEN	CHANNEL			
6.001	2.6.1				
	Earth work in excavation by mechan over areas (exceeding 30 cm in dept including disposal of excavated earth earth to be levelled and neatly dress	hical means (Hy h, 1.5 m in wid h, lead up to 50 ed.All kinds of	ydraulic excavator)/r th as well as 10 sqm 0 m and lift up to 1.5 soil	nanual means on plan) m, disposed	
	Net Total	5.254cum	@215.37/cum	1131.55	
6.002	4.1.5				
	Providing and laying in position cer cost of centering and shuttering - Al coarse sand : 6 graded stone aggreg	nent concrete o 1 work up to pl ate 20 mm nom	f specified grade exc inth level:1:3:6 (1 ce inal size)	eluding the ment : 3	
	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 reacement concrete work, using cemer manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includi proportions as per IS: 9103 to accel workability without impairing stren - in -charge. Note:- Cement content /less cement used as per design mix plinth level upto floor V level	ady mixed M-25 at content as per tching plant and ontinuous agitate reed cement cor Taying, excludi ng cost of admin erate/ retard set gth and durabilit considered in th is payable/reco	grade concrete for n approved design mi transported to site of ed mixer, manufactur acrete work including ng the cost of center xtures in recommend ting of concrete, imp ity as per direction of his item is @330 kg overable separately.	reinforced x, f work in red as per mix g pumping of ing, shuttering led prove f the Engineer /cum. Excess Ill work above	
	Net Total	9.118cum	@11610.44/cum	105863.99	
6.005	5.34.1		10KA		
	Extra for providing richer mixes at specified cement content used is pa grade concrete instead of M-25 grad in M-30 is @ 340 kg/cum).	all floor levels. yable/ recoveral de BMC/RMC.	Note:- Excess/less cole separately.Provid (Note:- Cement cont	ement over the ling M-30 ent considered	
	Net Total	11.994cum	@82.60/cum	990.70	
6.006	4.12 Extra for providing and mixing wat doses by weight of cement as per m	er proofing mat anufacturer	erial in cement conc 39;s specification .	rete work in	
	Net Total	3958.020kg	@1.35/kg	5343.33	
6.007	OD244264/2022-2023				
	Extra for providing sulphate resista	nt cement for th	e structures above p	inth level.	
	Net Total	11.994cum	@1899.46/cum	22782.12	
6.008	5.22.6				
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	including straig upto plinth lev	ghtening, cutting, be elThermo - Mechan	nding, placing ically Treated	
	Net Total	1439.280kilo gram	@98.92/kilogram	142373.58	
6.009	OD246784/2022-2023				
	Extra for providing epoxy coating f	or reinforcemen	it bars.		
	Net Total	11.994kg	@2.32/kg	27.83	
6.010	5.9.1				
	Centering and shuttering including	strutting, etc. an	d removal of form		

Sl No	Specification	Quantity	Rate	Amount	
	for:Foundations, footings, bases of	columns, etc for	r 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 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 floors, roofs, landings, balconies an	strutting, etc. ar	nd removal of form form	or:Suspended	
	Net Total	11.200sqm	@820.86/sqm	9193.63	
6.013	5.9.5				
	Centering and shuttering including beams, plinth beams, girders bressu	strutting, etc. ar	nd removal of form fore form fore fore fore fore for the second sec	or:Lintels,	
	Net Total	10.680sqm	@653.88/sqm	6983.44	
6.014	13.7.1	(BGA)		1	
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1	
	Net Total	5 <mark>7.975</mark> sqm	@403.74/sqm	23406.83	
	Finishing with Epoxy paint (two or as per manufacturer's specific preparation of surface, etc. complet Net Total	more coats) at a rations including e.On concrete v	all locations prepared g appropriate priming work	d and applied g coat,	
6.016	22 23 1	<i>31.915</i> sqiii	@ 22 1.35/ 5qm	15005.55	
	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re tunnels / subway and bridge deck etc., prep integral crystalline slurry : 2 parts v integral crystalline slurry : 1 part was same from negative (internal) side v shall meet the requirements as spec permeability of concrete by more the DIN 1048 and resistant to 16 bar hy crystalline slurry shall be capable of self-healing shall be carried out all complete as engineerin- charge. The product performance sh	stalline slurry o C structures like servior, sewage ared by mixing vater) for vertica ater) for horizon with the help of ified in ACI-212 han 90% compar- ydrostatic pressu- ng of cracks up per specification hall carry guaran	f hydrophilic in natu retaining walls of th & water treatm in the ratio of 5 : 2 (al surfaces and 3 : 1 ntal surfaces and app synthetic fiber brush 2-3R-2010 i.e by red red with control cond ire on negative side. to a width of 0.50mr n and the direction of ntee for 10 years aga	re for e basement, hent plant, 5 parts (3 parts lying the h. The material lucing crete as per The n. The work f the inst any	
	Net Total	15.000sam	@573.84/sam	8607.60	
6.017	22 23 2	12.0005411		0007.00	
0.017					

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 & amp; 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				
	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-healin shall be carried out all complete as engineerin- charge. The product performance sh leakage.For horizontal surface one of	ng of cracks up per specification nall carry guaran coat @1.10 kg r	to a width of 0.50mm n and the direction of ntee for 10 years again per som.	n. The work f the inst any	
	Net Total	5.600sqm	@442.30/sqm	2476.88	
		1660	Heading Total(Rs)	404360.31	
7	MANNUAL FINE SCREEN CHA	ANNEL	GOAL		
7.001	5.37.2		and the second		
	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 unter 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 wat doses by weight of cement as per m	er proofing mat	erial in cement conci	rete work in	
	Net Total	1851.300kg	@1.35/kg	2499.26	
7.004	OD244422/2022-2023				
	Extra for providing sulphate resistant	nt cement for th	e structures above pl	inth level.	
Sl No	Specification	Quantity	Rate	Amount	
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	Net Total	5.610cum	@1899.46/cum	10655.97	
7.005	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	673.200kilogr am	@98.92/kilogram	66592.94	
7.006	OD246785/2022-2023				
	Extra for providing epoxy coating f	or reinforcemer	it bars.		
	Net Total	5.610kg	@2.32/kg	13.02	
7.007	5.9.2				
	Centering and shuttering including thickness) including attached pilastering attached pilaste	strutting, etc. ar ers, butteresses,	nd removal of form form form form form form	or:Walls (any urses etc.	
	Net Total	37.200sqm	@721.70/sqm	26847.24	
7.008	5.9.3	CON DO		3	
	Centering and shuttering including floors, roofs, landings, balconies an	strutting, etc. and access platfor	nd removal of form form	or:Suspended	
	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 cement : 3 fine sand)				
	Net Total	55.800sqm	@403.74/sqm	22528.69	
7.010	13.52.2				
	Finishing with Epoxy paint (two or as per manufacturer's specific preparation of surface, etc. complet	more coats) at a ations including e.On concrete w	all locations prepared g appropriate priming york	d and applied g coat,	
	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 & amp; 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
	leakage.For vertical surface two coa	ats @0.70 kg pe	r 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 & amp; 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			
	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 looked for her performance one performance.			
	Net Total	6.200sqm	@442.30/sqm	2742.26
			Heading Total(Rs)	225757.70
8	OIL & GREASE TRAP			
8.001	2.6.1	UBUIC WORKS		
	Earth work in excavation by mecha over areas (exceeding 30 cm in dep including disposal of excavated earth earth to be levelled and neatly dress	nical means (Hy th, 1.5 m in wid th, lead up to 50 ed.All kinds of	/draulic excavator)/n th as well as 10 sqm m and lift up to 1.5 soil	nanual means on plan) m, disposed
	Net Total	37.785cum	@215.37/cum	8137.76
8.002	4.1.5			
	Providing and laying in position cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	nent concrete o Il work up to pli ate 20 mm nom	f specified grade exc inth level:1:3:6 (1 ce inal size)	luding the ment : 3
	Net Total	5.052cum	@7413.74/cum	37454.21
8.003	5.37.1			
	Providing and laying in position reacement concrete work, using cement manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includi proportions as per IS: 9103 to accel workability without impairing stren - in -charge. Note:- Cement content /less cement used as per design mix	dy mixed M-25 at content as per sching plant and ontinuous agitate cced cement con laying, excludi ng cost of admiz erate/ retard sett gth and durabili considered in th is payable/reco	grade concrete for r approved design mit transported to site o ed mixer, manufactu acrete work including ng the cost of center xtures in recommend ting of concrete, imp ity as per direction of his item is @330 kg werable separately.A	einforced x, f work in red as per mix g pumping of ing, shuttering led prove f the Engineer /cum. Excess .ll 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	-12 B.D.		2
	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 .			
<u> </u>	Net 10tal	10030.730Kg	@1.55/Kg	15570.01
8.007	OD244458/2022-2025	at compant for th	a atructuras abova n	linth loval
	Extra for providing surpliate resista	1000000000000000000000000000000000000	@1800 46/oum	57886.04
8 008	5 22 6	30.473cuiii	@1899.40/Culli	57880.04
8.008	 08 5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, plac in position and binding all complete upto plinth levelThermo - Mechanically Treat 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 f	or reinforcemer	nt bars.	
	Net Total	3657.000kg	@2.32/kg	8484.24
8.010	5.9.1			
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. ar columns, etc for	nd removal of form	
	Net Total	40.660sqm	@337.42/sqm	13719.50

Sl No	Specification	Quantity	Rate	Amount
8.011	5.9.2			
	Centering and shuttering including thickness) including attached pilaste	strutting, etc. ar ers, butteresses,	nd removal of form form form form	or:Walls (any urses etc.
	Net Total	104.575sqm	@721.70/sqm	75471.78
8.012	13.7.1			
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1
	Net Total	119.070sqm	@403.74/sqm	48073.32
8.013	13.52.2			
	Finishing with Epoxy paint (two or as per manufacturer's specific preparation of surface, etc. complete	more coats) at a ations including e.On concrete v	all locations prepared g appropriate priming vork	l and applied g coat,
	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 & amp; 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 vartical surfaces two costs (20 70 kg per sem			
0.015	Net Total	45.500sqm	@573.84/sqm	26109.72
8.015	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re tunnels / subway and bridge deck etc., prep- integral crystalline slurry : 2 parts w integral crystalline slurry : 1 part wa same from negative (internal) side v shall meet the requirements as spec- permeability of concrete by more th DIN 1048 and resistant to 16 bar hy crystalline slurry shall be capable of self-healing	stalline slurry o c structures like servior, sewage ared by mixing vater) for vertica ater) for horizon with the help of ified in ACI-212 an 90% compan drostatic pressu-	f hydrophilic in natu retaining walls of th & amp; water treatm in the ratio of 5 : 2 (1 al surfaces and 3 : 1 (1) tal surfaces and app synthetic fiber brush 2-3R-2010 i.e by red red with control conc ure on negative side.	re for e basement, nent plant, 5 parts (3 parts lying the n. The material lucing crete as per The n. The work

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				
	Net Total	9.000each	@548.45/each	4936.05	
	OF P	UBLIC WORKS	Heading Total(Rs)	1013779.52	
9	GRIT SEPARATOR				
9.001	2.6.1				
	Earth work in excavation by mecha- over areas (exceeding 30 cm in dep including disposal of excavated earth earth to be levelled and neatly dress	nical means (Hy th, 1.5 m in wid th, lead up to 50 ed.All kinds of	ydraulic excavator)/r th as well as 10 sqm 0 m and lift up to 1.5 soil	nanual means on plan) m, disposed	
	Net Total	49.309cum	@215.37/cum	10619.68	
9.002	4.1.5				
	Providing and laying in position cer cost of centering and shuttering - Al coarse sand : 6 graded stone aggreg	nent concrete o ll work up to pl ate 20 mm nom	f specified grade exc inth level:1:3:6 (1 ce inal size)	luding the ment : 3	
	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		TO Rea		
	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 wat doses by weight of cement as per m	er proofing mat anufacturer	erial in cement conc 39;s specification .	rete work in	
	Net Total	12847.890kg	@1.35/kg	17344.65	
9.007	OD244602/2022-2023				
	Extra for providing sulphate resista	nt cement for th	e structures above pl	inth 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 f	or reinforcemen	it bars.		
	Net Total	4671.960kg	@2.32/kg	10838.95	
9.010	5.9.1				
	Centering and shuttering including	strutting, etc. an	d removal of form		

Sl No	Specification	Quantity	Rate	Amount	
	for:Foundations, footings, bases of	columns, etc for	r 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 floors, roofs, landings, balconies an	strutting, etc. ar d access platfor	nd removal of form f	or:Suspended	
	Net Total	12.000sqm	@820.86/sqm	9850.32	
9.013	13.7.1				
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1	
	Net Total	155.800sqm	@403.74/sqm	62902.69	
9.014	13.52.2	TROAD.		1	
	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	9 <mark>0.19</mark> 0sqm	@224.33/sqm	20232.32	
9.015	22.23.1	ATFORM FOR TH	E MANAGEMENT		
	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 & amp; 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 55.530sam @573.84/sqm 31865.34				
9.016	22.23.2				
2.010	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re tunnels / subway and bridge deck etc., prep integral crystalline slurry : 2 parts v	stalline slurry o c structures like servior, sewage ared by mixing vater) for vertica	of hydrophilic in naturetaining walls of the & water treatment in the ratio of 5 : 2 (al surfaces and 3 : 1)	re for e basement, nent plant, 5 parts (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 distance of 5 km (average) to the re reservoir of height not less than 3 m tanker lorry, tools and other applien	s fited in lorry a servoir site and 1 using 5 HP die aces and cost of	nd conveying water pumping the water i esel engine pump set water etc. complete.	from a nto the , hire for	
	Net Total	35.225Kilo litre	@185.72/Kilo litre	6541.99	
9.018	19.16		IORM.		
	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				
	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 cer cost of centering and shuttering - A	ment concrete o ll work up to pl	f specified grade exc inth level:1:3:6 (1 ce	eluding the ment : 3	
	coarse sand : 6 graded stone aggreg	ate 20 mm nom	inal size)		
10.005	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			
	Net Total	91.179cum	@11610.44/cum	1058628.31
10.005	5.34.1			
	Extra for providing richer mixes at specified cement content used is pagrade concrete instead of M-25 grad in M-30 is @ 340 kg/cum).	all floor levels. yable/ recoveral le BMC/RMC.	Note:- Excess/less c ble separately.Provid (Note:- Cement cont	ement over the ling M-30 ent considered
	Net Total	289.228cum	@82.60/cum	23890.23
10.006	4.12			
	Extra for providing and mixing wat doses by weight of cement as per m	er proofing mat anufacturer's sp	erial in cement conc	rete work in
	Net Total	95445.240kg	@1.35/kg	128851.07
10.007	OD235084/2022-2023			
	Extra for providing sulphate resistant	nt cement for th	e structures above p	inth 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 for:Foundations, footings, bases of	strutting, etc. ar columns, etc fo	nd removal of form r mass concrete		
	Net Total	317.510sqm	@337.42/sqm	107134.22	
10.011	5.9.2				
	Centering and shuttering including thickness) including attached pilast	strutting, etc. ar ers, butteresses,	nd removal of form f	or:Walls (any urses etc.	
	Net Total	595.980sqm	@721.70/sqm	430118.77	
10.012	13.7.1				
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1	
	Net Total	671.730sqm	@403.74/sqm	271204.27	
10.013	13.52.2		and the second		
	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				
10.015	22.23.2	_, _, _, 00 00qm		10,000,07	
10.015	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re / subway and bridge deck etc., prep	stalline slurry o Structures like servior, sewage ared by mixing	of hydrophilic in nature retaining walls of the & water treatment present in the ratio of 5 : 2 (re for e basement, blant, tunnels 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 sh leakage.For horizontal surface one	nall carry guara coat @1.10 kg p	ntee for 10 years aga oer sqm.	inst any
	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		C-	
	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 acerse and: 6 graded stone aggregate 20 mm pominel 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 mecha over areas (exceeding 30 cm in dep including disposal of excavated ear earth to be levelled and neatly dress	nical means (H th, 1.5 m in wid th, lead up to 50 ed.All kinds of	ydraulic excavator)/r th as well as 10 sqm) m and lift up to 1.5 soil	nanual means on plan) m, disposed
	Net Total	81.166cum	@215.37/cum	17480.72
11.002	4.1.5 Providing and laying in position cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	ment concrete o ll work up to pl ate 20 mm nom	f specified grade exc inth level:1:3:6 (1 ce inal size)	cluding the ment : 3
	Inet I otal	∠1.044cum	@/415./4/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				
	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				
	Net Total	67.200cum	@11610.44/cum	780221.57	
11.005	5.34.1 Extra for providing richer mixes at specified cement content used is pa grade concrete instead of M-25 grad in M-30 is @ 340 kg/cum).	all floor levels. yable/ recoveral de BMC/RMC.	Note:- Excess/less co ble separately.Provid (Note:- Cement cont	ement over the ling M-30 ent considered	
11.006	4.12	102.470 cu m	@ 02.00/eum	13072.02	
11.000	Extra for providing and mixing wat doses by weight of cement as per m	er proofing mat anufacturer	erial in cement conc 39;s specification .	rete work in	
	Net Total	60215.100kg	@1.35/kg	81290.39	
11.007	OD243745/2022-2023				
	Extra for providing sulphate resistant	nt cement for th	e structures above pl	inth level.	
	Net Total	182.470cum	@1899.46/cum	346594.47	
11.008	5.22.6				
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	including strai upto plinth lev	ghtening, cutting, be elThermo - Mechani	nding, placing ically Treated	

Sl No	Specification	Quantity	Rate	Amount
	Net Total	21896.400kil ogram	@98.92/kilogram	2165991.89
11.009	OD246773/2022-2023			
	Extra for providing epoxy coating f	or reinforcemer	nt bars.	
	Net Total	21896.400kg	@2.32/kg	50799.65
11.010	5.9.1			
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. ar columns, etc for	nd removal of form r mass concrete	
	Net Total	176.470sqm	@337.42/sqm	59544.51
11.011	5.9.2			
	Centering and shuttering including thickness) including attached pilaste	strutting, etc. ar ers, butteresses,	nd removal of form form form form form form and string cou	or:Walls (any urses etc.
	Net Total	448.000sqm	@721.70/sqm	323321.60
11.012	5.9.3	Aller		-
	Centering and shuttering including floors, roofs, landings, balconies an	strutting, etc. ar d access platfor	nd removal of form form	or:Suspended
	Net Total	43.348sqm	@820.86/sqm	35582.64
11.013	5.9.5			
	Centering and shuttering including beams, plinth beams, girders bressu	strutting, etc. ar mers and cantil	nd removal of form fore evers	or:Lintels,
	Net Total	49.280sqm	@653.88/sqm	32223.21
11.014	13.7.1			
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1
	Net Total	508.260sqm	@403.74/sqm	205204.89
11.015	13.52.2			
	Finishing with Epoxy paint (two or as per manufacturer's specific preparation of surface, etc. complet	more coats) at a ations including e.On concrete v	all locations prepared g appropriate priming vork	l and applied g coat,
	Net Total	290.260sqm	@224.33/sqm	65114.03
11.016	22.23.1			
	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re tunnels / subway and bridge deck etc., prep integral crystalline slurry : 2 parts w integral crystalline slurry : 1 part was same from negative (internal) side w shall meet the requirements as spec- permeability of concrete by more the DIN 1048 and resistant to 16 bar hy	stalline slurry o c structures like servior, sewage ared by mixing vater) for vertica ater) for horizon with the help of ified in ACI-212 an 90% compar- vdrostatic pressu	f hydrophilic in natu retaining walls of th & amp; water treatm in the ratio of 5 : 2 (2 al surfaces and 3 : 1 (2) ntal surfaces and app synthetic fiber brush 2-3R-2010 i.e by red red with control conc ure on negative side.	re for e basement, ent plant, 5 parts (3 parts lying the L. The material ucing crete as per 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 & amp; 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 som				
11.010	Net Total	118.810sqm	@442.30/sqm	52549.66	
11.018	Filling water with 5000 litre tankers distance of 5 km (average) to the re reservoir of height not less than 3 m tanker lorry, tools and other applien	s fited in lorry a servoir site and 1 using 5 HP die lices and cost of	nd conveying water pumping the water i esel engine pump set water etc. complete.	from a nto the , hire for	
	Net Total	594.050Kilo litre	@185.72/Kilo litre	110326.97	
11.019	2.25		-		
	Filling available excavated earth (ex foundation etc. in layers not exceed layer by ramming and watering, lea	xcluding rock) i ing 20 cm in de d up to 50 m an	in trenches, plinth, sight, consolidating ea of lift up to 1.5 m.	des of ich deposited	
	Net Total	63.559cum	@260.18/cum	16536.78	
11.020	19.16Providing 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 mecha over areas (exceeding 30 cm in dep including disposal of excavated eart earth to be levelled and neatly dress	nical means (H th, 1.5 m in wid th, lead up to 50 ed.All kinds of	ydraulic excavator)/r hth as well as 10 sqm m and lift up to 1.5 soil	nanual means on plan) m, disposed	
	Net Total	97.414cum	@215.37/cum	20980.05	
12.002	4.1.5				
	Providing and laying in position cen cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	ment concrete o ll work up to pl ate 20 mm nom	f specified grade exc inth level:1:3:6 (1 ce inal size)	eluding the ement : 3	
	Net Total	33.605cum	@7413.74/cum	249138.73	
12.003	5.37.1		GRAF	N I	
	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				
	Net Total	151.425cum	@9947.98/cum	1506372.87	
12.004	5.37.2				
	Providing and laying in position reacement concrete work, using cement manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includi proportions as per IS: 9103 to accel workability without impairing stren - in -charge. Note:- Cement content /less cement used as per design mix plinth level upto floor V level	dy mixed M-25 at content as per thing plant and ontinuous agitat reed cement cor laying, excludi ng cost of admi erate/ retard set gth and durabilit considered in t	5 grade concrete for n approved design mi l transported to site o ed mixer, manufactuncrete work including ing the cost of center xtures in recommence ting of concrete, imp ity as per direction of his item is @330 kg overable separately.A	reinforced x, of work in red as per mix g pumping of ing, shuttering led prove f the Engineer cum. Excess all work above	
	Net Total	74.700cum	@11610.44/cum	867299.87	
12.005	5.34.1				

SI 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 wat doses by weight of cement as per m	er proofing mat anufacturer's sp	erial in cement conc	rete work in	
	Net Total	74621.250kg	@1.35/kg	100738.69	
12.007	OD235099/2022-2023				
	Extra for providing sulphate resistat	nt cement for th	e structures above pl	inth level.	
	Net Total	226.125cum	@1899.46/cum	429515.39	
12.008	5.22.6				
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	including strai	ghtening, cutting, be relThermo - Mechani	nding, placing ically Treated	
	Net Total	27135.000kil ogram	@98.92/kilogram	2684194.20	
12.009	OD235100/2022-2023				
	Extra for providing epoxy coating f	or reinforcemer	nt bars.		
	Net Total	27135.000kg	@2.32/kg	62953.20	
12.010	5.9.1				
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. ar columns, etc for	nd removal of form r mass concrete		
	Net Total	194.820sqm	@337.42/sqm	65736.16	
12.011	5.9.2				
	Centering and shuttering including thickness) including attached pilaster	strutting, etc. ar ers, butteresses,	nd removal of form for plinth and string cou	or:Walls (any urses etc.	
	Net Total	500.000sqm	@721.70/sqm	360850.00	
12.012	5.9.5				
	Centering and shuttering including beams, plinth beams, girders bressu	strutting, etc. ar mers and cantil	nd removal of form fore fore fore fore fore fore fore for the second sec	or:Lintels,	
	Net Total	7.770sqm	@653.88/sqm	5080.65	
12.013	13.7.1				
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1	
	Net Total	583.560sqm	@403.74/sqm	235606.51	
12.014	13.52.2				
	Finishing with Epoxy paint (two or as per manufacturer's specifications of surface, etc. complete.On concre	more coats) at a including approtection of the second second second second second second second second second s	all locations prepared opriate priming coat,	l and applied preparation	
	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 coa	ats @0.70 kg pe	r sqm		
	Net Total	243.000sqm	@573.84/sqm	139443.12	
12.016	22.23.2	LAOAN	A F	17	
	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	/30.113K110 litre	litre	137082.35	
12.018	19.16				
	Providing orange colour safety foot as per IS: 10910 on 12 mm dia steed cross section as 23 mm x 25 mm an 165 mm with minimum 112 mm spa	rest of minimum el bar conformin d over all minim ace between pro	m 6 mm thick plastic ng to IS:1786, having num length 263 mm ptruded legs having 2	c encapsulated g minimum and width as 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	-1232		3	
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)				
	Net Total	1 <mark>4.670</mark> cum	@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 reacement concrete work, using cement manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includit proportions as per IS: 9103 to accel workability without impairing stren - in -charge. Note:- Cement content /less cement used as per design mix	ady mixed M-25 at content as per- traching plant and ontinuous agitat reed cement con laying, excludi- ng cost of admi erate/ retard set gth and durabil- considered in t is payable/reco	5 grade concrete for r approved design mi l transported to site of ed mixer, manufactu- ncrete work including ng the cost of center xtures in recommend ting of concrete, imp ity as per direction of his item is @330 kg overable separately.A	reinforced x, of work in red as per mix g pumping of ing, shuttering led prove f the Engineer t/cum. Excess all work above	

EST No. :WRD/KWA-CESEWA/EST/4856/2023_27_1_1 (Edit Id : 1) (Dsor year : 2018,Cost Index (Place : Malappuram,Value : 136.44),GST : 18%

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 specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content conside 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 wat doses by weight of cement as per m	er proofing mat anufacturer	erial in cement conc 39;s specification.	rete work in	
	Net Total	40756.980kg	@1.35/kg	55021.92	
13.007	OD243859/2022-2023				
	Extra for providing sulphate resistant	nt cement for th	e structures above pl	inth level.	
	Net Total	123.506cum	@1899.46/cum	234594.71	
13.008	5.22.6	Mar	MAF		
	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	1482 <mark>0.7</mark> 20kil ogram	@98.92/kilogram	1466065.62	
13.009	OD246775/2022-2023				
	Extra for providing epoxy coating f	or reinforcemer	nt bars.		
	Net Total	14820.720kg	@2.32/kg	34384.07	
13.010	5.9.1				
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. ar columns, etc for	nd removal of form r mass concrete		
	Net Total	110.700sqm	@337.42/sqm	37352.39	
13.011	5.9.2				
	Centering and shuttering including thickness) including attached pilaster	strutting, etc. ar ers, butteresses,	nd removal of form form form form form form	or:Walls (any urses etc.	
	Net Total	338.100sqm	@721.70/sqm	244006.77	
13.012	5.9.3				
	Centering and shuttering including floors, roofs, landings, balconies an	strutting, etc. ar d access platfor	nd removal of form form	or:Suspended	
	Net Total	66.743sqm	@820.86/sqm	54786.66	
13.013	5.9.5				
	Centering and shuttering including beams, plinth beams, girders bressu	strutting, etc. ar mers and cantil	nd removal of form fore form fore fore fore for the second s	or:Lintels,	
	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 as per manufacturer's specific preparation of surface, etc. complete	more coats) at a ations including e.On concrete w	all locations prepared g appropriate priming vork	d and applied g coat,	
	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 & amp; 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-212-3 R -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				
	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 (low duty) charges including all cos	C.I. manhole cov st, labour charge	ver 455mm x 610mm es etc., complete.	n with frame	
	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				
	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 mecha over areas (exceeding 30 cm in dep including disposal of excavated ear earth to be levelled and neatly dress	nical means (Hy th, 1.5 m in wid th, lead up to 50 ed.All kinds of	ydraulic excavator)/r th as well as 10 sqm) m and lift up to 1.5 soil	nanual means on plan) m, disposed	
	Net Total	36.015cum	@215.37/cum	7756.55	
14.002	4.1.5				
	Providing and laying in position cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	ment concrete o ll work up to pl ate 20 mm nom	f specified grade exc inth level:1:3:6 (1 ce inal size)	cluding the ment : 3	
	Net Total	8.898cum	@7413.74/cum	65967.46	
14.003	5.37.1				
	Providing and laying in position reacement concrete work, using cemer manufactured in fully automatic bas transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includi	ady mixed M-25 at content as per tching plant and ontinuous agitat rced cement con a laying, excludi ng cost of admi	b grade concrete for n approved design mi l transported to site of ed mixer, manufactur increte work including ng the cost of center xtures in recommend	reinforced x, of work in red as per mix g pumping of ing, shuttering led	

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 unto floor V level				
	Net Total	30.600cum	@11610.44/cum	355279.46	
14.005	5.34.1		Com-		
	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 wat doses by weight of cement as per m	er proofing mat anufacturer's sp	erial in cement conc	rete work in	
	Net Total	18700.770kg	@1.35/kg	25246.04	
14.007	OD235088/2022-2023				
	Extra for providing sulphate resista	nt cement for th	e structures above pl	inth 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	6800.280kilo gram	@98.92/kilogram	672683.70	
14.009	OD235089/2022-2023				
	Extra for providing epoxy coating f	or reinforcemen	nt 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 for:Foundations, footings, bases of	strutting, etc. ar columns, etc for	nd removal of form r mass concrete	
	Net Total	55.260sqm	@337.42/sqm	18645.83
14.011	5.9.2			
	Centering and shuttering including thickness) including attached pilast	strutting, etc. ar ers, butteresses,	nd removal of form form form form form	or:Walls (any urses etc.
	Net Total	204.000sqm	@721.70/sqm	147226.80
14.012	13.7.1			
	12 mm cement plaster finished with cement : 3 fine sand)	n a floating coat	of neat cement of m	ix:1:3 (1
	Net Total	229.470sqm	@403.74/sqm	92646.22
14.013	13.52.2			
	Finishing with Epoxy paint (two or as per manufacturer's specifications of surface, etc. complete.On concre	more coats) at a sincluding apprete work	all locations prepared opriate priming coat,	d and applied , preparation
	Net Total	114.120sqm	@224.33/sqm	25600.54
14.014	22.23.1	STRATES BOARD	INRA!	
	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			
14.015	22.23.2	•		
	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re / subway and bridge deck etc., prep integral crystalline slurry : 2 parts v integral crystalline slurry : 1 part w same from negative (internal) side v shall meet the requirements as spec permeability of concrete by more th DIN 1048 and resistant to 16 bar hy crystalline	estalline slurry of c structures like eservior, sewage ared by mixing vater) for vertica ater) for horizon with the help of ified in ACI-21 han 90% compa- ydrostatic pressu	f hydrophilic in natu retaining walls of th & water treatment p in the ratio of 5 : 2 (al surfaces and 3 : 1 ntal surfaces and app synthetic fiber brush 2-3R-2010 i.e by red red with control conduction ire on negative side.	re for le basement, blant, tunnels 5 parts (3 parts lying the h. The material lucing crete as per The

Sl No	Specification	Quantity	Rate	Amount	
	slurry shall be capable of self-healin shall be carried out all complete as engineerin-	ng of cracks up per specification	to a width of 0.50mm n and the direction of	n. The work f the	
	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 course and: 6 graded stope aggragate 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 WIT	TH PLATE SE	TTLER		
15.001	2.6.1				
	Earth work in excavation by mecha over areas (exceeding 30 cm in dep including disposal of excavated earth earth to be levelled and neatly dress	nical means (H th, 1.5 m in wid th, lead up to 50 sed.All kinds of	ydraulic excavator)/r th as well as 10 sqm) m and lift up to 1.5 soil	nanual means on plan) m, disposed	
	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 reacement concrete work, using cement manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of	dy mixed M-25 at content as per tching plant and ontinuous agitat rced cement con laying, excludi	b grade concrete for r approved design mi l transported to site o ed mixer, manufactu ncrete work including ng the cost of center	reinforced x, of work in red as per mix g pumping of ing, 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	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 wat doses by weight of cement as per m	er proofing mat	erial in cement concrete concr	rete work in	
	Net Total	37724.020kg	@1.35/kg	50927.43	
15.007	OD235095/2022-2023				
	Extra for providing sulphate resista	nt cement for th	e structures above pl	inth level.	
	Net Total	110.953cum	@1899.46/cum	210750.79	
15.008	5.22.6				
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	t including straig to plinth lev	ghtening, cutting, be elThermo - Mechani	nding, placing cally Treated	
	Net Total	13314.360kil ogram	@98.92/kilogram	1317056.49	
15.009	OD235096/2022-2023				
	Extra for providing epoxy coating f	or reinforcemen	t 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 for:Foundations, footings, bases of	strutting, etc. ar columns, etc for	nd removal of form r mass concrete	
	Net Total	14.940sqm	@337.42/sqm	5041.05
15.011	5.9.2			
	Centering and shuttering including thickness) including attached pilaste	strutting, etc. ar ers, butteresses,	nd removal of form f plinth and string co	or:Walls (any urses etc.
	Net Total	253.960sqm	@721.70/sqm	183282.93
15.012	5.9.3			
	Centering and shuttering including floors, roofs, landings, balconies an	strutting, etc. ar	nd removal of form f m	or:Suspended
	Net Total	47.500sqm	@820.86/sqm	38990.85
15.013	5.9.5			
	Centering and shuttering including beams, plinth beams, girders bressu	strutting, etc. ar mers and cantil	nd removal of form f evers	or:Lintels,
	Net Total	13.680sqm	@653.88/sqm	8945.08
15.014	5.9.6	h pseudo	MAF	
	Centering and shuttering including Pillars, Piers, Abutments, Posts and	strutting, etc. ar	nd removal of form f	or:Columns,
	Net Total	2 <mark>1.24</mark> 0sqm	@869.03/sqm	18458.20
15.015	13.7.1	ATFORM FOR TH	E MANAGEMENT	
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1
	Net Total	546.490sqm	@403.74/sqm	220639.87
15.016	13.52.2			
	Finishing with Epoxy paint (two or as per manufacturer's specifications of surface, etc. complete.On concre	more coats) at a including approtection to the second seco	all locations prepared opriate priming coat	d and applied , preparation
	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 sh leakage.For horizontal surface one	all carry guaran coat @1.10 kg p	ntee for 10 years aga per sqm.	inst any	
	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 coa	ats @0.70 kg pe	er 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 stope aggragate 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 mecha over areas (exceeding 30 cm in dep including disposal of excavated ear	nical means (Hy th, 1.5 m in wid th, lead up to 50	ydraulic excavator)/n th as well as 10 sqm) m and lift up to 1.5	nanual means on plan) 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 reacement concrete work, using cement manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includi proportions as per IS: 9103 to accel workability without impairing stren - in -charge. Note:- Cement content /less cement used as per design mix plinth level	dy mixed M-25 th content as per ching plant and ontinuous agitat reced cement cor flaying, excludi ing cost of admi erate/ retard set gth and durabilit considered in t is payable/reco	b grade concrete for n approved design mi l transported to site of ed mixer, manufactur ncrete work including ng the cost of center xtures in recommend ting of concrete, imp ity as per direction of his item is @330 kg overable separately.A	reinforced x, of work in red as per mix g pumping of ing, shuttering led prove f the Engineer /cum. Excess all wiork upto	
	Net Total	9.683cum	@9947.98/cum	96326.29	
10.00+	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				
16.005	5.34.1				
	Extra for providing richer mixes at specified cement content used is pa grade concrete instead of M-25 grad in M-30 is @ 340 kg/cum).	all floor levels. yable/ recoveral le BMC/RMC.	Note:- Excess/less c ble separately.Provid (Note:- Cement cont	ement over the ling M-30 cent considered	
16.006	/ 12	17.337Cuill	₩ 02.00/Culli	1+30.37	
10.000	Extra for providing and mixing wat doses by weight of cement as per m	er proofing mat anufacturer's sp	erial in cement conc	rete work in	
	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 in position and binding all complete bars of grade Fe-500D or more	including straig upto plinth lev	ghtening, cutting, be elThermo - Mechani	nding, placing cally Treated
	Net Total	2107.080kilo gram	@98.92/kilogram	208432.35
16.008	OD235093/2022-2023			
	Extra for providing epoxy coating f	or reinforcemer	nt bars.	
	Net Total	2107.080kg	@2.32/kg	4888.43
16.009	OD235094/2022-2023			
	Extra for providing sulphate resistant	nt cement for th	e structures above pl	inth level.
	Net Total	17.559cum	@1899.46/cum	33352.62
16.010	5.9.1			
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. an columns, etc for	nd removal of form r mass concrete	2
	Net Total	29.207sqm	@337.42/sqm	9855.03
16.011	5.9.2	- marchine	TOR	
	Centering and shuttering including strutting, etc. and removal of form for: Walls (a thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	59.346sqm	@721.70/sqm	42830.01
16.012	5.9.3	DISULC WORKS		
	Centering and shuttering including floors, roofs, landings, balconies an	strutting, etc. ar d access platfor	nd removal of form form	or:Suspended
	Net Total	3.140sqm	@820.86/sqm	2577.50
16.013	13.7.1			
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1
	Net Total	74.410sqm	@403.74/sqm	30042.29
16.014	13.52.2			
	Finishing with Epoxy paint (two or as per manufacturer's specifications of surface, etc. complete.On concre	more coats) at a including approte work	all locations prepared opriate priming coat,	l and applied preparation
	Net Total	34.736sqm	@224.33/sqm	7792.33
16.015	22.23.1			
	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re / subway and bridge deck etc., prep integral crystalline slurry : 2 parts w integral crystalline slurry : 1 part was same from negative (internal) side v	stalline slurry o c structures like servior, sewage ared by mixing vater) for vertica ater) for horizor with the help of	f hydrophilic in natu retaining walls of th & water treatment p in the ratio of 5 : 2 (al surfaces and 3 : 1 ntal surfaces and app synthetic fiber brush	re for e basement, lant, tunnels 5 parts (3 parts lying the a. 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-				
	leakage.For vertical surface two cos	nall carry guarai ats @0.70 kg pe	ntee for 10 years aga er sqm	inst any	
	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				
	Net Total	3.140sqm	@442.30/sqm	1388.82	
16.017	100.36.1	<u> </u>	1	<u> </u>	
	distance of 5 km (average) to the re reservoir of height not less than 3 n tanker lorry, tools and other applier	s fited in forry a servoir site and a using 5 HP die aces and cost of	nd conveying water pumping the water i esel engine pump set water etc. complete.	from a nto the , hire for	
	Net Total	13.188Kilo litre	@185.72/Kilo litre	2449.28	
16.018	100.41.34				
	Supplying and fixing Rectangular C (low duty) charges including all cos	C.I. manhole cov st, labour charge	ver 455mm x 610mm es etc., complete.	n with frame	
	Net Total	1.000no	@2815.71/no	2815.71	
16.019	19.16				
	Providing orange colour safety foot as per IS: 10910 on 12 mm dia stee cross section as 23 mm x 25 mm an 165 mm with minimum 112 mm sp top surface by ribbing or chequerin projections on tail length on 138 mm stand the bend test and chemical res	rest of minimu el bar conformin d over all minir ace between pro g besides necess n as per standar sistance test as p	m 6 mm thick plastic ng to IS:1786, having num length 263 mm otruded legs having 2 sary and adequate an rd drawing and suital per specifications and	c encapsulated g minimum and width as 2 mm tread on choring ble to with d 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	- Handreich	1000		
	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				
	Net Total	29.161cum	@9947.98/cum	290093.04	
17.004	5.37.2 Providing and laying in position reacement concrete work, using cement manufactured in fully automatic bat transit mixer for all leads, having condesign of specified grade for reinfort R.M.C. from transit mixer to site of finishing and reinforcement includit proportions as per IS: 9103 to accel workability without impairing strent - in -charge. Note:- Cement content /less cement used as per design mix plinth level upto floor V level	dy mixed M-25 t content as per ching plant and ontinuous agitat reed cement cor laying, excludi ng cost of admi erate/ retard set gth and durabil considered in t is payable/reco	b grade concrete for r approved design mi l transported to site o ed mixer, manufactu- ncrete work including ing the cost of center xtures in recommend ting of concrete, imp ity as per direction o his item is @330 kg overable separately.A	reinforced x, f work in red as per mix g pumping of ing, shuttering led prove f the Engineer /cum. Excess .ll work above	
	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 wat doses by weight of cement as per m	er proofing mate anufacturer's sp	erial in cement concre ecification .	rete work in	
	Net Total	17582.080kg	@1.35/kg	23735.81	
17.007	OD235097/2022-2023				
	Extra for providing sulphate resistant	nt cement for th	e structures above pl	inth level.	
	Net Total	51.712cum	@1899.46/cum	98224.88	
17.008	5.22.6	1000			
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	including straig upto plinth lev	ghtening, cutting, be elThermo - Mechani	nding, placing cally Treated	
	Net Total	620 <mark>5.44</mark> 0kilo gram	<mark>@98</mark> .92/kilogram	613842.12	
17.009	OD235098/2022-2023				
	Extra for providing epoxy coating f	or reinforcemen	it bars.		
	Net Total	6205.440kg	@2.32/kg	14396.62	
17.010	5.9.1				
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. an columns, etc for	d removal of form mass concrete		
	Net Total	60.695sqm	@337.42/sqm	20479.71	
17.011	5.9.2				
	Centering and shuttering including thickness) including attached pilaster	strutting, etc. an ers, butteresses,	d removal of form form form form form form and string cou	or:Walls (any arses etc.	
	Net Total	150.343sqm	@721.70/sqm	108502.54	
17.012	13.7.1				
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1	
	Net Total	174.576sqm	@403.74/sqm	70483.31	
17.013	13.52.2				
	Finishing with Epoxy paint (two or as per manufacturer's specifications of surface, etc. complete.On concre	more coats) at a including approtection of the second second second second second second second second second s	all locations prepared opriate priming coat,	l and applied preparation	
	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	- ABA		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.				
17.016	100.36.1	22 (0) 15 4 (11)		10121107	
	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	litre	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 mecha over areas (exceeding 30 cm in dep including disposal of excavated ear earth to be levelled and neatly dress	nical means (H th, 1.5 m in wid th, lead up to 50 ed.All kinds of	ydraulic excavator)/r hth as well as 10 sqm m and lift up to 1.5 soil	nanual means on plan) m, disposed
	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		E	
	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			
	Net Total	15.812cum	@9947.98/cum	157297.46
18.004	5.37.2			
	Providing and laying in position reacement concrete work, using cement manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includi proportions as per IS: 9103 to accel workability without impairing stren - in -charge. Note:- Cement content /less cement used as per design mix plinth level upto floor V level	dy mixed M-25 at content as per ching plant and ontinuous agitat reed cement con laying, excludi ng cost of admi erate/ retard set gth and durabil considered in t is payable/reco	5 grade concrete for n approved design mi I transported to site of ed mixer, manufactur nerete work including ing the cost of center xtures in recommend ting of concrete, im- ity as per direction of his item is @330 kg overable separately.A	reinforced x, of work in red as per mix g pumping of ing, shuttering led prove f the Engineer /cum. Excess all work above
1	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 wat doses by weight of cement as per m	er proofing mat anufacturer's sp	erial in cement conc	rete work in	
	Net Total	10299.960kg	@1.35/kg	13904.95	
18.007	OD235101/2022-2023				
	Extra for providing sulphate resistant	nt cement for th	e structures above pl	inth level.	
	Net Total	31.212cum	@1899.46/cum	59285.95	
18.008	5.22.6	1000			
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	including straig upto plinth lev	ghtening, cutting, be elThermo - Mechani	nding, placing cally Treated	
	Net Total	374 <mark>5.440</mark> kilo gram	<mark>@98.92/kilogram</mark>	370498.92	
18.009	OD235102/2022-2023				
	Extra for providing epoxy coating f	or reinforcemen	it bars.		
	Net Total	3745.440kg	@2.32/kg	8689.42	
18.010	5.9.1				
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. an columns, etc for	nd removal of form r mass concrete		
	Net Total	32.020sqm	@337.42/sqm	10804.19	
18.011	5.9.2				
	Centering and shuttering including thickness) including attached pilaster	strutting, etc. an ers, butteresses,	nd removal of form for plinth and string cou	or:Walls (any arses etc.	
	Net Total	123.200sqm	@721.70/sqm	88913.44	
18.012	13.7.1				
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1	
	Net Total	138.480sqm	@403.74/sqm	55909.92	
18.013	13.52.2				
	Finishing with Epoxy paint (two or as per manufacturer's specifications of surface, etc. complete.On concre	more coats) at a including approtection of the second second second second second second second second second s	all locations prepared opriate priming coat,	l and applied preparation	
	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	Ser.		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.				
18.016	100 36 1	1 4 .0035qm	@ ++2.30/3qm	0220.00	
10.010	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	litre	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	
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	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				
	Net Total	24.300cum	@9947.98/cum	241735.91	
19.004	5.22.6				
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	including strai upto plinth lev	ghtening, cutting, be elThermo - Mechani	nding, placing cally Treated	
	Net Total	2916.000kilo gram	@98.92/kilogram	288450.72	
19.005	5.9.1				
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. ar columns, etc for	nd removal of form r 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 cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	nent concrete o ll work up to pl ate 20 mm nom	f specified grade exc inth level:1:3:6 (1 ce inal size)	eluding the ment : 3	
	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				
	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				
	Net Total	21.306cum	@11610.44/cum	247372.03	
20.005	5.34.1				
	Extra for providing richer mixes at specified cement content used is pagrade concrete instead of M-25 grad in M-30 is @ 340 kg/cum).	all floor levels. yable/ recoveral le BMC/RMC.	Note:- Excess/less c ble separately.Provid (Note:- Cement cont	ement over the ling M-30 cent considered	
	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 levels				
	Net Total	51.714cum	@1899.46/cum	98228.67	
20.008	5.22.6				
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	t including strai e upto plinth lev	ghtening, cutting, ber elThermo - Mechani	nding, placing cally Treated	
	Net Total	6205.680kilo gram	@98.92/kilogram	613865.87	
20.009	OD246779/2022-2023				
	Extra for providing epoxy coating f	or reinforcemen	nt bars.	2	
	Net Total	6205.680kg	@2.32/kg	14397.18	
20.010	5.9.1		LOKA		
	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	UBLIC WORKS			
	Centering and shuttering including thickness) including attached pilast	strutting, etc. ar ers, butteresses,	nd removal of form for plinth and string cou	or:Walls (any irses etc.	
	Net Total	142.040sqm	@721.70/sqm	102510.27	
20.012	5.9.3				
	Centering and shuttering including floors, roofs, landings, balconies an	strutting, etc. ar d access platfor	nd removal of form form	or:Suspended	
	Net Total	15.760sqm	@820.86/sqm	12936.75	
20.013	5.9.5				
	Centering and shuttering including beams, plinth beams, girders bressu	strutting, etc. ar mers and cantil	nd removal of form fore evers	or:Lintels,	
	Net Total	46.640sqm	@653.88/sqm	30496.96	
20.014	5.9.6				
	Centering and shuttering including Pillars, Piers, Abutments, Posts and	strutting, etc. ar Struts	nd removal of form for	or:Columns,	
	Net Total	2.160sqm	@869.03/sqm	1877.10	
20.015	13.7.1				
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1	
	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 & amp; 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 materia 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	8 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 & amp; 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.				
20.010	100.36.1	23.0008qiii	е тт <i>2.30/</i> в q Ш	11037.30	
20.019	Filling water with 5000 litre tankers distance of 5 km (average) to the res reservoir of height not less than 3 m tanker lorry, tools and other applien	fited in lorry a servoir site and using 5 HP die ces and cost of	nd conveying water pumping the water i esel engine pump set water etc. complete.	from a nto the , hire for	

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			c encapsulated g minimum and width as 2 mm tread on choring ble to with d having ing including ement: 3 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	ATFORM FOR TH	E MANAGEMENT		
	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 cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	nent concrete o ll work up to pl ate 20 mm nom	f specified grade exc inth level:1:3:6 (1 ce inal size)	eluding the ement : 3	
	Net Total	9.634cum	@7413.74/cum	71423.97	
21.003	5.37.1				
	Providing and laying in position reacement concrete work, using cement manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includin proportions as per IS: 9103 to accel workability without impairing stren - in -charge. Note:- Cement content /less cement used as per design mix	dy mixed M-25 th content as per- reching plant and ontinuous agitat reced cement cor laying, excludi- ing cost of admin- erate/ retard set gth and durabili- considered in the is payable/recor-	grade concrete for r approved design mi transported to site of ed mixer, manufactur nerete work including ng the cost of center xtures in recommend ting of concrete, imp ity as per direction of his item is @330 kg overable separately.	reinforced x, of work in red as per mix g pumping of ing, shuttering led prove f the Engineer /cum. Excess all wiork upto	

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	7 <mark>4.314</mark> cum	@82.60/cum	6138.34	
21.006	4.12				
	Extra for providing and mixing wat doses by weight of cement as per m	er proofing mat anufacturer's sp	erial in cement conc ecification .	rete work in	
	Net Total	24523.620kg	@1.35/kg	33106.89	
21.007	OD235081/2022-2023				
	Extra for providing sulphate resistant	nt cement for th	e structures above pl	linth level.	
	Net Total	74.314cum	@1899.46/cum	141156.47	
21.008	5.22.6				
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	including strai	ghtening, cutting, be elThermo - Mechani	nding, placing ically Treated	
	Net Total	8917.680kilo gram	@98.92/kilogram	882136.91	
21.009	OD235082/2022-2023				
	Extra for providing epoxy coating f	or reinforcemer	it bars.		
	Net Total	8917.680kg	@2.32/kg	20689.02	
21.010	5.9.1				
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. ar columns, etc for	nd removal of form r 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 cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1	
	Net Total	260.680sqm	@403.74/sqm	105246.94	
21.013	13.52.2				
	Finishing with Epoxy paint (two or as per manufacturer's specifications of surface, etc. complete.On concre	more coats) at a including appr te work	all locations prepared opriate priming coat,	l and applied preparation	
	Net Total	130.200sqm	@224.33/sqm	29207.77	
21.014	22.23.1				
	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 materia 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				
	Net Total	111.600sqm	@573.84/sqm	64040.54	
21.015	22.23.2				
	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re / subway and bridge deck etc., prep integral crystalline slurry : 2 parts v integral crystalline slurry : 1 part w same from negative (internal) side v shall meet the requirements as spec permeability of concrete by more th DIN 1048 and resistant to 16 bar hy crystalline slurry shall be capable of self-healing shall be carried out all complete as engineerin- charge. The product performance sh leakage.For horizontal surface one of	stalline slurry o C structures like (servior, sewage ared by mixing vater) for vertica ater) for horizon with the help of ified in ACI-21 an 90% compa drostatic pressu- ng of cracks up per specification hall carry guaran coat @1.10 kg p	of hydrophilic in nature retaining walls of the value of the water treatment print the ratio of 5 : 2 (if al surfaces and 3 : 1 (in tal surfaces and 3 : 1 (in tal surfaces and application of the surface) and the control concurred with control concurred with control concurred are on negative side. It or a width of 0.50mm n and the direction of the surface of the surface of the surface) are super supe	re for e basement, olant, tunnels 5 parts (3 parts lying the a. The material ucing crete as per The m. The work f the inst any	

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 as per IS: 10910 on 12 mm dia steed cross section as 23 mm x 25 mm an 165 mm with minimum 112 mm spa top surface by ribbing or chequering projections on tail length on 138 mr stand the bend test and chemical res manufactures permanent identificati fixing in manholes with 30x20x15 c coarse sand: 6 graded stone aggrega	rest of minimum el bar conformin d over all minim ace between pro- g besides necess n as per standar distance test as p ion mark to be v com cement conc te 20 mm nomi	m 6 mm thick plastic ng to IS:1786, having num length 263 mm otruded legs having 2 sary and adequate an ord drawing and suitab per specifications and visible even after fixi- crete block 1:3:6 (1c nal size) Complete a	c encapsulated g minimum and width as 2 mm tread on choring ble to with d having ing including ement: 3 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	UBLIC WORKS	a produced and t		
	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	1800.000metr e	@2139.32/metre	3850776.00	
22.002	20.2.5				
	Boring, providing and installing bor grade M-25 of specified diameter ar working load not less than specified including the cost of boring, with be appropriate length for setting out an embedded in the pile cap etc. all con all lifts and leads (Length of pile for cap).600 mm dia piles	red cast-in-situ n nd length below l, excluding the entonite solution d removal of sa mplete, includin r payment shall	reinforced cement co the pile cap to carry cost of steel reinforce and temporary casi time and the length of ag removal of excava be measured upto bo	oncrete piles of a safe cement but ng of f the pile to be ated earth with ottom of pile	
	Net Total	666.000metre	@3448.10/metre	2296434.60	
22.003	20.6.1.1				
	Vertical load testing of piles in acco	ordance with IS	2911(Part IV) inclu	ding	

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 & amp; 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 & amp; 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 & amp; the direction of engineer -in-Charge.				
	Net Total	5.0 <mark>00per</mark> test	@36449.26/per test	182246.30	
22.006	OD246261/2022-2023	ATFORM FOR TH	E KANAGEMENT		
	Extra over charges for core cutting piling works	of 30cm depth i	n the rock strata whi	le doing the	
	Net Total	41.100metre	@6737.51/metre	276911.66	
22.007	OD252171/2022-2023				
	Epoxy coated steel reinforcement for bending, placing in position and bin Mechanically Treated bars of grade	or R.C.C. work ding all comple Fe-500D or mo	including straighteni ete upto plinth level. pre (5.22.6+OD 16)	ng, cutting, Thermo	
	Net Total	59293.013kg	@100.00/kg	5929301.30	
			Heading Total(Rs)	12805077.4 6	
23	ADMINISTRATIVE/LABORAT ROOM BUILDING	ORY/CHEMI	CAL HOUSE / CON	NTROL	
23.001	OD251949/2022-2023				
	Administrative / Laboratory / Chem	ical House / Co	ontrol Room Building	7	
	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 CO	NTROL PANI	EL 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) 270000.12					
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	191		-		
27.001	2.8.1	0.26.64.0		51		
27.002	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 2301					
	Providing and laying in position cer cost of centering and shuttering - Al coarse sand : 8 graded stone aggreg	nent concrete o ll work up to pl ate 40 nominal	f specified grade exc inth level:1:4:8 (1 ce size)	luding the ment : 4		
	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 in position and binding all complete	including strai	ghtening, cutting, ber elThermo - Mechani	nding, placing cally Treated		

Sl No	Specification	Quantity	Rate	Amount
	bars of grade Fe-500D or more			
	Net Total	5362.500kilo gram	@98.92/kilogram	530458.50
27.005	5.9.1			
	Centering and shuttering including for:Foundations, footings, bases of	strutting, etc. ar columns, etc for	nd removal of form r mass concrete	
	Net Total	275.000sqm	@337.42/sqm	92790.50
27.006	50.6.7.2			
	Laterate masonry with neatly dresse size in cement mortar 1:6 for super including all cost of materials, labor	ed laterate stone structure above ur charges etc.	of size 40x20x15cm plinth level up to flo	or nearest for two level
	Net Total	155.900cum	@7968.73/cum	1242325.01
27.007	10.25.2			
	Item Shifted to bad head 14 as item 14.75 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	4 <mark>80.0</mark> 00kg	@155.15/kg	74472.00
	Wall painting with premium acrylic (Volatile including applying addition and colour.Two coats	emulsion paint anal coats where	of interior grade, ha	ving VOC eve even shade
	Net Total	12.000sqm	@134.94/sqm	1619.28
27.009		1 4 4 6	1\	
	12 mm cement plaster of mix:1:4 ($\frac{1}{1520} \frac{260}{260}$	(0.216.08/sam)	492400 11
27.010	12 / 8 1	1529.500sqiii	@310.08/sqiii	403400.11
27.010	Finishing with Deluxe Multi surface primer as per manufacturers specific 1.25 ltr/10 sqm over and including of sqm	e paint system f cations:Two or one coat of spec	for interiors and exter more coats applied o rial primer applied @	iors using n walls @ 0.75 ltr /10
	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 in footpath, parks, lawns, drive way thickness & amp; size/ shape, made required colour & amp; pattern over and	chamfered edge s or light traffic by table vibrato 50mm thick co	Cement Concrete pa parking etc, of requ bry method using PU mpacted bed of sand	iver blocks ired strength, mould, laid in , compacting

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 & amp; 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 & amp; 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			
	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 & amp; 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 & amp; 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 concrete 1:3:6 (1 cement : 3 coarse size) over 75 mm bed of dry brick b consolidated and grouted with fine complete and as per direction Engir	channel 30 cm sand : 6 graded pallast 40 mm n sand, including neer - in-Charge	wide and 50 mm thic l stone aggregate 20 ominal size, well ran finishing the top smo	k with cement mm nominal amed and both etc.				
	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		100					
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 cer cost of centering and shuttering - A coarse sand : 8 graded stone aggreg	ment concrete o ll work up to pl ate 40 nominal	f specified grade exc inth level:1:4:8 (1 ce size)	Pluding the ment : 4				
	Net Total	20.000cum	@6857.60/cum	137152.00				
29.003	4.1.5 Providing and laying in position cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	nent concrete o ll work up to pl ate 20 mm nom	f specified grade exc inth level:1:3:6 (1 ce inal size)	cluding the ment : 3				
	Net Total	37.500cum	@7413.74/cum	278015.25				
29.004	4.1.3							
	Providing and laying in position cer cost of centering and shuttering - A sand (zone-III) : 4 graded stone agg	nent concrete o ll work up to pl regate 20 mm r	f specified grade exc inth level:1:2:4 (cem ominal size)	luding the ent : 2 coarse				
	Net Total	6.250cum	@8040.94/cum	50255.88				
29.005	5.9.2							
	Centering and shuttering including	strutting, etc. ar	nd removal of form for	or:Walls (any				

Sl No	Specification	Quantity	Rate	Amount
	thickness) including attached pilaste	ers, butteresses,	plinth and string cou	rses 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	1.000		5 40000 02
	Net Total	1.000no	@540000.03/no	540000.03
			Heading Total(Rs)	540000.03
32	CENTRIFUGE BUILDING		AF	
32.001	OD251983/2022-2023		JORA-	
	Centrifuge Building	1.000mg	@2200000 15/mg	2200000 15
	Net I otal	1.00010	Heading Total (Ps)	3300000.15
22	SI LIDCE SHED	LIBUIC WORKS	Treating Total(RS)	5500000.15
33 001	OD251991/2022-2023			
55.001	Sludge Shed			
	Net Total	1.000no	@660000.03/no	660000.03
			Heading Total(Rs)	660000.03
34	LANDSCAPING AND GREEN B	BELT FORMA	TION	
34.001	OD252102/2022-2023			
	Landscaping and green belt formati	on		
	Net Total	1.000no	@1500000.07/no	1500000.07
			Heading Total(Rs)	1500000.07
35	PROVISION FOR PROVIDING PLANT BY SCADA	AUTOMATE	D SYSTEM TO TH	E ENTIRE
35.001	OD252007/2022-2023			
	Provision for providing automated s	system to the en	tire 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 floors, roofs, landings, balconies an	strutting, etc. ar d access platfor	nd removal of form f	or:Suspended				
	Net Total	409.035sqm	@820.86/sqm	335760.47				
36.002	5.9.5							
	Centering and shuttering including beams, plinth beams, girders bressu	strutting, etc. ar mers and cantil	nd removal of form f	or:Lintels,				
	Net Total	78.000sqm	@653.88/sqm	51002.64				
36.003	5.9.7							
	Centering and shuttering including (excluding landings) except spiral	strutting, etc. ar staircases)	nd removal of form f	or:Stairs,				
	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 layal unto floor V layal							
	Net Total	60.240cum	@11610.44/cum	699412.91				
36.005	5.22.6							
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	including strai	ghtening, cutting, be relThermo - Mechan	nding, placing ically Treated				
	Net Total	7228.800kilo gram	@98.92/kilogram	715072.90				
36.006	5.34.1							
	Extra for providing richer mixes at a specified cement content used is pay grade concrete instead of M-25 grad in M-30 is @ 340 kg/cum).	all floor levels. yable/ recoveral le BMC/RMC.	Note:- Excess/less c ble separately.Provid (Note:- Cement cont	ement over the ling M-30 tent considered				
	Net Total	60.240cum	@82.60/cum	4975.82				
36.007	OD254074/2022-2023							
	Extra for providing epoxy coating f	or reinforcemer	nt bars.					
	Net Total	7228.800kg	@2.32/kg	16770.82				
36.008	OD254073/2022-2023							
	Extra for providing sulphate resistant	nt cement for th	e structures above p	linth 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 wate doses by weight of cement as per ma	r proofing mat mufacturer	erial in cement concr 39;s specification .	rete work in						
	Net Total	19879.200kg	@1.35/kg	26836.92						
36.010	13.52.2	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 cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1						
	Net Total	677.982sqm	@403.74/sqm	273728.45						
36.012	50.10.1									
	Steel work in built up G I tubular (re trusses etc., including cutting, hoistin of approved steel primer, including v etc. complete	ound, square or ng,fixing in pos welding and bo	r rectangular hollow sition and applying a lted with special sha	tubes etc.) priming coat ped washers						
	Net Total	6426.500kg	@191.08/kg	1227975.62						
			Heading Total(Rs)	3758804.48						
	CPLA OF PL	Tot	al Estimation PAC	93902781.68						
38	Extra Charges									
	Provision for GST									
37.001		93902781.68	18.00%	16902500.7 0						
			Grand Total	0.00						
			Round off	0.00						
]	Rounded Total(Rs)	110805282.3 8						
	Rupees Eleven Crore Eight Lakh Fi	ve Thousand T	wo Hundred and Eig	ohty Two						

Sewerage Camp Office Kerala Water Authority Malappuram-676 505

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

(i/c) Executive Engineer PPD Regional Office Kerele Water Author & Kochi - 682011

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Superintending Engineer PPD Regional Office Kerala Water Authority Kochi - 682011



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 PA	C 69172155.97
С	Extra Charges	1
C.001	Provision for GST	FI
	69172155.97 18.00%	12450988.07
	Grand Tota	al 0.00
	Round o	ff 0.00
	Rounded Total(R	s) 81623144.04
	Rupees Eight Crore Sixteen Lakh Twenty Three Thousand One H Four	undred and Forty

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 & amp; 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 & amp; 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, erec centrifugal submer	ction, testi sible sew	ing and com	nissioning of pump 11 Hp	f self priming to 100 HP	g, non clo	g		
	Raw Sewage Pump	4	15.000				60.000		
	Sewage pump EQ to MBBR tank	3	15.000				45.000		
	Total								
			Tota	l Quantity i	n HP (Hors	e power)	105.000		
1.002	OD252954/2022-2	2023							

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
	Supply at site, erection, testing and commissioning of self priming, non cicc centrifugal submersible sewage transfer pump for rated continuous duty at (from reputed manufacturers complying to IS 1520 and conforming to oth standards), CI construction, bronze impeller, complete with 3 phase motor, with automatic pedestal coupling, delivery bend, required wire chain, was bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressur Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting comm suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. co all respects with detachable arrangements, level indicators for automatic s & amp; switch off as required by the standard specifications complete with accessories as per technical specification or as directed by Engineer In Ch shall have dry run protection & amp; high/ low level alarm. Electrical Com shall be supplied with the pump as per the specifications in the Electrical I 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	191.			4.000	
	Sludge Transfer to Centrifuge Pump	2	1.000	QA	DRA	FT	2.000	
	Septage pump	4	2.000	J.			8.000	
	Filtrate cum dilution pump to EQ tank	2	2.000	C WORKS	MANAGEMEN	1	4.000	
	Total						18.000	
			Tota	l Quantity i	n HP (Hors	e power)	18.000	
1.003	OD235301/2022-2	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, approximately 4H	testing ar P or as rec	nd commission quired with the	oning of directed by the order of the order	ct driven floa rm	ating mixe	ers of	
	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							

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
1.004	OD249818/2022-2	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 & amp; 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 fix	ing of mo	no block cer	trifugal pum	p			
	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			ET	60.000	
	Total			Mich Starson	DO KA	1	64.000	
		1.0	Tota	l Quantity i	n HP (Hors	e power)	64.000	
1.005	OD235307/2022-2	2023		N		10		
	"Air Blower air blower for indo 1500 rpm, pulleys silencer with suital belt tightening arra complete as per tea Charge (phase motor with b	<br&g oor applica s, pressure ble flange angement chnical sp Capacity: IP 68 Prot</br&g 	t;Supply,erec ation comple gauges, pres s, common r interconnect ecification o 2763 m3/hr. ection - 60 F	ction, testing te with acoust ssure relief v notor and con ing line with r as Directed Pr IP	and commis stic canopy, a alve, acousti mpressor bas flanges incl by Engineer essure: 0.6 k	sioning of air filter, r c hood, su se frame w uding all a r in g/sqcm M	it win lobe notor of notion vith motor accessories lotor : three	
	"Air Blower air blower	<br&g< td=""><td>t;Supply,erec</td><td>ction, testing</td><td>and commis</td><td>sioning of</td><td>twin lobe</td></br&g<>	t;Supply,erec	ction, testing	and commis	sioning of	twin lobe	
	Air Blower - 60 HP	5					5.000	
	Total						5.000	
				,	Total Quant	tity in no	5.000	
1.006	OD235308/2022-2	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							

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	"Bubble D	iffuser for	r MBBR Tar	k Supplying	at site,		
	Bubble Diffuser for MBBR Tanks	3					3.000
	Total						3.000
					Total Quant	tity in no	3.000
1.007	OD235309/2022-2	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"						
	commissioning of	Coarse B	ub			i, testing e	camp,
		1	101	Stoppes.	-01	FI	1.000
	Total	_	-	-	10.00	-	1.000
	Total Quantity in no						1.000
1.008	OD235310/2022-2	2023				10	
	"Air Grid Pi valves and other ad unit"	pe <br& cessories a</br& 	cgt;Supply an as required for	nd installatio	n of air pipes rs to various	s (HDPE) tanks as a	aly into complete
	"Air Grid valves and oth	Pipe <b< td=""><td>r>Supply</td><td>and installat</td><td>ion of air pip</td><td>es (HDPE</td><td>E) aly into</td></b<>	r>Supply	and installat	ion of air pip	es (HDPE	E) aly into
	Air Grid	4					4.000
	Total						4.000
				r	Fotal Quant	ity in set	4.000
1.009	OD235312/2022-2	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 Me media of polyprop	dia Supply ylene con	ying and fixi struction	ng of non- cl	logging freel	y moving	biomass
		1	623.980				623.980
	Total						623.980
				Т	otal Quantit	y in cum	623.980
1.010	OD235313/2022-2	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 Chlo	rinator sy	stem Supply	at site, erect	ion,			
		1					1.000	
	Total						1.000	
				r 	Fotal Quant	ity in set	1.000	
1.011	OD235314/2022-2	2023						
	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"							
	aquot;Electromag	sneuc nov	v meter Supp	ory, installatio	on, testing		2 000	
	Totol	2				10	2.000	
			OF PUBL	C WORKS	Total Quant	ity in no	2.000	
1.012	000225215/2022 2	0022			Total Qualit	ny m no	2.000	
1.012	"Lifting Med Supply, installation mechanism to lift equipments, found	chanism f on & the equip dation etc	for Air Grid commission ments from a "	ing of the ma height not le	nually opera ess than 5m i	ting chair ncluding a	n pulley all	
	"Lifting M	echanism	for Air Grid	Supply, inst	allation & an	np; comm	issioning of	
		4					4.000	
	lotal				T (1 C		4.000	
4 0 1 5				,	Total Quant	ity 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&guot:							
	"SS Gates S materials, fab	Supplying	at site, insta	llation testing	g and commi	ssioning o	of all	
		8					8.000	
	Total						8.000	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
				r	Fotal Quant	ity 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	ng Summ	x 10mm and	omm clear s	space across	the	2 000	
	Total	2					2.000	
				141 - T	Fotal Quant	ity in set	2.000	
1.015	OD235319/2022-2	2023	0.5	(AA)	Total Quant	iej ili see		
	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 C	oarse Scr	een					
		2					2.000	
	Total					• • •	2.000	
1.01.6					l'otal Quant	ity 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 M	lechanism	n Supplying a	at site all elec	ctro-mech			
		2					2.000	
	Total							
1.017	00000001/00000				Total Quant	ity in no	2.000	
1.017	0D235321/2022-2	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	Sludge Thickener Mechanism Supplying all materials, fabricating, fixing and								
		1					1.000			
	Total				T (10)	•. •	1.000			
1.010					Total Quant	ity in no	1.000			
	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"									
	with all wetted parts in PP construction suitable for pumping Poly Electrolyte solution including cost of suitable agita									
		2		\prec			2.000			
	Total		-0. ATT		NANNAISCIACO		2.000			
			OF PUBL	IC WORKS	Total Quant	tity in no	2.000			
	"Portable Ho Supply and comm with lifting height vehicle patform fo complete set as pe "Portable Ho	bist - 500l issioning of 6m, 5I r easy shi r standard bist - 500l	cg of portable M HP Motor, 41 fting of equi ls" cg Supply an	Aonkey type 5V 50Hz all pments and r d commissio	Hoist with ca mounted on naterials whe ning of porta	apacity up a suitable enever req ble M	oto 500kg, e medium juired with 1.000			
	Total					•. •	1.000			
1.000	00005005/0000	0000			Total Quant	ity in no	1.000			
1.020	"Wheel Barn Supply of three wh "Wheel Barn	row neel type	wheel barrov	v of capcity 2	2001trs"	• •				
		1					1.000			
	Total	·					1.000			
					Total Quant	tity in no	1.000			
1.021	OD235326/2022-2	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"								
	"Aluminiun	n Ladder	Supply, Insta	llation o					
		4					4.000		
	Total						4.000		
					Total Quant	ity in no	4.000		
1.022	OD235327/2022-2	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	[I					
		4					4.000		
	Total						4.000		
			d	25.2	Total Quant	ity in no	4.000		
1.023	OD235328/2022-2	2023	161	Service 1		FT	1		
	respects as require technical specifica "Monorail 0	supply et d by the s tion&que Crane Sup	c. with om h standard spec ot; ply, Installat	ifications co	mplete with a	all accessent position	bries as per		
		1					1.000		
	Total						1.000		
				I	Total Quant	ity in no	1.000		
1.024	OD235329/2022-2	2023							
	"Pressure sa pressure sand filte epoxy coating insi pain quality as insi 7.0Kg/cm? with as filter media includ valves, internals, p arrangement, etc a over pebble/gravel directed by Engine fabricated pipes ar m3/hour
 "Pressure sand filte</br> 	nd filter& r vertical de and an tructed by s operatin ing grade oressure g nd all oth l with inspect in Chan d special ;Diamete nd filter& r vertical	Lt;br>Sup type pressure ti corrosive to Engineer) v g pressure of d pebble and auges, strain- er accessorie bection manh rge. The sco s including v r - 2.4m.< Lt;br>Sup	pply at site, e e vessel fabri reatment out vithstand a m 3.5 Kg/cm?, sand and an ers, supportin s tested twic toles etc com pe shall inclu alves <br& br>Heigh pply at site, e</br& 	rection and c cated with M side, two coa inimum test , complete w tracite , front ng structure, e the working plete as per s ide complete zgt;Flow Rat t - 2.5m&quo rection and c cated with M	ommissio IS constru- tts of pain pressure of ith valves al piping, back wasl g pressure specificati piping w e:52 ot; ommissio	ning of iction with it outside (of and dual butteryfly b supported ion or as ith MS		
		2	ej po prossurv				2,000		
	Total			I			2.000		

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
				1	Total Quant	tity 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.<:br>Height - 2.5m							
	Activated Carbon Carbon filter vertice	filter Sup cal type p	oply at site, er ressure vesse	rection and c	ommissionir with M	ng of Acti	vated	
		2		Sale.			2.000	
	Total		J.	O AL	_	1 I	2.000	
			1	CAROLESS .	Total Quant	tity in no	2.000	
1.026	OD235331/2022-2	2023		21	er-	-		
	Supply at site, inst Press shall be auto surface and SS flat Outlet cake consiss filter press shall be all around drain sy the entire surround charge"	allation a mated, re parallel tency sho tency	nd commissi cessed type p bar, with PP uld not be m The Filter F e provided to er the specifi	oning of filte press with SS cloth. Filter ore than 35% Press Unit sh prevent the cations or as	er press /cent 6 fabricated s operations to 6 moisture. T all be mount filtrate wate: directed by	rifuge sys tructure p be mecha 'he capaci ed on a pl r from con the engine	tem. Filter ipe button mical. ty of the atform and ntaminating per in	
	Supply at site, ins	tallation a	and commission	ioning of filt	er press /cen	trifuge sys	ste	
		2					2.000	
	Total						2.000	
					Total Quant	tity in no	2.000	
1.027	OD235332/2022-2	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							
	SLUDGE DEWA convenient sludge 1 0kg/hr to 750kg/	TERING dewaterin br the Slu	and Packing ng.Machine i	UNIT -Volus s available for ed from 70%	ite is a dewa or dry sludge	tering unit	t for put of	
		2	U				2.000	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
	Total						2.000	
				Т	'otal Quanti	ty 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 channels, plates et	ng stainle c	ss steel (Gra	de 304) railir	ng made of H	lollow tub	es,	
		1				8.0000 00	8.000	
	Total			101			8.000	
			113	(A)	Total Quant	tity in kg	8.000	
1.029	OD255523/2022-2	2023		Cleaner !!	601	AF B		
	Piping, bypass arrangements, steel ladder, framework and fire fighting arrangements							
	Piping, bypass arrangements, steel ladder, framework and fire fighting arrangements							
		1	- Sauna		MANJAGONAG		1.000	
	Total		OF PUBL	IC WORKS	1910110119	000	1.000	
				,	Total Quant	tity in no	1.000	
1.030	OD235333/2022-2	2023						
	Plate settler media about 1.0 mm thick /day minimum at 6 required.	- Media to k. The pla 50 degree	o be of UV s in settling are slope. The m	tabilized stia ea should be nedia is to be	nless steel, 7 between 10 a provided alo	50 mm he – 1 ong with le	eight and 2 m2/m3 ock nuts as	
	Plate settler medi about 1.0 mm thic	a- Media k.	to be of UV	stabilized sti	anless steel,	750 mm h	neight and	
		1	302.400				302.400	
	Total						302.400	
				,	Total Quant	tity in no	302.400	
1.031	OD255524/2022-2	2023						
	Supply of GPS fitt including de-sludg	ed vacuur	m truck of ca ment and cle	pacity 3000 aning device	litres for sep es	tage mana	igement	
	Supply of GPS fitt including de-sludg	ed vacuu	m truck of ca ment and cle	pacity 3000 aning device	litres for sep	tage mana	igement	
		2					2.000	
	Total						2.000	
				,	Fotal Quant	ity in no	2.000	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
1.032	OD255533/2022-2	2023						
	Odour control unit	for co-tr	eatment unit	and STP				
	Odour control unit	for co-tr	eatment unit	and STP	1	1	F	
		1					1.000	
	Total						1.000	
					Total Quant	tity in no	1.000	
1.033	OD255534/2022-2	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			Alla.			1.000	
			J.	(O)	Total Quant	tity in no	1.000	
1.034	OD255535/2022-2	2023	100	COROLECT.	GR!	ALL B	2	
	Alum and Lime D Alum dosing tank dosing electronic i	osing Sys having ca netering t	tem- Supply pacity 50 lits ype pump of	, <mark>instal</mark> lation, re in LLDPE 5 1-3 LPH rai	, commitioni / FRP/PP ma nge with 2.5	ng and tes aterial and bar worki	ting of alum ng pressure	
	Alum and Lime D Alum dosing tank dosing	osing Sys having ca	tem- Supply pacity 50 lit	, installation, re in LLDPE	, commitioni / FRP/PP ma	ng and tes aterial and	ting of alum	
		1					1.000	
	Total						1.000	
				1	Total Quant	tity in no	1.000	
1.035	OD256582/2022-2	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 clarified water cha steel	ort for ste innels inc	el brackets, c luding supply	channels, and ying, fixing a	l other eleme and testing et	nts to hole c. with his	d plates and gh quality	
		1					1.000	
	Total						1.000	
					Total Quant	tity in no	1.000	
1.036	OD256653/2022-2	2023						
	Supply, installatio	n and con	nmissioning	of solar units	for STP			
	Supply, installatio	n and con	nmissioning	of solar units	for STP		1.000	
		1					1.000	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
	Total						1.000	
					Total Quant	tity in no	1.000	
2	ELECTRICAL W	ORKS						
2.001	OD235336/2022-2	2023						
	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) & amp; 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 Ti	ransforme	er and 11 kv i	indoor free s	tanding cube	le		
		1		.001			1.000	
	Total		11	CALL I			1.000	
2 002	000000000000000000000000000000000000000	0000	181	ANG DA	Total Quant	ity in no	1.000	
	commissioning of 2026 (Part 1 to Par required at site or "CT - PT Ur	Indoor ty Indoor ty as directent it and TO	pe 11KV CT p; as per KS d by the Eng DD meter Su	-PT Unit 3P EB specifica ineer In Cha oplying, insta	hase Dry typ tion complete rge" allation, testin	e confirm e in all res	ing to IS spects as	
	commissioning of	Indoor					1 000	
	Total	1					1.000	
				,	Fotal Quant	itv in set	1.000	
2.003	OD235338/2022-2	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 & guot:							
	0kA Surge (Lighti galvanized 10kA	ning Arre	ester) Supply	& Insta	llation of He	avy Duty	hot dipped	
		2					2.000	
	Total						2.000	
					Total Quant	tity in no	2.000	
2.004	OD235339/2022-2	2023						

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	
			1	Total Quant	ity in no	1.000	
OD235340/2022-2	2023						
"Earthing Ec X 600 mm X 3 mm cover plate having charcoal/ coke and	quipments n thick ind locking a l salt as re	s for Transfor cluding acces arrangement s equired.&quo	rmer Earthin ssories, and p and watering ot;	g with coppe providing ma pipe of 2.7 i	r earth pla sonry enc neter long	ate 600 mm losure with g etc. with	
"Earthing Ec plate 600 mm X 60	quipments 00 mm X	s for Transfor 3 mm	rmer <br&< td=""><td>gt;Earthing v</td><td>vith coppe</td><td>er earth</td></br&<>	gt;Earthing v	vith coppe	er earth	
						1 000	
	1				-	1.000	
Total	1	P	< 1			1.000	
Total		PLATE		'otal Quanti	ty in L.S	1.000 1.000	
Total OD235341/2022-2	1	Peruary		'otal Quanti	ty in L.S	1.000 1.000	
Total OD235341/2022-2 "500KVA D of ?Silent Type? D KVA, 415 volts at phase system&am	2023 Diesel Gen 1500 RP p; for 0.85	erator Provid erating set a M, 0.8 laggir 5 Load Facto	ling, Installin longwith hav ng power fac r .	Total Quanti ng, Testing a ring Prime Pe tor at 415 V	ty in L.S nd Comm ower Ratin suitable fo	1.000 1.000 issioning ng of 250 or 50 Hz, 3	
Total OD235341/2022-2 "500KVA D of ?Silent Type? D KVA, 415 volts at phase system&am "250KVA D	1 2023 Diesel Gen Diesel Gen 1500 RP p; for 0.8 Diesel Gen	erator Provid erating set a M, 0.8 laggir 5 Load Facto erator Provid	ting, Installin longwith hav ng power fac r . ting, Installin	Total Quanti ng, Testing a ring Prime Pe tor at 415 V ng, Testing a	ty in L.S nd Comm ower Ratin suitable fo nd Comm	1.000 1.000 issioning ng of 250 or 50 Hz, 3 issioning	
Total OD235341/2022-2 "500KVA D of ?Silent Type? D KVA, 415 volts at phase system&am "250KVA D	1 2023 viesel Gen Diesel Gen 1500 RPI p; for 0.85 viesel Gen 1	erator Provid herating set a M, 0.8 laggir 5 Load Facto erator Provid	ding, Installin longwith hav ng power fac r . ling, Installin	Total Quanti ng, Testing a ring Prime Po tor at 415 V ng, Testing a	ty in L.S nd Comm ower Ratin suitable fo nd Comm	1.000 1.000 issioning ng of 250 or 50 Hz, 3 issioning 1.000	
Total OD235341/2022-2 "500KVA D of ?Silent Type? D KVA, 415 volts at phase system&am "250KVA D Total	1 2023 Diesel Gen Diesel Gen 1500 RP p; for 0.8 Diesel Gen 1	erator Provid herating set a M, 0.8 laggir 5 Load Facto erator Provid	ling, Installin longwith hav ng power fac r . ling, Installin	Yotal Quanti ng, Testing a ring Prime Po tor at 415 V ng, Testing a	ty in L.S nd Comm ower Ratin suitable fo nd Comm	1.000 1.000 issioning ng of 250 or 50 Hz, 3 issioning 1.000 1.000	
Total OD235341/2022-2 "500KVA D of ?Silent Type? D KVA, 415 volts at phase system&am "250KVA D Total	1 2023 Diesel Gen Diesel Gen 1500 RP p; for 0.8 Diesel Gen 1	erator Provid herating set a M, 0.8 laggir 5 Load Facto erator Provid	ling, Installin longwith hav ng power fac r . ling, Installin	Total Quanti ng, Testing a ring Prime Po tor at 415 V ng, Testing a Total Quant	ty in L.S nd Comm ower Ratin suitable for nd Comm ity in no	1.000 1.000 issioning ng of 250 or 50 Hz, 3 issioning 1.000 1.000 1.000	
Total OD235341/2022-2 "500KVA D of ?Silent Type? D KVA, 415 volts at phase system&am "250KVA D Total OD235342/2022-2	1 2023 Diesel Gen Diesel Gen 1500 RP p; for 0.85 Diesel Gen 1	erator Provid herating set a M, 0.8 laggir 5 Load Facto erator Provid	ling, Installin longwith hav ng power fac r . ling, Installin	Total Quanti ng, Testing a tor at 415 V ng, Testing a Total Quant	ty in L.S nd Comm ower Ratin suitable fo nd Comm ity in no	1.000 1.000 issioning ng of 250 or 50 Hz, 3 issioning 1.000 1.000 1.000	
Total OD235341/2022-2 "500KVA D of ?Silent Type? D KVA, 415 volts at phase system&am "250KVA D Total OD235342/2022-2 "Auto Mains Fabricating, Install control including a complete with rela analyser to indicate KVARH & pi frequency, control all complete . "Auto Mains Commission i	2023 piesel Gen Diesel Gen Diesel Gen 1500 RPI p; for 0.83 piesel Gen 1 2023 s Failure U ling, Testi auto by- p pys, timers e currents rovision f cabling f	erator Provid herating set a M, 0.8 laggir 5 Load Facto erator Provid erator Provid unit (AMF P ing & amp; C ass panel, su s, set of CTs a, phase and 1 for overload, rom AMF pa Unit (AMF P	anel) anel) anel) anel) anel) anel) anel) anel to diesel anel) Fabrica	Total Quanti ag, Testing a ving Prime Per tor at 415 V ag, Testing a Total Quant ag of automat O KVA silent & amp; protection frequency, p restricted ea engine and en- ating, Installi	ty in L.S nd Comm ower Ratin suitable for nd Comm ity in no ity in no tic mains type DG ection and ower fact where ng, Testin	1.000 1.000 issioning ng of 250 or 50 Hz, 3 issioning 1.000	
	Main LT panel Su 50Hz, floor mount transformer and al gauge CRCA shee color over a coat o specification comp standards and KSE Main LT panel Su 50Hz Total OD235340/2022-2 "Earthing Eo X 600 mm X 3 mr cover plate having charcoal/ coke and "Earthing Eo plate 600 mm X 60	Main LT panel Supplying, i 50Hz, floor mounted MS Cu transformer and all motors i gauge CRCA sheet painted color over a coat of superior specification complete in all standards and KSEB standa Main LT panel Supplying, i 50Hz 1 Total 1 OD235340/2022-2023 "Earthing Equipments X 600 mm X 3 mm thick in cover plate having locking a charcoal/ coke and salt as re "Earthing Equipments plate 600 mm X 600 mm X	Main LT panel Supplying, installation, to 50Hz, floor mounted MS Cubicle type p. transformer and all motors including all gauge CRCA sheet painted with 2coats of color over a coat of superior quality iron specification complete in all respects as in standards and KSEB standards or as dired Main LT panel Supplying, installation, to 50Hz 1 Total 0D235340/2022-2023 "Earthing Equipments for Transfor X 600 mm X 3 mm thick including access cover plate having locking arrangement charcoal/ coke and salt as required." "Earthing Equipments for Transfor plate 600 mm X 600 mm X 3 mm	Main LT panel Supplying, installation, testing and co 50Hz, floor mounted MS Cubicle type panel board su transformer and all motors including all inter connect gauge CRCA sheet painted with 2coats of superior qu color over a coat of superior quality iron primer of ap specification complete in all respects as required at si standards and KSEB standards or as directed by the E Main LT panel Supplying, installation, testing and co 50Hz 1 Total 0D235340/2022-2023 "Earthing Equipments for Transformer Earthing X 600 mm X 3 mm thick including accessories, and p cover plate having locking arrangement and watering charcoal/ coke and salt as required." "Earthing Equipments for Transformer <br& 3="" 600="" mm="" mm<="" plate="" td="" x=""><td>Main LT panel Supplying, installation, testing and commissioning 50Hz, floor mounted MS Cubicle type panel board suitable for co transformer and all motors including all inter connections, wiring gauge CRCA sheet painted with 2coats of superior quality enamel color over a coat of superior quality iron primer of approved quality specification complete in all respects as required at site conforming standards and KSEB standards or as directed by the Engineer In C Main LT panel Supplying, installation, testing and commissioning 50Hz 1 1 Total 1 Total Quant OD235340/2022-2023 & quot;Earthing Equipments for Transformer Earthing with coppe X 600 mm X 3 mm thick including accessories, and providing ma cover plate having locking arrangement and watering pipe of 2.7 r charcoal/ coke and salt as required." & quot;Earthing Equipments for Transformer Earthing v plate 600 mm X 3 mm</td><td>Main LT panel Supplying, installation, testing and commissioning of S3pha 50Hz, floor mounted MS Cubicle type panel board suitable for connecting 3 transformer and all motors including all inter connections, wiring in all etc gauge CRCA sheet painted with 2coats of superior quality enamel paint of a 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 relev standards and KSEB standards or as directed by the Engineer In Charge. Main LT panel Supplying, installation, testing and commissioning of S3pha 50Hz 1 Total Total Quantity in no OD235340/2022-2023 "Earthing Equipments for Transformer Earthing with copper earth pla X 600 mm X 3 mm thick including accessories, and providing masonry enc cover plate having locking arrangement and watering pipe of 2.7 meter long charcoal/ coke and salt as required." "Earthing Equipments for Transformer Earthing with copper plate 600 mm X 600 mm X 3 mm</td></br&>	Main LT panel Supplying, installation, testing and commissioning 50Hz, floor mounted MS Cubicle type panel board suitable for co transformer and all motors including all inter connections, wiring gauge CRCA sheet painted with 2coats of superior quality enamel color over a coat of superior quality iron primer of approved quality specification complete in all respects as required at site conforming standards and KSEB standards or as directed by the Engineer In C Main LT panel Supplying, installation, testing and commissioning 50Hz 1 1 Total 1 Total Quant OD235340/2022-2023 & quot;Earthing Equipments for Transformer Earthing with coppe X 600 mm X 3 mm thick including accessories, and providing ma cover plate having locking arrangement and watering pipe of 2.7 r charcoal/ coke and salt as required." & quot;Earthing Equipments for Transformer Earthing v plate 600 mm X 3 mm	Main LT panel Supplying, installation, testing and commissioning of S3pha 50Hz, floor mounted MS Cubicle type panel board suitable for connecting 3 transformer and all motors including all inter connections, wiring in all etc gauge CRCA sheet painted with 2coats of superior quality enamel paint of a 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 relev standards and KSEB standards or as directed by the Engineer In Charge. Main LT panel Supplying, installation, testing and commissioning of S3pha 50Hz 1 Total Total Quantity in no OD235340/2022-2023 "Earthing Equipments for Transformer Earthing with copper earth pla X 600 mm X 3 mm thick including accessories, and providing masonry enc cover plate having locking arrangement and watering pipe of 2.7 meter long charcoal/ coke and salt as required." "Earthing Equipments for Transformer Earthing with copper plate 600 mm X 600 mm X 3 mm	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						1.000
				,	Total Quant	tity in no	1.000
2.008	OD235343/2022-2	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 Ec mm X 3 mm thick	quipments	s for DG Ear	hing with co	pper earth pl	ate 600 m	im X 600
		1					1.000
	Total						1.000
				Т	'otal Quanti	ty in L.S	1.000
2.009	OD235344/2022-2	2023					
	Design, Fabricatio Panel of cubical co floor mounted fabr lock doors with Du shall have enough set with individual provision for Busb alley, interconnect terminals, number phase 50Hz AC su supply, installation control cables as p Main Control Cent Electrical	n, Supply onstructio ricated of ust, vermi size to ac MCCB& oars, ACB ions havin ing etc, co pply with a, termina er specifi tre Design	y, Installation n with fully a 2mm thick C proof and po- comadate the z#39;s/MCB is & amp; RC ng all accession plete in all n enclosure pri- tion testing & cations or as n, Fabrication	and commis automated fe CRCA Sheets owder coated individual c of appropriat CB's as ories mountin l respect suits rotection class kamp; Comm directed by t h, Supply, Ins	ssioning of E ature (indoor compartment with approve control centre te capacity at s specified be ng and intern able for oper ss IP 54 as re- nissioning of the Engineer stallation and	lectrical C type) pre- natised wi- ved shade. es of each nd also to elow with al wiring, ation on 4 quired. In the all po In Charge	Control ferably th hinge The panel equipment have cable earth .15V, 3 cluding ower and e." bioning of
		1					1.000
	Total						1.000
0.010	00005045/0000	0000		T	otal Quanti	ty 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
				Т	'otal Quanti	ty in L.S	1.000
2.011	OD235346/2022-2	2023					

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
	Brass Glands & amp; 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 & amp; Aluminium Lugs Supplying and making end termination with brass compression							
		1					1.000	
	Total							
	Total Quantity in L.S							
2.012	OD235347/2022-2	2023						
	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 & amp; 63A , 100mA RCCB ii) Outgoing Feeders - 4Nos of 25A MCCB with 25A, 30mA RCCBs iii) Outgoing Feeders - 1Nos of 6A MCB							
	"Power Dist	rib <mark>ution</mark> E	Board (Contro	o <mark>l Roo</mark> m &ar	np; Centrifug	ge Buildin	ng)	
		1				10	1.000	
	Total		OF PUEU	C WORKS	MANAGENER	5	1.000	
				Ί	'otal Quanti	ty in L.S	1.000	
2.013	OD235348/2022-2	2023						
	"Wiring &an with earthwire wit and fitting of GI b following modular accessories and fix	np; Light h required oxes alon switch/s ctures as a	ing accessori l sizes of FR g with modu ockets,suppl pproved by o	es :- Wiring LS PVC insu lar base and y,installatior lept.	for circuit/su llated copper cover plates, a,testing and	bmain wi conducto supplying commissi	ring along or,supply and fixing oning of all	
	"Wiring &an with earthwire wit	np; Light h required	ing accessori 1 sizes	es :- Wiring	for circuit/su	ıbmain wi	ring along	
		1					1.000	
	Total						1.000	
				T	'otal Quanti	ty in L.S	1.000	
2.014	OD235349/2022-2	2023						
	"EXTERNA supplying and layi Copper conductor amendments 1.1 k MCCB/MCB/RCC and safety equipm excavation, sand c required in the spe	L LIGHT ng of PV XLPE co v grade of CB,supply ents ,fire ushioning cification	TNG Providi C insulated a ntrol cables a f required siz and erection extinguishers g, protective o s or as direct	ing external l nd PVC shea as per is:7098 the direct in gr of mettalic s, etc . compl covering and ed by the En	ighting arran athed / XLPE 8/Part-I/88 w ound includi poles,strret li ete including refilling the gineer in Ch	igements l power ca ith latest ing ght poles g necessar trench etc arge.&que	by able of earthing y c. as ot;	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
	"EXTERNAL LIGHTING Providing external lighting arran							
		1					1.000	
	Total							
	Total Quantity in L.S							
3	CHARGES FOR POWER ALLOCATION TO KSEB AND POWER EXTENSION BY CABLE							
3.001	OD235350/2022-2	2023						
	Charges for Power	allocatio	n to KSEB a	nd power ex	tension by ca	able		
	Charges for Power allocation to KSEB and power extension by cable							
		1					1.000	
	Total						1.000	
				ſ	otal Quanti	ty in L.S	1.000	
4	TOOLS AND PLA	ANTS		100				
4.001	OD235335/2022-2	2023	d	23.20		_		
	Tools and Plants		一個力			FI		
	Tools and Plants			inclusion	LOKA	3-		
		1	-		P		1.000	
	Total			×		10.	1.000	
			OF PUR	ORM FOR THE	'otal Quanti	ty 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 & amp; 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 & amp; 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) 3360000.00						
	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 & amp; 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 & amp; 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 commi approximately 4HP or as required w mixing and efficiency, complete set gear box, cables, wall mooring and equipments etc complete for the equ supplied with the pump as per the sp by the Engineer in Charge	ssioning of dire with the rotating with 3 phase m anchoring syste alization tank. pecifications in	ct driven floating mi arm for rated contin notor, including rotar em with all electro m Electrical Control p the Electrical BOQ o	xers of uous duty y paddles, echancial anel shall be or as directed			
	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 & amp; high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOO Motor : three phase motor with IP 68 Protection.						
	Net Total	64.000HP (Horse power)	@25000.00/HP (Horse power)	1600000.00			
1.005	OD235307/2022-2023	UBLIC WORKS	C Produced and I				
	"Air Blower Supply air blower for indoor application co 1500 rpm , pulleys, pressure gauges silencer with suitable flanges, comm belt tightening arrangement intercon complete as per technical specificat Charge Capacity: 2763 m three phase motor with IP 68 Protect	y,erection, testin mplete with acc s, pressure relief non motor and c nnecting line wi ion or as Direct 3/hr. etion - 60 HP	ng and commissionin bustic canopy, air filt valve, acoustic hoo compressor base fran th flanges including ed by Engineer in Pressure: 0.6 kg/sqcr	g of twin lobe er, motor of d, suction ne with motor all accessories m Motor :			
	Net Total	5.000no	@100000.00/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	ation Tank					

Sl No	Specification	Quantity	Rate	Amount				
	Supplying at site, erection, testing & amp; 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 Sup valves and other acessories as requi unit"	ply and installat red for the blow	tion of air pipes (HD vers to various tanks	PE) aly into as a complete				
	Net Total	4.000set	@250000.01/set	100000.04				
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	62 <mark>3.980</mark> cum	@15000.01/cum	9359706.24				
1.010	OD235313/2022-2023							
	"Gas Chlorinator system Supply at site, erection, testing and system (gas filled Chlorine) with all pumping Chlorine gas including bo using heavy duty PVC tubes, gas lin cover etc.complete with all accessor chlorine tonners"	commissioning l wetted parts in oster pumps, va ne diffusers, em ries. Capacity :	of electronic chlorir PP construction sui lves, suctions and de ergency repair kit, F 500gm to 1kg/hr wit	ne dosing table for elivery lines RP motor h 2nos of				
	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							
	Net Total	2.000no	@75000.00/no	150000.00				
1.012	OD235315/2022-2023			С				
	"Lifting Mechanism for Air C Supply, installation & amp; commis mechanism to lift the equipments fr equipments, foundation etc"	Grid ssioning of the r om a height not	manually operating c t less than 5m includ	chain pulley ing all				
	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	AND	MRAL	~				
	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							
	Net Total	2.000set	@100000.01/set	200000.02				
1.016	OD235320/2022-2023							
	"Griting Mechanism Supplying at site all electro-mechar commissioning of the griting mecha drawings, tender specifications or a	nical equipments anism to suit gri s directed by Er	s, fabricating, fixing tting chamber sizes a ngineer in Charge.&c	and as per quot;				
	Net Total	2.000no	@470000.02/no	940000.04				
1.017	OD235321/2022-2023							
	"Sludge Thickener Mechanist Supplying all materials, fabricating central driven type sludge thickenin Thickener tank as per drawings incl with removable scrappers with suff tender specifications and as directed	m , fixing and com g mechanism fo uding all feed v icient 3phase m l by Engineer ir	nmissioning of Bridg or the full diameter ovell, drive and rake r otor and gears etc con Charge"	e mounted of the Sludge nechanism omplete as per				
	Net Total	1.000no	@270000.01/no	270000.01				
1.018	OD235322/2022-2023							
	Poly Electrolyte dosing system Supplying and fixing of electronic of	losing pump wi	th 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/no							
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"							
1.020	Net Total	1.000no	@90000.01/no	90000.01				
1.020	"Wheel Barrow Supply of three wheel type wheel b	arrow of capcity	y 2001trs"					
	Net Total	1.000no	@25000.00/no	25000.00				
1.021	OD235326/2022-2023	11-8.9.4-11	D D					
	"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	"FRP Ladder Supply, Installation of FRP ladders required height as per the drawings	with caging on or as directed b	each elevated structory the Engineer in Ch	ures of arges"				
	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 & amp; 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							
	& CD235329/2022-2023 & quot;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 score shell 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.<:br>:Diameter - 2.6m.<:br>:Height - 2.5m							
	Net Total	2.000no	@2250000.10/no	4500000.20				
1.026	OD235331/2022-2023	L'AGAN		51				
	"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							
	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	© 1200000.00/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 about 1.0 mm thick. The plan settlin /day minimum at 60 degree slope. Trequired.	UV stabilized st ng area should b The media is to b	ianless steel, 750 mr be between 10 &ndas be provided along wi	n height and h; 12 m2/m3 th lock nuts as				
	Net Total	302.400no	@3250.00/no	982800.00				
1.031	OD255524/2022-2023							
	Supply of GPS fitted vacuum truck including de-sludging equipment ar	of capacity 300 d cleaning devi	0 litres for septage n ces	nanagement				
	Net Total	2.000no	@4500000.21/no	900000.42				
1.032	OD255533/2022-2023	1880 N		2				
	Odour control unit for co-treatment	unit and STP	mAF					
	Net Total	<u>1.000no</u>	@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- Su Alum dosing tank having capacity 5 dosing electronic metering type pur pressure	pply, installatio 50 litre in LLDF np of 1-3 LPH 1	on, commitioning and PE/ FRP/PP material range with 2.5 bar wo	l testing of and alum orking				
	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 commission	ning of solar un	its for STP					
	Net Total	1.000no	@2000000.09/no	2000000.09				
			Heading Total(Rs)	51714155.5 <u>3</u>				
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 <br commissioning of Indoor type 11K 2026 (Part 1 to Part 5) & amp; as pe required at site or as directed by the</br 	>Supplying, V CT-PT Unit 3 r KSEB specific Engineer In Ch	installation, testing Phase Dry type conf cation complete in al harge"	and firming to IS l respects as				
	Net Total	1.000set	@200000.01/set	200000.01				
2.003	OD235338/2022-2023	11-8.0.4-11	- AF					
	"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.							
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 F of ?Silent Type? Diesel Generating KVA, 415 volts at 1500 RPM, 0.8 l phase system& for 0.85 Load l	roviding, Instal set alongwith h agging power fa Factor .	ling, Testing and Co aving Prime Power I actor at 415 V suitab	mmissioning Rating of 250 le for 50 Hz, 3				

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 & amp; 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 & amp; protection and energy analyser to indicate currents, phase and line voltages, frequency, power factor, KWH, KVARH & amp; 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 accessories, and providing masonry arrangement and watering pipe of 2 required."	0 mm X 600 m enclosure with .7 meter long et	n X 3 mm thick incluction of the second seco	uding ocking ke and salt as				
	Net Total	1.000L.S	@90000.00/L.S	90000.00				
2.009	OD235344/2022-2023		DRA					
	"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.							
0.011		1.000L.5	S	1400000.00				
2.011	Brass Glands & amp; Aluminium Lubrass compression gland and alumin PVC sheathed I XLPE aluminium c	ugs Supplying a nium lugs for re onductor cable	nd making end term quired size of PVC i of 1.1 kV grade as re	ination with nsulated and equired.				

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 & amp; 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 & amp; 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 toting and commissioning of								
	all accessories and fixtures as appro	ved by dept.	0.050000.00.7. 0	250000.00					
2.014	Net 1 otal	1.000L.S	@250000.02/L.S	250000.02					
	"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								
	Net Total	1.000L.S	@1400000.06/L. S	1400000.06					
			Heading Total(Rs)	9258000.44					
3	CHARGES FOR POWER ALLO EXTENSION BY CABLE	CATION TO	KSEB AND POWE	CR					
3.001	OD235350/2022-2023								
	Charges for Power allocation to KS	EB and power of	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 69172155.9						
6	Extra Charges						
	Provision for GST						
5.001		69172155.97	18.00%	12450988.0 7			
			Grand Total	0.00			
	Round off 0.0						
	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 Sewerage Camp Office Kerala Water Authority Malappuram-676 505

Kochi - 682011

Executive Engineer. PPD Regional Office Kerele Water Author # Kochi - 682011

Superintending Engineer PPD Regional Office Kerala Water Authority Kochi - 632011



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	107182083.8 3				
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 & amp; ALLIED WORKS COMPLETE	13885500.75				
7	LINE EXTENSION, DEPOSIT TO KS <mark>EB,</mark> 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	304875105.8 3				
С	Extra Charges					
C.001	Provision for GST					
	304875105.83 18.00%	54877519.05				
	Grand Total	0.00				
	Round off	0.00				
	Rounded Total(Rs) 359752624.8					
	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 bitu	iminous /	concrete roa	ds	nR	-		
	Sewer lines from 225mm to 630 mm(PWD BT)	2	586.700	21	EE		1173.400	
	Deduction for HDD -Sewer lines from 225mm to 630 mm(PWD BT)	-2	80.400	ORM FOR THE C WORKS	EAANAIGEAND	er.	-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						
	Total Quantity in metre						
1.002	15.43.2				1010		
	Dismantling manu material and dispo of Engineer -in-Ch	ally / by n sal of uns arge:Bitu	nechanical m erviceable m minous road	eans includi aterial within	n <mark>g stacking (</mark> n 50 metres l	of servicea ead as per	ble direction
	Bitumin	us road	OF PUBL	C WORKS		0.5	
	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	_	T	711.200
	MH to IC- MT BT	1	1328.000	0.700	DRA		929.600
	MH to IC- HARBOUR Dept. ROAD	1	256.000	0.700	LE		179.200
	Total		OF PUBL	C WORKS		898 	11851.15 0
				То	otal Quantit	y in sqm	11851.15 0
1.003	100.8.2						
	Fencing 1.50m hig coir yarn on vertic	h with tw al casuari	o rows of cas na pole (girth	suarina poles 1 15cm to 24	s (girth 15cm cm) fixed at	to 24cm) 1.5m inte	tied with rvals.
	Fencing 1.50	m high w	ith two rows	of casuarina	poles (girth	15cm to 2	24cm) tied
	With coir yarn on V	ertical ca	suarina pole	(girth 15cm	to 24cm) fix	ed at 1.5m	n intervals.
	225mm to 630 mm	1	6605.300			0.3000	1981.590
	Inspection chamber to manhole - 160mm pvc	1	2776.000			0.3000 00	832.800
	Total						2814.390
				Tota	al 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 s caution tape in ver	ide of trer tical casu	nches, 1.50 m arina pole (g	height with hith hith	two rows of 24cm) fixed	10 cm pla at 2 m int	astic tervals.			
	Sewer lines from 225mm to 630 mm	1	6605.300			0.7000 00	4623.710			
	Inspection chamber to manhole - 160mm pvc	1	2776.000			0.7000 00	1943.200			
	Total						6566.910			
	Total Quantity in metre									
1.005	100.1.1									
	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	\prec II		0.8000	7754.176			
	Inspection chamber to manhole - 160mm pvc	1	2776.000	0.700	1.000	0.8000 00	1554.560			
	Deducting BT demolishing QTY	-1	11851.15 0		0.300		- 3555.345			
	Total						5753.391			
				Te	otal Quantit	y 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 trenche sockets,	es of requ	ired width fo	or pipes, cabl	es, etc includ	ling excav	vation for			
	Quantity from calculation sheet	1	9692.720			$\begin{array}{c} 0.2000\\00\end{array}$	1938.544			
	Inspection chamber to manhole - 160mm pvc	1	2776.000	0.700	1.000	0.2000 00	388.640			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	Total						2327.184		
				Т	otal Quantit	y in cum	2327.184		
1.007	100.1.2								
	Excavating trenche sockets, and dressi exceeding 3m, inc required, in layers deposited layer by directed, within a	es of requ ing of side luding get not excee ramming lead of 50	ired width fo es, ramming of tting out the eding 20cm in , watering, et m, in all kind	or pipes, cabl of bottoms, c excavated so n depth, inclu tc., and dispo ls of soil.	es, etc., inclu lepth exceed il, and then r uding consol osing of surp	Iding exca ing 1.5m l eturning t idating ea lus excava	vation for out not he soil as ch ated soil as		
	Excavating tre for sockets	nches of r	equired widt	h for pipes, o	cables, etc in	cluding e	cavation		
	Quantity from calculation sheet	1	3042.760			0.7500 00	2282.070		
	Total						2282.070		
				Te	otal Quantit	y in cum	2282.070		
1.008	100.2.8								
	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 trenche sockets,	es of requ	ired width fo	r pipes, cabl	es, etc incluc	ling excav	ation for		
	Quantity from calculation sheet	1	3042.760			0.2500 00	760.690		
	Total						760.690		
				Te	otal Quantit	y 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 strutting, shoring	case of s	hafts, wells,	cesspits, mai	holes and th	e like incl	luding		
		2	4170.800		3.000	0.3000 00	7507.440		
	Total								
				Т	otal Quantit	y in sqm	7507.440		
1.010	2.23								
	Extra for planking position (Face area	and strut	ting in open t nber perman	imbering if i ently left to	required to b be measured	e left pern).	nanently in		

EST No. :WRD/KWA-CESEWA/EST/4856/2023_27_3_2 (Edit Id : 1)	
(Dsor year : 2018,Cost Index (Place : Malappuram,Value : 136.44),GST : 186	%

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	Extra for plank in position	ing and st	rutting in ope	en timbering	if required to	o be left p	ermanently		
		2	6605.300	3.000		0.0300 00	1188.954		
	Total						1188.954		
				Te	otal Quantit	y in sqm	1188.954		
1.011	OD235696/2022-2	2023							
	Supplying, Provid laid wherever nece	ing beddir essary with	ng with m sai h all lead and	nd for sewer l lift.	lines as per s	specificati	ions to be		
	Supplying, Pro- be laid wherever n	viding bec	lding with m with all lead	sand for sev and lift.	ver lines as p	er specifi	cations to		
	beding for lines	1	6605.300	0.600	0.100	0.2500 00	99.080		
	Total 99.080								
	Total Quantity in cum								
1.012	4.1.3		FI P	641	/	ET			
	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	0.2500 00	99.080		
	Total						99.080		
				Тс	otal Quantity	y in cum	99.080		
1.013	100.7.2								
	Bailing out water y conveyance to the of fuel lubricating	with engir site, erect oil and ot	e and pump ing, dismant her stores pa	set above 5H ling and taking y of staff etc	IP up to 10H ng back of er ., complete.	P including ine and	ng pump, cost		
	Bailing out water i lengine and pumps	using pum set above :	ip above 5 H 5HP	P and Up to	10 HP-Bailir	ng out wat	ter with		
	Bailing out water using pump above 5 HP and Up to 10 HP	20	8.000	5.000*0.7 46			596.800		
	Total								
				То	tal Quantity	v in Kwh	596.800		
1.014	100.7.3								
	Bailing out water conveyance to the of fuel lubricating	with engir site, erect oil and ot	e and pump ing, dismant her stores pa	set above 10 ling and taki y of staff etc	HP up to 201 ng back of ei ., complete.	HP includ ngine and	ing pump, cost		

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	Bailing out water engine and pump	using pur set above	np above 10 10HP and up	HP and Up t to 20HP	o 20 HP - Ba	ailing out	water with		
	Bailing out water using pump above 10 HP and Up to 20 HP	20	8.000	15*0.746			1790.400		
	Total						1790.400		
				To	tal Quantity	y in Kwh	1790.400		
1.015	100.7.4								
	Bailing out water conveyance to the of fuel lubricating	with enginesite, erection of the other of the other of the other o	ne and pump ting, dismant ther stores pa	set above 20 ling and taki y of staff etc	HP up to 30 ng back of e	HP includ ngine and	ing pump, cost		
	Bailing out water using pump above 20 HP and Up to 30 HP -Bailing out water with engine and pump set above 25 HP and up to 30 HP								
	Bailing out water using pump above 20 HP and Up to 30 HP	20	8.000	25*0.746		FT	2984.000		
	Total 2984.000								
	Total Ouantity in Kwh 2984.000								
1.016	100.98.226								
	Supply of PVC Pi	pe, 8kg/ci	n2, 160mm I	Dia.	NAMAGENNES	41			
	Supply of uPVC	C Pipe, IS	4985: 2000 ,	8kg/cm2, 10	50mm Dia.				
	MH to IC	1	2776.000				2776.000		
	Total						2776.000		
				Tot	al Quantity	in metre	2776.000		
1.017	OD235697/2022-2	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 & amp; 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, holding clamps, 10	lowering 60mm PV	into trenches	s, laying to c	orrect line a	nd grade u	sing CC		
	MH to IC	1	2776.000				2776.000		
	Total						2776.000		
				Tot	al Quantity	in metre	2776.000		
1.018	OD235698/2022-2	2023							

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Supply of PE Pipe Outer Dia.	PE 100 (IS 14333/ sev	werage pipe	with latest IS	S), 8kg, 22	25mm			
	Supply of PE Pipe Outer Dia.	e PE 100 ((IS 14333/ se	werage pipe	with latest I	S), 8kg, 2	25mm			
	PE Pipe - 225 mm	1	5612.700				5612.700			
	Total						5612.700			
				Tot	al Quantity	in metre	5612.700			
1.019	OD235699/2022-2	OD235699/2022-2023								
	Supply of PE Pipe Outer Dia.	PE 100 (IS 14333/ sev	werage pipe	with latest IS	S), 8kg, 28	80mm			
	Supply of PE Pipe Outer Dia	e PE 100 ((IS 14333/ se	werage pipe	with latest I	S), 8kg, 2	80 mm			
	PE Pipe - 280 mm	1	279.000	.00.			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 Outer Dia	PE 100 (IS 14333/ sev	werage pipe	with latest IS	S), 8kg, 35	5 mm			
	PE Pipe - 355 mm	1	1048.600				1048.600			
	Total						1048.600			
				Tot	al Quantity	in metre	1048.600			
1.021	OD235701/2022-2	2023								
	Supply of PE Pipe Outer Dia.	PE 100 (IS 14333/ sev	werage pipe	with latest IS	S), 8kg, 45	60 mm			
	Supply of PE Pi Outer Dia.	pe PE 100	0 (IS 14333/	sewerage pij	pe with latest	t IS), 8kg,	450 mm			
	PE Pipe - 450 mm	1	405.300				405.300			
	Total						405.300			
				Tot	al Quantity	in metre	405.300			
1.022	OD239661/2022-2	2023								
	Supply of PE Pipe	PE 100 (IS 4984/1995	5), 8kg, 560r	nm Outer Di	a.				
	Supply of PE Pipe	e PE 100	(IS 4984/199	5), 8kg, 560	mm Outer Di	ia.				
	PE Pipe - 560 mm	1	558.100				558.100			
	Total						558.100			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Total Quantity in metro									
1.023	OD239660/2022-2	2023								
	Supply of PE Pipe	100 (IS 4	984/1995), 8	8kg, 630mm	Outer Dia.					
	Supply of PE Pipe	e 100 (IS 4	4984/1995),	8kg, 630mm	Outer Dia.	1 1				
	PE Pipe - 630 mm	1	1766.600				1766.600			
	Total						1766.600			
				Tot	al Quantity	in metre	1766.600			
1.024	100.10.8									
	and aligning the pipes (is : 4)64) on faile portion including conveying within initial fead 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		ĽĒ	11. 112.	4963.400			
	Total		OF PUEL	CWORKS	SAANAGEMMEN	ATT.	4963.400			
				Tot	al 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 OI	O PE pipe								
	PE Pipe - 280 mm	1	69.000				69.000			
	Total						69.000			
				Tot	al 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 pi	ре							
		1	740.500				740.500			
	Total									
	Total Quantity in metr									
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 pi	pe			10				
	PE Pipe - 450 mm	1	371.900	KARAR THE	RARIAGERAER	0	371.900			
	Total						371.900			
				Tot	al 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 pi	pe							
	PE Pipe - 560 mm	1	331.600				331.600			
	Total						331.600			
				Tot	al 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 C	DPE pip	es									
	630 mm 1 128.900 128.900											
	Total											
	Total Quantity in metre											
1.030) OD235702/2022-2023											
	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 ins RCC M20	pection cl	hambers of s	ize 0.45x0.45	5m (inside) a	nd 0.45m	deep with					
	inspection chambers	1	174.000				174.000					
	Total						174.000					
					Total Quant	tity in no	174.000					
1.031	OD235703/2022-2	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 insp RCC M20	pection ch	ambers of si	ze 0.45x0.45	m (inside) ar	nd 0.60m	deep with					
	inspection chambers	1	104.000				104.000					

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	Total						104.000				
				1	Total Quant	ity in no	104.000				
1.032	OD235704/2022-2	2023									
	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 ins RCC M20	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.60m deep with RCC M20									
	inspection chambers	1	139.000	641		T	139.000				
	Total 139.000										
	Total Quantity in no										
1.033	OD235705/2022-2	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 aborder.										
	Constructing inspection chambers of size 0.60x0.60m (inside) and 0.75m deep with RCC M20										
	inspection chambers	1	139.000				139.000				
	Total										
	Total						139.000				
	Total				Total Quant	ity in no	139.000 139.000				

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									
	Total Quantity in no									
1.035	OD235707/2022-2023									
	Installation of PE pipe between 110mm & amp; 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<:br>resolution and penetration									
	Installation of PE jon grade	pipe betw	een 110mm	& 225m	m outer dia	by HDD r	nethod for			
	225mm outer dia by HDD method	1	649.300				649.300			
	Total									
	Total Quantity in metre									
1.036	OD235708/2022-2	2023								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	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									
	method									
	OD PE pipe- HDD	1	210.000	Q I	1	ET	210.000			
	Total		200	NG65Bear	DRA	-	210.000			
				Tot	al Quantity	in metre	210.000			
1.037	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									
	OĎ PĚ pipe- HDD Laying 450mm OD PE pipe-	1	308.100				308.100 33.400			
	HDD	1	221100							
	Total									
				Tot	al Quantity	in metre	341.500			
1.038	OD235710/2022-2	2023								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	Installation of PE - method Installation directional drilling 500mm mm dia PI	-550mm-6 n of HDP ; method - E pipe by	510mm mm 6 E -550mm-6 Add 20% ine horizontal di	lia PE pipe b 10mm mm d crease to the rectional dril	by horizontal ia PE pipe by Installation of lling method	directions y horizont of HDPE	al drilling al -355mm-				
	Installation of PE - method	-550mm-6	510mm mm o	lia PE pipe b	y horizontal	direction	al drilling				
	Laying 560mm OD PE pipe- HDD	1	226.500				226.500				
	Total										
	Total Quantity in metre										
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		1637.700	₹ 1	E		1637.700				
	Total		OF PUEL	C WORKS	MANAGEMEN	100	1637.700				
				Tot	al Quantity	in metre	1637.700				
2	CONSTRUCTIO	N OF MA	NHOLES								
2.001	100.3.1.1										
	Earthwork in open all kinds of soil an lift up to 1.5m incl	well exca d conveyi uding nea	avation (aboving and deposite the second sec	ve water) for siting the spo	wells of dian oil within ini	meter up t tial lead o	o 2.50m in f 50m and				
	Earthwork in oper	n well exc	avation								
	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				
				To	otal Quantit	y in cum	3145.067				
2.002	100.3.1.2										

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Earthwork in open all kinds of soil an lift from 1.5m to 3	well exca d conveyi .0m inclu	avation (abov ng and depos ding neat bar	ve water) for siting the sponstructure sponstructure structure str	wells of diar bil within init	neter up t ial lead o	o 2.50m in f 50m and			
	Earthwork in oper	n well exc	avation							
	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									
	Total Quantity in cum									
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 112 3.140 1.3*1.3 0.250									
	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			
				То	otal Quantity	y in cum	1574.472			
2.004	100.3.1.14									
	Earthwork in open 2.50m in all kinds 50m and lift from	well exca of soil an 4.5m to 6	avation (in or d conveying .0m including	under water and depositing neat bankir	r) for wells of ng the spoil wing.	f diamete within ini	r up to tial lead of			
	Earthwork in oper	n well exc	avation							
	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 33									
				То	otal Quantity	y in cum	330.520			
2.005	100.3.1.15									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	Earthwork in open 2.50m in all kinds 50m and lift from	well exca of soil an 6.0m to 7	avation (in or d conveying .5m includin	r under water and depositi g neat bankir	r) for wells o ng the spoil y ng.	f diamete within ini	r up to tial lead of				
	Earthwork in open	well exca	avation								
	MH 1.8Dia ,5.5M Depth	3	3.140	1.7*1.7	0.300		8.167				
	Total						8.167				
				Te	otal Quantit	y in cum	8.167				
2.006	100.6.1										
	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	1	1508.707				
	MH 1.2Dia ,2.5M Depth	112	3.140	2.600	3.250	Ð.	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						11041.52 8				
				Te	otal Quantit	y in sqm	11041.52 8				
2.007	100.6.S.1										
	Structural steel we including cutting, steel primer all con	ork in sing hoisting, f mplete. (e	le section, fi fixing in posi xcluding cos	xed with or v ition and app t of material	without connu- lying a primi s)	ecting pla ing coat o	te, f approved				
	Structural steel wo	ork in sing	le section,								
	MH 1.2Dia ,1.5M Depth	91	3.140	2.400	2.200	0.3000 00	452.612				
	MH 1.2Dia ,2.5M Depth	112	3.140	2.600	3.250	0.3000	891.509				
	MH 1.5Dia ,3.5M Depth	93	3.140	3.100	4.300	0.3000 00	1167.788				

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	MH 1.5Dia ,4.5M Depth	48	3.140	3.100	5.300	0.3000 00	742.899
	MH 1.8Dia ,5.5M Depth	3	3.140	3.400	6.000	0.3000 00	57.650
	Total						3312.458
				Total Q	Quantity in k	kilogram	3312.458
2.008	100.7.1						
	Bailing out water v erecting, dismantli and other stores pa	with 5HP ng and tal y of staff	engine and p king back of etc., complet	ump set incluengine and p	uding convey oump, cost of	yance to t fuel lubr	he site, icating oil
	Bailing out water	T					
	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	ET	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	1	179.040
	Total		OF PUBL	RM FOR THE CWORKS	NANAGENAEN	(T)	11876.32 0
				To	tal Quantity	in Kwh	11876.32 0
2.009	100.7.4						
	Bailing out water conveyance to the of fuel lubricating	with engin site, erect oil and ot	e and pump ing, dismant her stores pa	set above 20 ling and taking of staff etc.	HP up to 301 ng back of ei ., complete.	HP includ	ing pump, cost
	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
				To	tal Quantity	in Kwh	5729.280
2.010	4.1.6						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Providing and layi of centering and sl sand : 6 graded sto	ng in posi nuttering - one aggreg	tion cement All work up gate 40 mm n	concrete of s to plinth lev ominal size)	pecified grad vel:1:3:6 (1 c	le excludi ement : 3	ing the cost coarse			
	Providing and layi	ng in posi	tion 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									
	Total Quantity in cum 314.508									
2.011	5.37.1									
	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									
	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	· · · · · · · · · · · · · · · · · · ·			T					
	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	1.5000 00	155.371	
	MH 1.2Dia ,2.5M Depth	112	3.140	1.550	0.300	$2.5000 \\ 00$	408.828	
	MH 1.5Dia ,3.5M Depth	93	3.140	1.850	0.350	3.5000 00	661.790	
	MH 1.5Dia ,4.5M Depth	48	3.140	1.850	0.350	4.5000 00	439.160	
	MH 1.8Dia ,5.5M Depth	3	3.140	2.150	0.350	5.5000 00	38.987	
	Total	1.0		1	-		1704.136	
	Total Quantity in cum							
2.012	2 5.34.1							
	Extra for providing specified cement c grade concrete ins in M-30 is @ 340	g richer m content use tead of M kg/cum)	ixes at all flo ed is payable -25 grade BM	oor levels. No / recoverable //C/RMC. (N	ote:- Excess/ e separately.I lote:- Cemen	less ceme Providing t content	nt over the M-30 considered	
	Extra for providu	ng richer i	mixes					
	Quantity as per item No.11	1	2768.056				2768.056	
	Total						2768.056	
				Te	otal Quantit	y in cum	2768.056	
2.013	4.12					<u> </u>		
	Extra for providing doses by weight of	g and mix f cement a	ing water pro	ofing mater acturer'	ial in cement	concrete	work in	
	Extra for providing	ng and mi	xing water p	roofing mate	rial			
	Quantity as per item No.11	1	2768.056		340.000		941139.0 40	
	Total							
				,	Fotal Quant	ity in kg	941139.0 40	
2.014	5.22.1							

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Steel reinforcemer in position and bin steel bars	nt for R.C ding all c	.C work incluois omplete upto	uding straigh 9 plinth level	tening, cuttin Mild steel an	ng, bendir Id Mediur	ng, placing n Tensile			
	Steel reinforceme	nt for R.C	C.C work							
	Quantity as per item No.11	1	2761.513		120.000		331381.5 60			
	Total						331381.5 60			
	Total Quantity in kg									
2.015	5.9.2									
	Centering and shut thickness) includir	ttering inc	cluding strutt d pilasters, b	ing, etc. and utteresses, p	removal of f linth and strip	form for:V	Valls (any s 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	FI	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	盟 七	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		1.5000 00	514.332			
	MH 1.2Dia ,2.5M Depth	112	3.140	1.200		$2.5000 \\ 00$	1055.040			
	MH 1.5Dia ,3.5M Depth	93	3.140	1.500		3.5000 00	1533.105			
	MH 1.5Dia ,4.5M Depth	48	3.140	1.500		4.5000 00	1017.360			
	MH 1.8Dia ,5.5M Depth	3	3.140	1.800		5.5000 00	93.258			
	Total						4213.095			
	Wall outside									
	MH 1.2Dia ,1.5M Depth	91	3.140	1.700		1.5000 00	728.637			
	MH 1.2Dia ,2.5M Depth	112	3.140	1.800		2.5000 00	1582.560			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	MH 1.5Dia ,3.5M Depth	93	3.140	2.200		3.5000 00	2248.554		
	MH 1.5Dia ,4.5M Depth	48	3.140	2.200		4.5000 00	1492.128		
	MH 1.8Dia ,5.5M Depth	3	3.140	2.500		5.5000 00	129.525		
	Total						6181.404		
				То	otal Quantit	y in sqm	11632.30 3		
2.016	5.9.20								
	Centering and shut floors, roofs, landi thick	ttering inc ngs, balco	cluding strutt onies and acc	ing, etc. and ess platform	removal of f with water p	form for:S proof ply 1	uspended 12 mm		
	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	601	FI	126.605		
	MH 1.5Dia ,3.5M Depth	93	3.140	<mark>.7</mark> 5*.75			164.261		
	MH 1.5Dia ,4.5M Depth	48	3.140	.75*.75	AANAGEMEN	100 (T)	84.780		
	MH 1.8Dia ,5.5M Depth	3	3.140	.9*.9			7.630		
	Total						486.142		
				To	otal Quantit	y 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 carpied 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			
	MH 1.2Dia ,1.5M Depth	91	3.140	1.200		$\begin{array}{c} 1.5000\\00\end{array}$	514.332			
	MH 1.2Dia ,2.5M Depth	112	3.140	1.200		2.5000 00	1055.040			
	MH 1.5Dia ,3.5M Depth	93	3.140	1.500		3.5000 00	1533.105			
	MH 1.5Dia ,4.5M Depth	48	3.140	1.500		4.5000 00	1017.360			
	MH 1.8Dia ,5.5M Depth	3	3.140	1.800		5.5000 00	93.258			
	Total									
	Total Quantity in sqm									
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 bas water tanks, roof slabs, podiums, reservior, sewage & amp; water treatment j tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 par integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 pa integral crystalline slurry : 1 part water) for horizontal surfaces and applying same from negative (internal) side with the help of synthetic fiber brush. Th shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducin permeability of concrete by more than 90% compared with control concrete DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The slurry shall be capable of self-healing of cracks up to a width of 0.50mm. TI 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									
-	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									
	Total Quantity in sqm									
2.019	13.7.1									
	12 mm cement pla cement : 3 fine sar	ster finish 1d)	ned with a flo	ating coat of	f neat cement	t of mix:1	:3 (1			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Outside of wall						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.700		$\begin{array}{c} 1.5000\\00\end{array}$	728.637
	MH 1.2Dia ,2.5M Depth	112	3.140	1.800		$2.5000 \\ 00$	1582.560
	MH 1.5Dia ,3.5M Depth	93	3.140	2.200		3.5000 00	2248.554
	MH 1.5Dia ,4.5M Depth	48	3.140	2.200		4.5000 00	1492.128
	MH 1.8Dia ,5.5M Depth	3	3.140	2.500		5.5000 00	129.525
	Total						6181.404
	Inside of wall						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.200		$\begin{array}{c} 1.5000\\00\end{array}$	514.332
	MH 1.2Dia ,2.5M Depth	112	3.140	1.200		2.5000 00	1055.040
	MH 1.5Dia ,3.5M Depth	93	3.140	1.500	DR	3.5000 00	1533.105
	MH 1.5Dia ,4.5M Depth	48	3.140	1.500	E	4.5000 00	1017.360
	MH 1.8Dia ,5.5M Depth	3	3.140	1.800	KANIAGEINER	5.5000 00	93.258
	Total						4213.095
	Base slab Top and	Cover sla	ub 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		11	GAN	_	ET.	600.933		
	Total Quantity in sqm								
2.020	13.65.1	1.0		1	-				
	Painting with black manufacture to give	k anti- con ve an even	rrosive bitum 1 shade:Two	as <mark>tic p</mark> aint o or more coat	f approved b s on new wo	rand and rk			
	Inside of wall		noru Alan ga						
	MH 1.2Dia ,1.5M Depth	91	3.140	1.200		1.5000 00	514.332		
	MH 1.2Dia ,2.5M Depth	112	3.140	1.200		$2.5000 \\ 00$	1055.040		
	MH 1.5Dia ,3.5M Depth	93	3.140	1.500		3.5000 00	1533.105		
	MH 1.5Dia ,4.5M Depth	48	3.140	1.500		4.5000 00	1017.360		
	MH 1.8Dia ,5.5M Depth	3	3.140	1.800		5.5000 00	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 sla	ab 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		A	120-					
	MH 1.2Dia ,1.5M Depth	91	3.140	.85*.85	50	FI	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	NANIAGO MO		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		$\begin{array}{c} 1.5000\\ 00 \end{array}$	728.637		
	MH 1.2Dia ,2.5M Depth	112	3.140	1.800		$2.5000 \\ 00$	1582.560		
	MH 1.5Dia ,3.5M Depth	93	3.140	2.200		3.5000 00	2248.554		
	MH 1.5Dia ,4.5M Depth	48	3.140	2.200		$\begin{array}{c} 4.5000\\00\end{array}$	1492.128		
	MH 1.8Dia ,5.5M Depth	3	3.140	2.500		5.5000 00	129.525		
	Total						6181.404		
	Total Quantity in sqm								
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		10	Sector 1	200	1-3	5		
	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	9.18.3							
	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 fixi	ng 560 m	m dia C.I. m	anhole cover					
	Total	347					347.000		
	Total						347.000		
				To	tal Quantity	y in each	347.000		
3	COLLECTION W	ELLS, LI	FTING STA	TIONS ANI) ALLIED V	VORKS			
3.001	100.3.1.1								
	Earthwork in open all kinds of soil an lift up to 1.5m incl	well exca d conveyi uding nea	avation (abov ing and depos at banking.	ve water) for siting the spo	wells of diar oil within init	neter up t tial lead o	o 2.50m in f 50m and		
	Earthwork in open	well exca	avation						
	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								
	Total 122.7								
	Total Quantity in cum								
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 exca	avation	CWORKS	MANAGERAEN	(T)			
	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		
				То	otal Quantity	y in cum	122.719		
3.003	100.3.1.13								
	Earthwork in open 2.50m in all kinds 50m and lift from	well exca of soil an 3.0m to 4	avation (in or d conveying .5m including	under water and depositing neat bankir) for wells on ng the spoil wing.	f diameter within init	r up to ial lead of		
	Earthwork in oper	n well exc	avation						
	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 2.50m in all kinds 50m and lift from	well exca of soil an 4.5m to 6	avation (in or d conveying .0m including	under water and depositing neat bankir) for wells on ng the spoil wing.	f diameter within init	r up to ial lead of		

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Earthwork in open	well exca	avation							
	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			
				To	otal Quantity	y in cum	43.544			
3.005	100.3.1.15									
	Earthwork in open 2.50m in all kinds 50m and lift from	well exca of soil an 6.0m to 7	avation (in or d conveying .5m including	under water and depositing neat bankir	for wells of ng the spoil ving.	f diameter within init	r up to ial lead of			
	Earthwork in open	well exca	avation							
	LS2	1	3.140	2.15*2.15	1.500		21.772			
	LS6 1 3.140 2.15*2.15 1.500									
	Total									
	Total Quantity in cum 43.544									
3.006	100.3.3.1	100.3.3.1								
	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 up to 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			
				Τα	tal Ouantity	v in cum	68.672			
3.007	100.3.3.2				<u> </u>) • • • [
	Earthwork in open and up to 3.50m ir initial lead of 50m	well exca all kinds and lift fi	avation (abov of soil and c rom 1.5m to 2	ve water) for onveying and 3.0m includin	wells of diar d depositing ng neat bank	neter abov the spoil ing.	ve 2.5m within			
	3.50 m in all kinds			water) for w						
	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			
				To	tal Quantity	y in cum	68.672			
3.008	100.3.3.13									
	Earthwork in open 2.5m and up to 3.5 within initial lead	well exca 0m in all of 50m an	avation (in or kinds of soil id lift from 3.	under water and conveyi 0m to 4.5m) for wells of ng and depos including nea	f diameter siting the at banking	r above spoil g.			
	Earthwork open w upto 3.50 m in all	ell excava kinds of s	ation (in or u oil	nder water) f	or wells of d	ia. above	2.5m and			

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			
				To	tal Quantity	y in cum	68.672			
3.009	100.3.4.14									
	Earthwork in open 2.5m and up to 3.5 initial lead of 50m	well exca 0m in ord and lift fi	avation (in or linary rock ar rom 4.5m to 6	under water nd conveying 5.0m includi) for wells of and depositing neat bank	f diameter ing the sp ing.	above toil within			
	Earthwork in op 2.5m and up to 3.5	en well ex Om in orc	cavation (in linary rock	or under wat	er) for wells	of diamet	ter above			
	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									
	Total Quantity in cum									
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	in .	34.336			
	CW 2 @ 3M Dia	1	3.140	2.7*2.7	1.500		34.336			
	Total						68.672			
				To	tal Quantity	y in cum	68.672			
3.011	100.3.4.16									
	Earthwork in open 2.5m and up to 3.5 initial lead of 50m	well exca 0m in orc and lift fi	avation (in or linary rock ar rom 7.5m to 9	under water nd conveying 0.0m includi) for wells of and depositing neat bank	f diameter ing the sp ing.	r above oil within			
	Earthwork in open	well exc	avation							
	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			
				To	tal Quantity	y in cum	27.469			
3.012	2.17.2									
	Close timbering in strutting, shoring a (Measurements to exceeding 3 m	case of s and packin be taken	hafts, wells, c ng cavities (w of the face are	cesspits, man herever request ea timbered).	holes and the ired) etc. con Depth excee	e like incl mplete ding 1.5 i	uding m but not			
	Close timbering in strutting, shoring a	n case of s and packir	shafts, wells, ng cavities (w	cesspits, mai herever requ	nholes and th	e like inc	luding			

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									
3.013	100.6.1									
	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									
	Providing steel s	heet shor	ing to the sid	es of the tren	iches					
	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			
				Te	otal Quantit	y in sqm	284.610			
3.014	100.6.S.1									
	Structural steel wo including cutting, steel primer all con	ork in sing hoisting, f nplete. (e	le section, fi fixing in posi xcluding cos	xed with or w tion and app t of materials	without conne lying a primi s)	ecting pla ing coat o	te, f approved			
	Structural steel	work in si	ngle section,							
	LS2 & LS 6	2	3.140	4.300	3.600	0.3000	29.164			
	CW 1	1	3.140	5.400	5.600	0.3000	28.486			
	CW 2	1	3.140	6.400	4.600	0.3000 00	27.732			
	Total						85.382			
				Total ()uantity in k	kilogram	85.382			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
3.015	100.7.1									
	Bailing out water v erecting, dismantli and other stores pa	with 5HP ng and ta y of staff	engine and p king back of etc., comple	ump set incl engine and p te.	uding convey oump, cost of	yance to t fuel lubr	he site, icating oil			
	Bailing out water errection, dismantl	r with 5 H ing and ta	IP engine and aking	l pumpset in	cluding conv	veyance to	the site,			
	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	T	59.680			
	Total 477.440									
	Total Quantity in Kwh 477.440									
3.016	100.7.2									
	Bailing out water v conveyance to the of fuel lubricating	with engin site, erect oil and of	he and pump ting, dismant ther stores pa	set above 5H ling and taki y of staff etc	IP up to 10H ng back of en ., complete.	P includingine and	ng pump, cost			
	Bailing out wate	r with eng	gine and pum	p set above 5	5HP up to 10	H				
	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 wate	er with en	gine and pun	np set above	10HP up to 2	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	
				То	tal Quantity	v 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, c of fuel lubricating oil and other stores pay of staff etc., complete.							
	Bailing out wate	r with eng	gine and pum	p set above 2	20HP up to 3	OHP		
	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	8	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	
				То	tal Quantity	in Kwh	1342.800	
3.019	100.7.5							
	Bailing out water y conveyance to the of fuel lubricating	with engir site, erect oil and ot	ne and pump ting, dismant her stores pa	set above 30 ling and taki y of staff etc	HP up to 40 ng back of en ., complete.	HP includ ngine and	ing pump, cost	
	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			
				To	tal Quantity	y in Kwh	716.160			
3.020	4.1.6									
	Providing and layi of centering and sh sand : 6 graded sto	ng in posi nuttering - one aggreg	ition cement - All work up gate 40 mm n	concrete of so to plinth level cominal size)	specified grad vel:1:3:6 (1)	de exclud cement : 3	ing the cost 3 coarse			
	PCC 1:3:6				I	1				
	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	ET	3.434			
	Total 19.345									
	Total Quantity in cum 19.345									
3.021	5.37.1									
	Providing and layi cement concrete w manufactured in fu- transit mixer for al design of specified R.M.C. from trans finishing and reinf as per IS: 9103 to impairing strength Cement content co- per design mix is p	ng in pos ork, using illy auton il leads, ha l grade fo it mixer to orcement accelerate and dura onsidered oayable/re	ition ready m g cement con hatic batching aving continu r reinforced c o site of layin including co e/ retard settin bility as per c in this item is coverable se	ixed M-25 g tent as per a g plant and tr ious agitated cement concr ag, excluding st of admixtung of concret lirection of t s @330 kg/c parately.All	proved desi ansported to ansported to a mixer, many rete work inco g the cost of o ures in recon te, improve he Engineer cum. Excess wiork upto p	e for reinf gn mix, site of we ufactured luding pu centering, mended p workabilit - in -charg /less ceme linth leve	forced ork in as per mix mping of shuttering proportions ty without ge. Note:- ent used as l			
	Providing an reinforced cement	nd laying concrete	in position re work	ady mixed N	M-25 grade c	oncrete fo	or			
	OF 1,2,3,4 2m Dia well depth up to 3m- Base concrete	4	1.900	1.900	0.450	3.1400 00	20.404			
	side wall	4	2.300	0.300	3.000	3.1400 00	25.999			
	cover slab	4	1.300	1.300	0.250	3.1400 00	5.307			
	LS 2 & LS 6 2m Dia well depth up to 6m-base concrete	2	2.000	2.000	0.450	3.1400 00	11.304			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	side wall	2	2.400	0.400	6.000	3.1400 00	36.173		
	cover slab	2	1.400	1.400	0.250	3.1400 00	3.077		
	CW1-3m Dia well depth up to 8m-Base concrete	1	2.550	2.550	0.450	3.1400 00	9.188		
	side wall	1	3.450	0.450	8.000	$\begin{array}{c} 3.1400\\00\end{array}$	38.999		
	cover slab	1	1.950	1.950	0.250	3.1400 00	2.985		
	CW2-3m Dia well depth up to 7M-Base concrete	1	2.550	2.550	0.450	3.1400 00	9.188		
	side wall	1	3.450	0.450	7.000	3.1400 00	34.124		
	cover slab	1	1.950	1.950	0.250	3.1400 00	2.985		
	Total 199								
	Total Quantity in cum								
3.022	5.34.1					573			
	Extra for providing specified cement c grade concrete inst in M-30 is @ 340	g richer m ontent use tead of M kg/cum).	ixes at all flo ed is payable -25 grade BN	oor levels. No / recoverable //C/RMC. (N	ote:- Excess/ e separately.H lote:- Cemen	less ceme Providing t content	nt over the M-30 considered		
	Extra for provid the specified ceme	ing richer nt conten	mixes at all	floor levels.	Note:- Exce	ss/less cer	nent over		
	Qty taken from item no-21	1	199.733				199.733		
	Total						199.733		
				Та	otal Quantity	y in cum	199.733		
3.023	4.12								
	Extra for providing doses by weight of	g and mix	ing water pro	ofing materi acturer's spec	al in cement	concrete	work in		
	Extra for provided of the formation of t	ding and r	nixing water	proofing ma	terial in cem	ent concre	ete work in		
	Qty taken from item no-21	1	199.733			340.00 0000	67909.22 0		
	Total								
	Total Quantity in kg								
3.024	5.9.2								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Centering and shut thickness) includir	ttering inc ng attache	cluding strutt d pilasters, b	ing, etc. and utteresses, pl	removal of f	orm for:V	Valls (any s etc.
	Centering and (any thickness) inc	shutterin	g including s tached pilaste	trutting, etc. ers,	and removal	of form	for: Walls
	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	FT	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	1 E	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									
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: Sus floors, roofs, landings, balconies									
	OF 1 2m Dia well depth up to 3m- cover slab	4	3.140	1*1	SANAGENED	(f)	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			
				Т	otal Quantit	y 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			120.00 0000	23967.96 0			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	Total						23967.96 0		
				,	Total Quant	tity in kg	23967.96 0		
3.027	22.23.1								
	Providing and app waterproofing trea water tanks, roof s / subway and bridg integral crystalline integral crystalline same from negativ shall meet the requ permeability of co DIN 1048 and resi slurry shall be cap shall be carried ou engineerin- charge. The produc leakage.For vertica	or isement, isement, isement, isements arts g the me material ing e as per crystalline the work any							
	Providing and approviding treat	olying inte tment to t	egral crystall he RCC stru	i <mark>ne slu</mark> rry of ctures like re	hydrophilic i taining walls	in nature f s -Veertic	for al wall		
	OF 1.2.3.4 2m Dia well depth up to 3m	10	3.140	2.000	3.000	e7	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								
				Т	otal Quantit	y in sqm	518.100		
3.028	22.23.2								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	 waterproofing treatment to the RCC structures like retaining walls of the b water tanks, roof slabs, podiums, reservior, sewage & water treatment plan / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 p integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 pintegral crystalline slurry : 1 part water) for horizontal surfaces and applyi same from negative (internal) side with the help of synthetic fiber brush. T shall meet the requirements as specified in ACI-212-3R-2010 i.e by reduct permeability of concrete by more than 90% compared with control concrete DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The slurry shall be capable of self-healing of cracks up to a width of 0.50mm. ' 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 agains leakage.For horizontal surface one coat @1.10 kg per sqm. Providing and applying integral crystalline slurry of hydrophilic in nature waterproofing treatment to the RCC structures- BASE SLAB 									
	Providing and ap waterproofing trea	plying int tment to t	egral crystal	line slurry of ctures- BAS	hydrophilic E SLAB	in nature	for			
	OF 1.2.3.4 2m Dia well depth up to 3m	10	3.140	1*1		ET	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	MANAGEMEN		7.065			
	CW 2 3m Dia well depth up to 7m	1	3.140	1.5*1.5			7.065			
	Total						61.230			
				T	otal Quantit	y in sqm	61.230			
3.029	13.7.1									
	12 mm cement pla cement : 3 fine sar	ster finish nd)	ned with a flo	bating coat of	f neat cement	t of mix:1	:3 (1			
	12 mm cement pl	laster finis	shed with a f	loating coat	of neat ceme	nt 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	0	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

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	
				Т	otal Quantity	y in sqm	830.138	
3.030	13.65.1		J.F	641	_	ET		
	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 blac manufacture to give	ck anti- co ye an ever	rrosive bitun shade:	nastic paint c	of approved b	orand and		
	OF 1,2,3,4 2m Dia well depth up to 3m-inside wall	4	3.140	2.000	3.000	ι.	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	FT	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	SAANAGGAAD		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
				Т	otal Quantit	y in sqm	830.138
3.031	100.41.34						
	Supplying and fixi (low duty) charges	ng Rectar	ngular C.I. m g all cost, lab	anhole cover	x 455mm x 6 etc., complet	10mm wi	th frame
	Supplying and fix duty) charges inclu	king Recta	angular CI m cost,	anhole cover	: 455x610 m	m with fra	ame (low
	OF 1 2m Dia well depth up to 3m	4		State.			4.000
	LS 2 & LS 6 2m Dia well depth up to 6m	2	町		DRA	FT	2.000
	CW1-3m Dia well depth up to 8m		Ρ	₹I	E		1.000
	CW2-3m Dia well depth up to 7M	1	OF PUBL	C WORKS	SAMAGENES		1.000
	Total						8.000
				,	Total Quant	tity in no	8.000
3.032	100.36.1						
	Filling water with of 5 km (average) height not less that and other applienc	5000 litre to the reso n 3 m usin es and co	e tankers fited ervoir site an ng 5 HP diese st of water et	l in lorry and d pumping tl el engine pur c. complete.	l conveying v he water into np set , hire t	water from the reserve for tanker	n a distance voir of lorry, tools
	Filling water with distance of 5 km (a	5000 litraverage) t	e tankers fite o the reserve	d in lorry and ir site	d conveying	water from	m a
	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

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	Total						181.335				
	Total Quantity in Kilo litre										
3.033	2.25										
	Filling available ex foundation etc. in layer by ramming	xcavated of layers not and water	earth (exclud exceeding 2 ring, lead up	ing rock) in 0 cm in dept to 50 m and	trenches, plin h, consolidat lift up to 1.5	nth, sides ting each o m.	of deposited				
	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	FT	150.720				
	Deduction	-2	3.140	1. 4*1.4	6.000	and a	-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				
				Te	otal Quantit	y 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			
				То	otal Quantity	y in each	113.000			
4	PUMPING MAIN	S								
4.001	100.59.1									
	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	31	PF		85.000			
	Municipality - BT CW1-MH290	1	150.000	RM POR THE	NANAGENEI	17	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									
	Total Quantity in metre 196									
4.002	15.43.2									
	Dismantling manu material and dispo of Engineer -in-Ch	ally / by 1 sal of uns harge:Bitu	nechanical n erviceable m minous road	neans includi aterial withi	ng stacking n 50 metres l	of service lead as per	able r direction			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
	Dismantling n material and dispo	nanually / sal of uns	by mechanic berviceable	cal means ind	cluding stack	ting of ser	viceable		
	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								
				Т	otal Quantit	y in sqm	1818.000		
4.003	100.1.1								
	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 t	renches o	f required wi	dth for pipes	, cables, etc.				
	Bituminous road - upto 225 mm PE	1	1375+85	0.800	1.000	0.8000 00	934.400		
	Bituminous road - 250-400 mm PE	1	350.000	1.000	1.000	0.8000 00	280.000		
	Bituminous road - 400-630 mm PE	1	150+50	1.500	1.000	$\begin{array}{c} 0.8000\\00\end{array}$	240.000		
	Total						1454.400		
				Тс	otal Quantit	y 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 trench	es of requ	uired width f	or pipes, cab	les, etc. Ordi	nary Rocl	ζ		
	Bituminous road - upto 225 mm PE	1	1375+85	0.800	1.000	0.2000 00	233.600		

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity	
	Bituminous road - 250-400 mm PE	1	350.000	1.000	1.000	0.2000 00	70.000	
	Bituminous road - 450-630mm PE	1	150+50	1.500	1.000	$\begin{array}{c} 0.2000\\00\end{array}$	60.000	
	Total						363.600	
				Тс	otal Quantit	y in cum	363.600	
4.005	100.8.1							
	Fencing one side of in vertical casuarir	of trenche na pole (g	s, 1.50m heig irth 15cm to	ght with two 24cm) fixed	rows of 10cm at 2m interva	n plastic c als.	aution tape	
	Fencing one sid tape in vertical cas	e of trenc uarina po	hes, 1.50 m ł le	neight with tw	wo rows of 1	0 cm plas	tic caution	
		1	1960.000			$\begin{array}{c} 0.7000\\00\end{array}$	1372.000	
	Total			1945			1372.000	
			65	Tota	al Quantity	in metre	1372.000	
4.006	OD243866/2022-2023							
	Supply of PE Pipe	PE 100 (IS 14333), 10	0 <mark>kg, 1</mark> 40mm	Outer Dia.			
	Supply of PE P	ipe PE 10	0 (IS 14333)	<mark>, 10kg</mark> , 140n	nm Outer Dia	a.		
	LS 6 TO MH 26	1	50.000			10	50.000	
	OF 1 TO MH 127	1	275.000	C WORKS	ALADIADED ASEA	S	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	
				Tot	al Quantity	in metre	1375.000	
4.007	OD243893/2022-2	2023						
	Supply of PE Pipe	, PE100, 1	PN10, 200m	m dia, confor	ming to IS 1	4333.		
	Supply of PE Pip	e, PE100	, PN10, 200n	nm dia, confo	orming to IS	14333.		
	LS 2 TO MH 40	1	85.000				85.000	
	Total						85.000	
				Tota	al Quantity	in metre	85.000	
4.008	OD243894/2022-2	2023						
	Supply of PE Pipe	, PE100, 1	PN10, 315m	m dia, confor	ming to IS 1	4333.		
	Supply of PE Pipe	e, PE100,	PN10, 315m	m dia, confo	rming to IS	14333.		
	CW2- MH 75	1	350.000				350.000	
	Total						350.000	
				Tota	al Quantity	in metre	350.000	
4.009	OD248629/2022-2	2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	Supply of PE Pipe	, PE100, I	PN10, 560m	m dia, confo	rming to IS 4	984/2016	•				
	Supply of PE Pipe	984/2016	•								
		1	150.000				150.000				
	Total						150.000				
				Tot	al Quantity	in metre	150.000				
4.010	OD248631/2022-2	2023									
	Supply of PE Pipe	, PE100, I	PN10, 630m	m dia, confo	rming to IS 4	984/2016	•				
	Supply of PE Pipe	984/2016	•								
		1	50.000				50.000				
	Total										
				Tot	al Quantity	in metre	50.000				
4.011	100.10.4										
	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.										
	Laving HDPE pip	es - Dia 14	40 PE	AM FOR THE	MANAGEMEN	41					
		1	1375.000				1375.000				
	Total						1375.000				
				Tot	al 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 C	DD PE pip	e								
	Laying 200 mm OD PE pipe	1	85.000				85.000				
	Total										
				Tot	al 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 C)D PE pip	e								
	OD PE pipe	1	350.000				350.000				
	Total						350.000				
				Tot	al 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	IC WORKS			150.000				
	Total						150.000				
				Tot	al Quantity	in metre	150.000				
4.015	100.10.17										
	Laying HDPE pipe and aligning the pi electrofusion mach working pressure a into the trenches a before back filling appliances etc., co Outside Diameter	es (IS : 49 ipes, elect nines, test and after t lready ma and level mplete bu Pipes.	984) on land ro-fusion we ing the pipel esting, align ide, testing the lling the trend it excluding of	portion inclu elding using a ine thus fabri ing the pipeli he line to suit ches includir cost of pipe a	ding convey automatic or icated to suit ine, lowering able pressure g all labour and fittings: 6	ing within semi-auto the hydra the pipe with pot charge, hi 530mm No	initial lead matic ulic in position able water re for ominal				
	Laying HDPE pip	es - Dia 6	30 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 Quant	tity in no	5.000				
4.017	100.98.473										
	Supply of CI Doul Valve with Cap Pl	ole Flange N 1.0, Siz	ed Sluice Val e 200mm.	ve Conformi	ng to IS 148	46 - 2000	, Sluice				
	Supply of CI Dou	ble Flang	ed Sluice Va	lve							
	Size 200 mm	1					1.000				
	Total						1.000				
				,	Total Quant	tity 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 Doul	ipply of CI Double Flanged Sluice Valve									
	Size 300 mm	1	65	220			1.000				
	Total										
	Total Quantity in no										
4.019	100.98.479										
	Supply of CI Doul Valve with Cap Pl	ole Flange N 1.0, Siz	ed Sluice Val e 500mm.	ve Conformi	ng to IS 148	46 - 2000	, Sluice				
	Supply of CI Dou	ble Flang	ed Sluice Va	lve		808					
	Size 500 mm	1					1.000				
	Total						1.000				
				,	Total Quant	tity in no	1.000				
4.020	100.98.480										
	Supply of CI Doul Valve with Cap Pl	ole Flange N 1.0, Siz	ed Sluice Val e 600mm.	ve Conformi	ng to IS 148	46 - 2000	, Sluice				
	Supply of CI Dou	ble Flang	ed Sluice Va	lve		T					
	Size 600mm	1					1.000				
	Total						1.000				
				,	Total Quant	tity 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										
				,	Total Ouant	tity in no	5.000				

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
4.022	100.31.2.5									
	Conveying and fix insertions etc., cor will be paid separa	ting C.I. s nplete, bu ately): 200	luice valves t excluding t Imm diamete	(with cap) by he cost of the er, Class II.	y providing b e valve (tail p	olts, nuts, pieces, if 1	rubber required,			
	Conveying and fi	ixing C.I.	sluice valves	5						
	Size 200 mm	1					1.000			
	Total						1.000			
				,	Total Quant	ity 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	Size 300 mm 1 1.000								
	Гоtal 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 Dou	ble Flang	ed Sluice Va	lve		88				
	Size 500 mm	1					1.000			
	Total						1.000			
				,	Total Quant	ity in no	1.000			
4.025	100.31.2.12									
	Conveying and fix insertions etc., cor will be paid separa	ting C.I. s nplete, bu ately): 600	luice valves at excluding t Imm diamete	(with cap) by he cost of the er, Class II.	y providing b e valve (tail p	olts, nuts, pieces, if 1	rubber required,			
	Supply of CI Dou	ble Flang	ed Sluice Va	lve						
	Size 600 mm	1					1.000			
	Total						1.000			
				,	Fotal Quant	ity in no	1.000			
4.026	5.1.3					v				
	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 la excluding the cost	ying in po	osition specif	ied grade of	reinforced ce	ement con	crete,			
	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			
				To	otal Quantity	y in cum	25.000			
4.027	5.9.1									
	Centering and shut footings, bases of	ttering ind columns,	cluding strutt etc for mass	ing, etc. and concrete	removal of f	orm for:F	oundations,			
	Centering and sh Foundations, footi	uttering i ngs, base	ncluding struss of columns	itting, etc. an	d removal of	form for	:			
	25 4.000 1.000 1.000									
	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		CORSING.	DR.	80.000 000	2000.000			
	Total	1	-1-2	-	-	10	2000.000			
				Total (Quantity in k	cilogram	2000.000			
5	WATER SUPPLY IN PUMPING ST	AND SA	ANATORY A	ARRANGEN	IENTS, ELE	CTRICA	L WIRING			
5.001	OD235712/2022-2	2023								
	Water Supply and	Sanatory	arrangement	s, Electrical	wiring in pur	nping sta	tions			
	Water Supply a	nd Sanato	ry arrangeme	ents, Electric	al wiring in p	oumping s	stations			
		8					8.000			
	Total						8.000			
				,	Total Quant	ity in no	8.000			
6	MECHANICAL, I GENERATOR, TI	ELECTRI RANSFO	CAL-PUMP RMER &am	SETS, GRIT p; ALLIED V	CHAMBER WORKS CO	R SCREE	N,			
6.001	OD252058/2022-2	2023								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	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 & amp; 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 & amp; 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, erec centrifugal submer	tion, testi sible sew	ng and comm	nissioning of pump	self priming	, non clog	5				
	LS 2	4	1.500				6.000				
	LS 6	3	1.500	1200-		-	4.500				
	OF 1	2	1.000	04-1		FI	2.000				
	OF 2	2	1.000	Constant 1	nR/	-	2.000				
	OF 3	2	1.000	3	C		2.000				
	OF 4	2	1.000	$< \ldots$			2.000				
	CW 1	4	10.000	NAM FOR THE	MANAGERAER	IT.	40.000				
	CW 2	4	2.000	n" Antstates			8.000				
	Total						66.500				
			Tota	l Quantity i	n HP (Hors	e power)	66.500				
6.002	OD235714/2022-2	2023									
	Supple and erectio Rs 3 Lakhs/Nos. C Supple and erectio	n of Indo Capacity-2 n of Indo	or Type Gen 25 KVA - 1 N or Type Gen	erator Capac lo. @ 10 Lak erator Capac	ity-1KVA to <u>hs/No.</u> ity-1KVA to	5 KVA -	7 Nos. @				
	Rs 3 Lakhs/Nos. C KVA - 1 No. @ 10	Capacity-5) Lakhs/N	KVA to 10 H lo.	KVA - 1 No.	@ 5 Lakhs/1	No. Capac	eity-25				
		1					1.000				
	Total						1.000				
				r	Fotal Quant	ity in no	1.000				
6.003	OD235715/2022-2	2023									
	Control Room, Ge	nerator R	oom and Cor	npound wall	with gate						
	Control Room, Generator Room and Compound wall with gate										
		8					8.000				
	Total 8.000										
				r	Fotal Quant	ity in no	8.000				
6.004	OD235716/2022-2	2023									

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	Automatic Control	l system									
	Automatic Contro	ol system					0.000				
	For LS and CW	8					8.000				
	Total						8.000				
					Total Quant	tity in no	8.000				
6.005	OD235720/2022-2	2023									
	Supply, delivery a for cleaning the sc hose required for c	nd erection reen chan operating	on of Multistanber,Pumpse the pump .	age force Pur t during serv	np 600LPM icing with 16	X 30M he 5 m of 20	ad suitable mm dia				
	Supply, delivery suitable for cleaning	and erecting the scr	tion of Multisteen chamber	stage force P ,Pumpset du	ump 600LPN	M X 30M g with 16	head m				
	For CWs , LSs , OFs	8					8.000				
	Total			SEL.			8.000				
	Total Quantity in set										
6.006	OD235721/2022-2	D235721/2022-2023									
	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		K WORKS	MANDADADA	0	2.000				
	Total						2.000				
				r	<u>Fotal Quant</u>	ity in set	2.000				
6.007	OD235722/2022-2	2023									
	Supply and deliver isolating valves	ry of Diap	ohragm type	pressure gau	ge with neces	ssary S.S	tubes and				
	Supply and delive isolating values	ery of Dia	aphragm type	e pressure ga	uge with nec	essary S.S	tubes and				
	For CWs , LSs , OFs	8					8.000				
	Total						8.000				
				I	Total Quant	tity in no	8.000				
6.008	OD235723/2022-2	2023									
	Supply and deliver	ry of spar	e parts for pu	imps,motors	and starter for	or mainter	nance.				
	Supply and delive	ery of spa	re parts for p	oumps,motor	s and starter	for mainte	enance.				
		8					8.000				
	Total						8.000				
					Total Quant	tity in no	8.000				
6.009	OD256786/2022-2	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 F	low meter	r,pressure an	d quality sen d quality sens	sors- Supply sors compati	and erect	ion of				
	CWs , LSs , OFs	8	•		•		8.000				
	Total						8.000				
				,	Total Ouant	tity 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.										
	end spanners, ring spanners, screw drivers, electrical megger, Tong testers, hand gloves etc.										
	CWs, LSs, OFs 8 8 8.000										
	Total						8.000				
	Total Quantity in set 8.000										
6.011	OD235726/2022-2	2023	Sec. Construction	of Assessing							
	Supply, delivery a Fire extinguisher of stand 5no's boards including s	nd erectin of 5 Kg ca s III. Ele tarter pan	ng of followin pacity (powo ectric quality els	ng safety iten der type 2 no Rubber mat	ns ,including 's) II. to be laid in	cost of sa Fire b front of a	ame. I. buckets with ll the panel				
	Supply, delivery	and erect	ing of follov	ving safety it	ems ,includii	ng cost of	same				
	CWs , LSs , OFs	8					8.000				
	Total						8.000				
				,	Total Quant	tity in no	8.000				
6.012	OD235730/2022-2	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 fixing across the s	g of stainl creen cha	ess steel scre mber	en made of b	oars of size 5	0 mm x 1	0 mm for				
	For CWs , LSs , OFs	8					8.000				
	Total						8.000				
				,	Total Quant	tity in no	8.000				

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
6.013	OD235731/2022-2	2023								
	Supply, delivery, operated pulley blo traveling trolley fo dia+3m) meters or Pumps and special	erecting ock hoist or a clear l suitable s from tru	and maintena with mono ra lift according design for era acks.	ance of 2 ton ail traveling of g to site condi- ection and ea	or suitable c on single girc ition for a tra sy loading a	apacity ha ler with o wel of 9 (nd unload	nd ver head well ing of			
	Supply , delivery operated pulley blo traveling trolley fo	, erecting ock hoist or a clear l	g and mainter with mono ra ift according	nance of 2 to ail traveling of to si	n or suitable on single girc	capacity h ler with o	nand ver head			
	For CW1 and CW2	2					2.000			
	Total						2.000			
				,	Total Quant	tity in no	2.000			
6.014	OD256787/2022-2	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		Section 1	DRA	FI	8.000			
	Total 8.000									
	Total Quantity in 1 nos 8.000									
6.015	OD256926/2022-2023									
	Wiring & amp; amp; 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 & amp; amp with earthwire wit and fitting	o; Lightin h required	g accessories l sizes of FR	s :- Wiring fo LS PVC insu	r circuit/subi llated copper	main wirii conducto	ng along r,supply			
	CWs , LSs , OFs	8					8.000			
	Total						8.000			
				,	Total Quant	tity in no	8.000			
7	LINE EXTENSIO	N, DEPO	SIT TO KSH	EB, ETC						
7.001	OD235689/2022-2	2023								
	Line extension, D	eposit to	KSEB, etc							
	line extension,	Deposit to	o KSEB, etc							
	CW and LS	8					8.000			
	Total						8.000			
				,	Total Quant	tity in no	8.000			
8	SEWERAGE SER	VICE CO	ONNECTION	N CHARGES	5					
8.001	OD235711/2022-2	2023								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity			
	Sewer service contand labour charges	nection cl	narges includ	ing connecti	on deposite f	ee and all	materials			
	Sewer service con and labour charges	nnection a	charges inclu	ding connect	tion deposite	fee and a	ll materials			
	Sewer service connection including D/ND	690					690.000			
	Total						690.000			
					Total Quant	tity in no	690.000			
9	PWD & NH - BM&BC ROAD REFORMATION WORK WITH 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			
				Т	otal Quantit	y 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 Macadam	, spreadir	ig and compa	acting graded	l stone aggre	gate to W	et Mix			
	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			
				Te	otal Quantit	y 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	DRI	FT	4615.400			
	NH BMBC - HDD - Sewer lines from 225 mm to 630 mm@ 1129.8 M	38	2.000	2.000	L.C.		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			
				Te	otal Quantit	y in sqm	5811.100			
9.004	5.2.b									
	Providing and app distributor at the racicleaned with mech	lying tack ate of 0.25 anical bro	coat with bi 5 - 0.30 kg pe oom.	tumen emuls er sqm on the	sion (RS) usi e prepared G	ng emulsi ranular Su	on pressure irface			
	Providing and ap	oplying ta	ck coat with	bitumen emu	ulsion (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			

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	PM - NH BMBC	1	475.000	1.500			712.500
	Total						9397.100
				Т	otal Quantit	y in sqm	9397.100
9.005	5.3.2.a						
	Providing and layi an average output premixed with a bi previously prepare alignment and roll For Grading II - (1	ng bitumi of 75 tonr ituminous ed surface ed as per 9 mm nor	nous macada nes per hour binder (VG with paver f clauses 501.6 minal size)	um with 80-1 using crushe 30), transpor inisher to the 5 and 501.7 t	00 TPH hot d aggregates rted to the sit required gra o achieve the	mix plant of specifi e, laid ove ade, level, e desired o	producing ed grading er a and compaction
	Providing and la	ying bitur	ninous maca	dam			
	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	FT	11.875
	IC to MH - NH BMBC	1	1016.000	1.500	0.050	1	76.200
	PM - NH BMBC	1	475.000	1.500	0.050	0	35.625
	Total						469.855
				To	otal Quantit	y in cum	469.855
9.006	5.2.a						
	Providing and app distributor at the ra cleaned with mech	lying tack ate of 0.20 anical bro	coat with bi) - 0.30 kg pe oom.	tumen emuls er sqm on the	sion(RS) usi e prepared bi	ng emulsi tuminous	on pressure surface
	Providing and ap	plying ta	ck coat with	bitumen emu	ulsion(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
				Т	otal Quantit	y in sqm	9397.100

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity		
9.007	5.6.2.a								
	Providing and layi an average output premixed with a b transporting the ho sensor control to the wheeled, vibratory MORTH specification mm Nominal Size	ng bitumi of 75 toni ituminous ot mix to v he require and tand tion claus	nous concret nes per hour binder(NRI work site, lay d grade, leve em rollers to se No. 507 co	e with 80-10 using crushed MB) @ 5.4 p ing with a hy l, and alignn achieve the omplete in all	0 TPH hot n d aggregates ercent of mix drostatic par nent, rolling desired comp respects For	nix plant p of specifi x and fille ver finishe with smoo paction as r Grading	oroducing ed grading, rr, er with oth per - II (13.2		
	Providing and la	ying bitur	ninous conci	rete					
	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	ET	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								
			OF PUBU	CWORKS TO	otal Quantit	y in cum	281.913		
9.008	8.13								
	Providing and layi reflectorising glass thickness of 2.5 m finished surface to	ng of hot s beads or m is exclu be level,	applied thern Bituminous sive of surfa uniform, and	noplastic con Surface @ 2 ace applied gl I free from st	npound 2.5 1 250 gms per s lass beads as reaks and ho	mm thick sqm area, per IRC: lles.	including the 35. The		
	Providing and layi	ng of hot	applied ther	noplastic cor	npound				
	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								
				То	otal Quantit	y in sqm	387.470		
9.009	8.35								

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity				
	Providing and fixi category A' 1 conforming to AS' when tested in acc D 788, and reflect fixing with adhesi performance as pe Reflector :-	ng reflect made out TM D 428 ordance v ivity confe ve etc. wit r clause 8	ive road stud of ASA/HIP 30, strong en- vith ASTM I orming to cla th 2 years wa 04.7.3 <bra< td=""><td>s (Raised Par S/ABS moule ough to supp 0 4280, reflec use 804.4. ir wranty for the > Road M</td><td>vement Mark ded body wit ort a load of ctive panel co acluding insta e road stud a farkers/Road</td><td>ter) of &# th shanks more that onfirming allation, d s well as the Stud with</td><td>39; and 13.635 T to ASTM rilling, for in field Lense</td></bra<>	s (Raised Par S/ABS moule ough to supp 0 4280, reflec use 804.4. ir wranty for the > Road M	vement Mark ded body wit ort a load of ctive panel co acluding insta e road stud a farkers/Road	ter) of &# th shanks more that onfirming allation, d s well as the Stud with	39; and 13.635 T to ASTM rilling, for in field Lense				
	Providing and fix	ing reflect	tive road stud	ls							
	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										
	Total 1266.000										
	Total Quantity in no 1266.00										
10	PWD - BT ROAD REFORMATION WORK WITH MORTH SPECIFICATION										
10.00	4.2.A.1	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 s	ub-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										
10.00	4.12										
2	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 Macadam	g, spreadi	ng and comp	acting grade	d stone aggre	egate to W	et Mix			
	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									
	Total Quantity in cum									
10.00	5.1.a									
3	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		506.300	2.000	ANNA SEMEN	m //	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			
				T	otal Quantit	y in sqm	1301.800			
10.00	5.2.b									
4	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 ap	oplying ta	ck coat with	bitumen emu	ulsion (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		
				T	otal Quantit	y in sqm	1995.400		
10.00	5.7.1								
	thickness composed of 11.2 mm to 0.09 mm (Type-A) aggregates using viscosi grade bitumen (VG - 30) to the required line, grade, and level to serve as wear 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 Sm wheeled roller 8-10 tonne capacity, and finishing to the required level and grad Providing laying and rolling of close-graded premix surfacing material of 20								
	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	PE		1518.900		
	PWD BT- HDD- Sewer lines from 225 mm to 630 mm @ 80.4 m	4	2.500	2.500	BAANAGEBAER		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		
				T	otal Quantit	y in sqm	1995.400		
10.00	5.8.a								
6	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		
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	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		
				Te	otal Quantit	y in sqm	1995.400		
11	MUNICIPALITY SPECIFICATION	(BT) RO	AD REFORM	MATION W	ORK WITH	MoRD			
11.00	4.1.A.1								
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-b	Granular Sub-base							
	MT BT - Open Cut - Sewer lines from 225 mm to 630 mm	1	3120.400	2.000	0.200	11 11 17	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		
				Тс	otal Quantit	y in cum	1677.280		
11.00	4.9								
2	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 Macad	am							

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
11.00	5.1.1a						
3	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		11 17	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
				Т	otal Quantit	y in sqm	8386.400
11.00	5.2.3a						
4	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 Provi	ding and a	applying tack	c coat with B	itumen emul	sion (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						13838.20 0		
				То	otal Quantit	y in sqm	13838.20 0		
11.00	5.9.1.2a								
	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 Op grade/modified bit	en-Gradeo umen) Bi	l Premix Car nder - Bitum	p <mark>et u</mark> sing Bit en S-65	cuminous (pe	enetration			
	MT BT - Open Cut - Sewer lines from 225 mm to 630 mm	1	3120.400	3.000		00	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						13838.20 0		
	Total Quantity in sqm								
11.00	5.12.A.3.2a								
6	Seal Coat - Manua sealing the voids in fall using Type A, By Manual Means	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 - Man	ual Means	<u>s - Type C - I</u>	Bitumen S-65	5				

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						
	Total Quantity in sqm						
12	HARBOUR DEPT ROAD REFORMATION WORK WITH MoRD SPECIFICATION						
12.00	4.1.A.1			100		FI	
1	Granular Sub-base Place Method < material, spreading by mix in place mo roller to achieve th 401. (i)	with We br> Co g in unifor ethod with he desired For Grac	Il Graded Ma onstruction o rm layers wit n rotavator at density, com ling I Materia	terial (Table f granular su h motor grad OMC, and c pplete as per ' al	400.1) < b-base by pr ler on prepar compacting v Technical Sp	or> (A) oviding w ed surface vith smoo pecificatio) By Mix in rell graded e, mixing th wheel on Clause
	Granular Sub-bas	e with We	ell Graded M	aterial			
	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						
	Total Quantity in cum						313.000
$12.00 \\ 2$	4.9						

SI No	Specification	No	Length	Width	Depth	Cf	Quantity	
	wet Mix Macadam & t, br> 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 & amp; 400.12 and Technical Specification Clause 406. By Mechanical Means with 1 km lead Wet Mix Macadam							
	Wet Mix Macada	m						
	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	A L	35.840	
	Total				a series		313.000	
		1.00		Το	tal Quantit	y in cum	313.000	
3	J.1.1a		ort Attra	NAME OF TAXABLE	SAANA GERAEN	er		
3	Prime Coat :- Low bitumen emulsion road surface and s means as per Tech Prime Coat :- Lo bitumen emulsion	y porosity (SS-1) on praying pr nical Specture w porosity (SS-1)	 P prepared sur- imer at the ra- cification Cla 	roviding and face of gran ate of 0.70-1 use 502 Providing an	applying pri ular base inc .0 kg/sqm us d applying p	imer coat luding cle ing mech rimer coa	with eaning of anical t with	
3	Prime Coat :- Low bitumen emulsion road surface and sy means as per Tech Prime Coat :- Loy bitumen emulsion Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm	y porosity (SS-1) on praying pr nical Spec w porosity (SS-1) 1	 P prepared sur imer at the ra cification Cla 670.900	roviding and face of gram ate of 0.70-1 use 502 Providing an 2.000	applying pr ular base inc .0 kg/sqm us d applying p	imer coat luding cle ing mech rimer coa	with eaning of anical at with 1341.800	
	Prime Coat :- Low bitumen emulsion road surface and s means as per Tech Prime Coat :- Loo bitumen emulsion Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm Harbour Dept Road - HDD - Sewer lines from 225 mm to 630 mm @ 320m	y porosity (SS-1) on praying pr nical Spec w porosity (SS-1) 1	 P prepared sur- imer at the ra- cification Cla 670.900 2.000	roviding and face of gran ate of 0.70-1 use 502 Providing an 2.000 2.000	applying pri ular base inc .0 kg/sqm us d applying p	imer coat luding cle ing mech rimer coa	with eaning of anical t with 1341.800 44.000	
	Prime Coat :- Low bitumen emulsion road surface and s means as per Tech Prime Coat :- Loo bitumen emulsion Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm Harbour Dept Road - HDD - Sewer lines from 225 mm to 630 mm @ 320m IC TO MH - Harbour Dept Road	y porosity (SS-1) on praying pr nical Spec w porosity (SS-1) 1 11	 P prepared sur- imer at the ra- cification Cla / 670.900 2.000 256.000	roviding and face of gram ate of 0.70-1 use 502 Providing an 2.000 2.000 0.700	applying pr ular base inc .0 kg/sqm us d applying p	imer coat luding cle ing mech orimer coa	with eaning of anical at with 1341.800 44.000 179.200	
	Prime Coat :- Low bitumen emulsion road surface and sy means as per Tech Prime Coat :- Loy bitumen emulsion Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm Harbour Dept Road - HDD - Sewer lines from 225 mm to 630 mm @ 320m IC TO MH - Harbour Dept Road Total	y porosity (SS-1) on praying pr nical Spec w porosity (SS-1) 1 11	 P prepared sur- imer at the ra- cification Cla / 670.900 2.000 256.000	roviding and face of gram ate of 0.70-1 use 502 Providing an 2.000 2.000 0.700	applying pr ular base inc .0 kg/sqm us d applying p	imer coat luding cle ing mech rimer coa	with eaning of anical it with 1341.800 44.000 179.200 1565.000	
	Prime Coat :- Low bitumen emulsion road surface and sy means as per Tech Prime Coat :- Loy bitumen emulsion Harbour Dept Road - Open Cut - Sewer lines from 225 mm to 630 mm Harbour Dept Road - HDD - Sewer lines from 225 mm to 630 mm @ 320m IC TO MH - Harbour Dept Road Total	y porosity (SS-1) on praying pr nical Spec w porosity (SS-1) 1 11	 P prepared sur- imer at the ra- cification Cla / 7 670.900 2.000 256.000	roviding and face of gram ate of 0.70-1 use 502 Providing an 2.000 2.000 0.700	applying pri ular base inc .0 kg/sqm us d applying p	y in sqm	with eaning of anical at with 1341.800 44.000 179.200 1565.000 1565.000	

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Tack Coat <br& using emulsion dis granular surfaces t Technical Specific</br& 	zgt;Provid stributor a reated wit sation Cla	ling and appl t the rate of (th primer &a use 503.	ying tack coa).25 to 0.30 k mp; cleaned	at with Bitur (g per sqm o with Hydrau	nen emuls n the prep llic broom	sion (RS-1) pared a as per
	Tack Coat <br&< td=""><td>gt;Provid</td><td>ling and appl</td><td>ying tack coa</td><td>at with Bitur</td><td>nen emuls</td><td>sion (RS-1)</td></br&<>	gt;Provid	ling and appl	ying tack coa	at with Bitur	nen emuls	sion (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		. het			FI	2465.450
	Total Quantity in sqm						2465.450
12.00	5.9.1.2a	100		3			
	grade/modified bit rolling of open-gra mm aggregates eit grade and level to mixing in a suitabl capacity, finished Type A or Type B Case - I By Manua	umen) Bi aded prem her using serve as v le plant, la to require or Type (al Means of	nder - Bitum ix carpet of 2 penetration g vearing cours aying and rol d level and g C as per Tech (I	en S-65 < 20 mm thicking grade bitume se on a previous ling with a the rades to be founded to be unical Specification I) Bitumen (States)	br> Provi ness compos n or emulsio ously prepare ree wheel 8 ollowed by s ication Claus S-65)	ding, layi ed of 13.2 n to requi ed base, in 0-100 kN weal coat o se 508. &	ng and 2 mm to 5.6 red line, ncluding static roller f either lt;br>
	20mm thick Open- grade/modified bit	-Graded F umen) Bi	Premix Carpe nder - Bitum	t using Bitun en S-65	ninous (pene	etration	
	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
				Te	otal Quantit	y in sqm	2465.450

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
12.00	5.12.A.3.2a						
6	Seal Coat - Manua seal coat sealing th and cross fall using 510 A. 65)	l Means - le voids in g Type A, By Manu	Type C - Bi a bituminou Type B and al Means :- C	tumen S-65 & 1s surface laio Type C as po Case - III : Ty	 Pr d to the spec er Technical ype C <br< td=""><td>roviding a ified leve Specifica > (II) I</td><td>nd laying ls, grade tion Clause Bitumen (S-</td></br<>	roviding a ified leve Specifica > (II) I	nd laying ls, grade tion Clause Bitumen (S-
	Seal Coat - Manua	l Means -	Type C - Bi	tumen 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	DRI	FT	384.000
	Total				er	-	2465.450
		100		Т	otal Quantit	y in sqm	2465.450
13	INTERCEPTION	AND DI	VERSION W	VORK	MANAGEMAN	17	
13.00	2.8.1	_	OF PUBU	C WORKS			
1	Earth work in exca in foundation trend including dressing out the excavated s of 50 m.All kinds	avation by ches or dr of sides a soil and d of soil	w mechanical ains (not exc and ramming isposal of sur	means (Hydr eeding 1.5 m of bottoms, plus excavat	raulic excava in width or lift up to 1.5 red soil as dir	ator) /man 10 sqm or m, includ rected, wi	ual means 1 plan), ling getting thin a lead
	Earth work in exc	avation b	y mechanical	means			
	OF 1,2,3,4	4	5.000	1.500	1.300		39.000
	Total						39.000
				Το	otal Quantity	y in cum	39.000
13.00	4.1.8						
2	Providing and layi of centering and sh sand : 8 graded sto	ng in posi nuttering - ne aggreg	ition cement - All work up gate 40 nomin	concrete of s to plinth lev nal size)	pecified grad el:1:4:8 (1 c	le excludi ement : 4	ng the cost coarse
	Providing and lay	ing in pos	sition 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
13.00 3	4.1.5						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and layi of centering and sl sand : 6 graded sto	ng in posi nuttering - one aggreg	tion cement All work up gate 20 mm n	concrete of s to plinth lev cominal size)	pecified grad vel:1:3:6 (1 c	de exclud ement : 3	ing the cost coarse
	Providing and la	ying in po	sition cemer	nt concrete			
	OF 1,2,3,4 Drain wall	8	5.000	0.150	1.000		6.000
	Total						6.000
				То	otal Quantit	y in cum	6.000
13.00	4.1.3						
4	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						
			10	To	otal Quantity	y in cum	1.000
13.00	5.1.2					-	
	Providing and layi excluding the cost to plinth level:1:1: nominal size	ng in posi of centeri 5:3 (1 cer	tion specifie ng, shutterin nent 1.5 coar	d grade of re ig, finishing a rse sand :3 gr	inforced cen and reinforce aded stone a	ement conce ement - A ggregate	rete, ll work up 20 mm
	Providing and layi	ng in posi	tion specifie	d grade of re	inforced cen	nent conci	cete,
	OF 1,2,3,4 Drain Slab	4	5.000	1.300	0.150		3.900
	Total						3.900
				То	otal Quantit	y in cum	3.900
13.00	5.9.2						
6	Centering and shu thickness) includir	ttering inc	luding strutt d pilasters, b	ing, etc. and utteresses, pl	removal of f	orm for:W	Valls (any s etc.
	Centering and shu	ttering					
	OF 1,2,3,4 Drain wall	16	5.000		1.000		80.000
	Total						80.000
				Te	otal Quantit	y in sqm	80.000
13.00	5.9.3						
7	Centering and shu floors, roofs, landi	ttering inc ngs, balco	cluding strutt	ing, etc. and ess platform	removal of f	orm for:S	uspended
	Centering and shu	ittering		· · · · · ·			
	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	
				Т	otal Quantit	y in sqm	32.000	
13.00	5.22.6							
8	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			85.000 000	331.500	
	Total						331.500	
				Total Q	Quantity in l	kilogram	331.500	
13.00	OD264189/2022-2	2023						
9	Supplying and fixi	ng Mecha	anical gates	1200-		-		
	Supplying and fixi	ng Mecha	anical gates			CE L	1	
	OF 1,2,3,4	2	4.000	New York	In KA		8.000	
	Total		" 	3-11	C-		8.000	
					Fotal Quant	tity in no	8.000	
				Article starting, while	CONTRACTOR AND			

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 NETWOR	K						
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	18762.600met re	@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	11851.150sq m	@363.19/sqm	4304219.17				
1.003	100.8.2							
	Fencing 1.50m high with two rows coir yarn on vertical casuarina pole	of casuarina po (girth 15cm to 2	les (girth 15cm to 24 24cm) fixed at 1.5m	cm) tied with intervals.				
	Net Total	2814.390metr e	@96.75/metre	272292.23				
1.004	100.8.1							
	Fencing one side of trenches, 1.50n tape in vertical casuarina pole (girth	n height with tw 15cm to 24cm	o rows of 10cm plas) fixed at 2m interva	tic caution ls.				
	Net Total	6566.910metr e	@28.15/metre	184858.52				
1.005	100.1.1							
	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 wid sockets, and dressing of sides, ramm getting out the excavated soil, and t exceeding 20cm in depth, including watering, etc., and disposing of surp m, in Ordinary Rock.	Ith for pipes, ca ning of bottoms hen returning th consolidating e plus excavated s	bles, etc., including , depth up to 1.5m, i le soil as required, in each deposited layer soil as directed, with	excavation for ncluding layers not by ramming, in a lead of 50			
	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	(16A)					
	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, w strutting, shoring and packing cavit (Measurements to be taken of the fa exceeding 4.5 m	ells, cesspits, m ies (wherever re ice area timbere	anholes and the like equired) etc. complet d).Depth exceeding	including e 3 m but not			
	Net Total	7507.440sqm	@222.59/sqm	1671081.07			
1.010	2.23						
	Extra for planking and strutting in c position (Face area of the timber pe	ppen timbering i rmanently left t	f required to be left o be measured).	permanently in			
	Net Total	1188.954sqm	@971.90/sqm	1155544.39			
1.011	OD235696/2022-2023						
	Supplying, Providing bedding with laid wherever necessary with all lea	m sand for sew d and lift.	er lines as per specif	ications to be			
	Net Total	99.080cum	@2303.87/cum	228267.44			
1.012	4.1.3						
	Providing and laying in position cen cost of centering and shuttering - A sand (zone-III) : 4 graded stone agg	ment concrete o ll work up to pli regate 20 mm n	f specified grade exc inth level:1:2:4 (cem ominal size)	eluding the ent : 2 coarse			
	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 p conveyance to the site, erecting, dis cost of fuel lubricating oil and other	pump set above a mantling and ta	5HP up to 10HP incl king back of engine taff etc., complete.	uding and pump,
	Net Total	596.800Kwh	@18.60/Kwh	11100.48
1.014	100.7.3			
	Bailing out water with engine and p conveyance to the site, erecting, dis cost of fuel lubricating oil and other	pump set above mantling and ta r stores pay of s	10HP up to 20HP ind king back of engine taff etc., complete.	cluding and pump,
	Net Total	1790.400Kwh	@9.29/Kwh	16632.82
1.015	100.7.4			
	Bailing out water with engine and p conveyance to the site, erecting, dis cost of fuel lubricating oil and other	pump set above f mantling and ta r stores pay of s	20HP up to 30HP ind king back of engine taff etc., complete.	cluding and pump,
	Net Total	2984.000Kwh	@6.19/Kwh	18470.96
1.016	100.98.226	(ROAD)		5
	Supply of PVC Pipe, 8kg/cm2, 160	mm Dia.	GAL	-
	Net Total	2776.000metr e	@935.01/metre	2595587.76
1.017	OD235697/2022-2023			
	Conveying to site, lowering into tre holding clamps, 160mm PVC SN 8 conforming to I.S.15328, including approved methods with rubber gask cost of gasket, to correct line, de w providing bedding for pipe line trem line to the required test pressure as watching, providing caution boards the pipes including hire for all tools following diamters	nches, laying to (8 Kg/Cm2) S jointing the pip tet for flexible ju atering with all thes with availa per IS, CPHEEO etc. wherever r s etc complete ir	correct line and grad & amp; S Sewerage p es using rubber rings bints as per specifical rates of recuperation able earth, hydraulic O specifications, ligh equired, during layin including commission	de using CC bipes s as per tion including etc, testing the ting, ig and jointing ing for the
	Net Total	2776.000metr e	@214.39/metre	595146.64
1.018	OD235698/2022-2023			
	Supply of PE Pipe PE 100 (IS 1433 Outer Dia.	3/ sewerage pip	e with latest IS), 8kg	g, 225mm
	Net Total	5612.700metr e	@1349.57/metre	7574731.54
1.019	OD235699/2022-2023			
	Supply of PE Pipe PE 100 (IS 1433 Outer Dia.	3/ sewerage pip	e with latest IS), 8kg	g, 280mm
	Net Total	279.000metre	@2087.37/metre	582376.23
1.020	OD235700/2022-2023			
	Supply of PE Pipe PE 100 (IS 1433	3/ sewerage pip	e with latest IS), 8kg	g, 355 mm

Sl No	Specification	Quantity	Rate	Amount
	Outer Dia.			
	Net Total	1048.600metr e	@3475.43/metre	3644335.90
1.021	OD235701/2022-2023			
	Supply of PE Pipe PE 100 (IS 1433 Outer Dia.	3/ sewerage pip	e with latest IS), 8kg	g, 450 mm
	Net Total	405.300metre	@6779.87/metre	2747881.31
1.022	OD239661/2022-2023			
	Supply of PE Pipe PE 100 (IS 4984	/1995), 8kg, 56	Omm Outer Dia.	
	Net Total	558.100metre	@10812.75/metr e	6034595.78
1.023	OD239660/2022-2023			
	Supply of PE Pipe 100 (IS 4984/19	95), 8kg, 630mr	n Outer Dia.	
	Net Total	1766.600metr e	@13672.04/metr e	24153025.8
1.024	100.10.8		DAF	
	working pressure and after testing, into the trenches already made, test before back filling and levelling the appliances etc., complete but exclud Outside Diameter Pipes.	aligning the pipe ing the line to su trenches includ ding cost of pipe	eline, lowering the p uitable pressure with ling all labour charge e and fittings: 225mm	ipe in position potable water e, hire for n Nominal
	Net Total	4963.400metr e	@379.69/metre	1884553.35
1.025	100.10.10			
	Laying HDPE pipes (IS : 4984) on lead and aligning the pipes, electro- electrofusion machines, testing the working pressure and after testing, into the trenches already made, test before back filling and levelling the appliances etc., complete but exclue Outside Diameter Pipes.	land portion inc fusion welding pipeline thus fal aligning the pipe ing the line to su trenches includ ding cost of pipe	luding conveying wi using automatic or so pricated to suit the hy eline, lowering the p uitable pressure with ling all labour charge e and fittings: 280mm	thin initial emi-automatic ydraulic ipe in position potable water e, hire for n Nominal
	Net Total	69.000metre	@523.02/metre	36088.38
1.026	100.10.12			
	Laying HDPE pipes (IS : 4984) on lead and aligning the pipes, electro- electrofusion machines, testing the working pressure and after testing, into the trenches already made, test before back filling and levelling the appliances etc., complete but exclud Outside Diameter Pipes.	land portion inc fusion welding pipeline thus fal aligning the pipe ing the line to su trenches includ ding cost of pipe	luding conveying wi using automatic or se pricated to suit the hy eline, lowering the p uitable pressure with ling all labour charge e and fittings: 355mm	thin initial emi-automatic ydraulic ipe in position potable water e, hire for n Nominal
	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 lead and aligning the pipes, electro- electrofusion machines, testing the working pressure and after testing, into the trenches already made, test before back filling and levelling the appliances etc., complete but exclude Outside Diameter Pipes.	land portion inc fusion welding pipeline thus fal aligning the pip ing the line to su trenches incluce ding cost of pipe	luding conveying wi using automatic or s bricated to suit the h eline, lowering the p uitable pressure with ling all labour charge and fittings: 560mr	ithin initial emi-automatic ydraulic ipe in position potable water e, hire for n Nominal
1.020	Inet Total	331.000metre	@991.58/metre	328807.93
	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			
	Net Total	128.900metre	@1102.31/metre	142087.76
1.030	OD235702/2022-2023			
	Constructing inspection chambers of RCC M20 using 20mm broken stor broken stone for removable cover s using 20mm broken stone for leveli excavation in all classes of soil, , pl neat cement flush coat, providing n sewer, providing provision for conr conveying, lifting, placing the cove and disposing the surplus earth with specifications , including the cost o resistant cement shall be used for th	of size 0.45x0.45 the for floor slab lab, Brick work ing course below astering the insi eccessary slope i hecting main sew r slab in position h all lead and lif f reinforcement the the construction	5m (inside) and 0.45 ,RCC M20 slab usin in CM 1:6 for walls v foundation includin ide with CM 1:3, 9m n the benching towa wer and service conn n by suitable means, t as per drawings and , testing the chambe on of inspection cha	m deep with g 20mm , PCC 1:4:8 ng earth work m thick with rds main ections, conveying d r and sulphate mber
1.021	Net Total	1/4.000no	@30/3.91/n0	039200.34
1.031	OD235703/2022-2023	6 : 0 45 0 44	F (1 11) 10 50	1 2.1
	RCC M20 using 20mm broken stor broken stone for removable cover s	of size 0.45x0.45 ne for floor slab lab, Brick work	RCC M20 slab usin, nCC M20 slab usin	m deep with g 20mm , PCC 1:4:8

using 20mm broken stone for levelling course belo excavation in all classes of soil, plastering the inst neat cement flush coat, providing necessary slope sewer, providing provision for connecting main se conveying, lifting, placing the cover slab in positio and disposing the surplus earth with all lead and his	w foundation include de with CM 1:3, 9mi in the benching towa wer and service conn on by suitable means, ft as per drawings and t, testing the chambe	ing earth work m thick with rds main ections, conveying d r and sulphate		
specifications, including the cost of reinforcement resistant cement shall be used for the the construct	0707600/	IIIDEI		
Net Total 104.000no	@7276.80/no	756787.20		
1.032 OD235704/2022-2023				
Constructing inspection chambers of size 0.60x0.6 RCC M20 using 20mm broken stone for floor slab broken stone for removable cover slab, Brick work using 20mm broken stone for leveling course belo excavation in all classes of soil, plastering the insi- neat cement flush coat, providing necessary slope sewer, providing provision for connecting main se conveying, lifting, placing the cover slab in position and disposing the surplus earth with all lead and li specifications, including the cost of reinforcement resistant cement shall be used for the the construct	0m (inside) and 0.60 ,RCC M20 slab usin c in CM 1:6 for walls w foundation includin de with CM 1:3, 9mn in the benching towa wer and service conn on by suitable means, ft as per drawings and c, testing the chambe ion of inspection cha	m deep with g 20mm , PCC 1:4:8 ng earth work n thick with rds main ections, conveying d r and sulphate mber		
Net Total 139.000no	@7472.82/no	1038721.98		
1.033 OD235705/2022-2023				
Constructing inspection chambers of size 0.60x0.6 RCC M20 using 20mm broken stone for floor slab broken stone for removable cover slab, Brick work using 20mm broken stone for leveling course belo excavation in all classes of soil, plastering the insi- neat cement flush coat, providing necessary slope sewer, providing provision for connecting main se conveying, lifting, placing the cover slab in positio and disposing the surplus earth with all lead and li specifications, including the cost of reinforcement resistant cement shall be used for the the construct	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 0.60x0.6 RCC M20 using 20mm broken stone for floor slab broken stone for removable cover slab, Brick work using 20mm broken stone for leveling course belo excavation in all classes of soil, plastering the insi- neat cement flush coat, providing necessary slope sewer, providing provision for connecting main se conveying, lifting, placing the cover slab in position and disposing the surplus earth with all lead and li specifications, including the cost of reinforcement resistant cement shall be used for the the construct	Om (inside) and 0.90 ,RCC M20 slab using in CM 1:6 for walls w foundation including de with CM 1:3, 9mn in the benching towa wer and service conno on by suitable means, ft as per drawings and t, testing the chambe	m deep with g 20mm , PCC 1:4:8 ng earth work n thick with rds main ections, conveying d r and sulphate mber		

Sl No	Specification	Quantity	Rate	Amount
1.035	OD235707/2022-2023			
	Installation of PE pipe between 110mm & amp; 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	5 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			
1.037	OD235709/2022-2023 Installation of PE -355mm-500mm method in all types of soil above /bc main including preparing and settin work, testing and commissioning ex all related civil /mechanical works l drilling stringing, reaming, pulling monitoring by approved guidance s drilling fluid /bentonite slurry. Prop material as per specification approv charge. Also using Ground penetrat utilities on the map of corridor with various utilities detected. Work to b antenna or latest for the best possible testing	mm dia PE pipe elow water table g up the plant a kcluding cost of like entry /exits back the new pi ystem. wastage ber back filling p red method state ing radar survey information of be conducted usi le resolution and	e by horizontal directer of or pumping /gravind equipment, instal pipe (6 m line pipe) pit as necessary. Dep per on the designed a of pipes, proper disposit and holes by appre- ement or as directed by in corridor with to locations and depths ing 500MHZ and 300 d penetration includi	tional drilling ty /distribution ling new pipe with butt joint watering, lignment and bosal of oved borrow by engineer in detect buried s to the top of 0MHZ ng hydraulic

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/metr e	2793906.95	
1.039	OD239701/2022-2023				
	Installation of PE -630 mm-710 mn method Installation of HDPE -630 n directional drilling method -Add 20 610 mm mm dia PE pipe by horizon	n mm dia PE pij mm-710mm mm 0% increase to th ntal directional	pe by horizontal dire n dia PE pipe by hor he Installation of HD drilling method	ctional drilling izontal PE -550 mm-	
	Net Total	1637.700metr e	@14802.16/metr	24241497.4	
		allen.	Heading Total(Rs)	107182083. 83	
2	CONSTRUCTION OF MANHO	LES	EDAF		
2.001	100.3.1.1		1000		
	Earthwork in open well excavation all kinds of soil and conveying and lift up to 1.5m including neat banki	(above water) f depositing the s ng.	or wells of diameter spoil within initial lea	up to 2.50m in ad of 50m and	
	Net Total	3145.067cum	@535.88/cum	1685378.50	
2.002	100.3.1.2				
	Earthwork in open well excavation all kinds of soil and conveying and lift from 1.5m to 3.0m including ne	(above water) f depositing the s at banking.	for wells of diameter spoil within initial les	up to 2.50m in ad of 50m and	
	Net Total	2815.895cum	@589.48/cum	1659913.78	
2.003	100.3.1.13				
	Earthwork in open well excavation 2.50m in all kinds of soil and conve 50m and lift from 3.0m to 4.5m inc	(in or under wa ying and depos luding neat ban	ter) for wells of dian iting the spoil within king.	neter up to initial lead of	
	Net Total	1574.472cum	@771.68/cum	1214988.55	
2.004	100.3.1.14				
	Earthwork in open well excavation 2.50m in all kinds of soil and conve 50m and lift from 4.5m to 6.0m inc	(in or under wa eying and depos luding neat ban	ter) for wells of dian iting the spoil within king.	neter up to i initial lead of	
	Net Total	330.520cum	@835.98/cum	276308.11	
2.005	100.3.1.15				
	Earthwork in open well excavation 2.50m in all kinds of soil and conversion and lift from 6.0m to 7.5m inc	(in or under wa eying and depos luding neat ban	ter) for wells of dian iting the spoil within king.	neter up to i initial lead of	
	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	11041.528sq m	@753.79/sqm	8322993.39
2.007	100.6.S.1			
	Structural steel work in single section including cutting, hoisting, fixing in steel primer all complete. (excludin	on, fixed with o n position and a g cost of materi	r without connecting pplying a priming co als)	plate, at of approved
	Net Total	3312.458kilo gram	@25.38/kilogram	84070.18
2.008	100.7.1	131		
	Bailing out water with 5HP engine erecting, dismantling and taking ba- and other stores pay of staff etc., co	and pump set in ck of engine and mplete.	cluding conveyance d pump, cost of fuel	to the site, lubricating oil
	Net Total	11876.320Kw h	@37.17/Kwh	441442.81
2.009	100.7.4			
	Bailing out water with engine and p conveyance to the site, erecting, dis cost of fuel lubricating oil and other	bump set above mantling and ta r stores pay of s	20HP up to 30HP in king back of engine taff etc., complete.	cluding and pump,
	Net Total	5729.280Kwh	@6.19/Kwh	35464.24
2.010	4.1.6			
	Providing and laying in position cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	ment concrete o ll work up to pl ate 40 mm nom	f specified grade exc inth level:1:3:6 (1 co inal size)	eluding the ement : 3
	Net Total	314.508cum	@7256.34/cum	2282176.98
2.011	5.37.1			
	Providing and laying in position reacement concrete work, using cemer manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includi proportions as per IS: 9103 to accel	ady mixed M-25 at content as per tching plant and ontinuous agitat reed cement cor f laying, excludi ng cost of admi erate/ retard set	grade concrete for n approved design mi transported to site of ed mixer, manufactur ncrete work including ng the cost of center xtures in recommence ting of concrete, imp	reinforced x, f work in red as per mix g pumping of ing, shuttering led prove

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	27536565.7 3	
2.012	5.34.1				
	Extra for providing richer mixes at specified cement content used is par grade concrete instead of M-25 grad in M-30 is @ 340 kg/cum).	all floor levels. yable/ recoveral le BMC/RMC.	Note:- Excess/less c ble separately.Provid (Note:- Cement cont	ement over the ling M-30 tent considered	
	Net Total	2768.056cum	@82.60/cum	228641.43	
2.013	4.12				
	Extra for providing and mixing wat doses by weight of cement as per m	er proofing mat anufacturer	erial in cement conc 39;s specification .	rete work in	
	Net Total	941139.040kg	@1.35/kg	1270537.70	
2.014	5.22.1	11 R.Q.S.M.	25	T	
	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	32226856.7 1	
2.015	5.9.2	Personal Asperators			
	Centering and shuttering including thickness) including attached pilast	strutting, etc. ar ers, butteresses,	nd removal of form f plinth and string co	or:Walls (any urses etc.	
	Net Total	11632.303sq m	@721.70/sqm	8395033.08	
2.016	5.9.20				
	Centering and shuttering including floors, roofs, landings, balconies an thick	strutting, etc. ar d access platfor	nd removal of form f rm with water proof	or:Suspended ply 12 mm	
	Net Total	486.142sqm	@923.03/sqm	448723.65	
2.017	22.23.1				
	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re tunnels / subway and bridge deck etc., prep integral crystalline slurry : 2 parts w integral crystalline slurry : 1 part was same from negative (internal) side w shall meet the requirements as spec- permeability of concrete by more th DIN 1048 and resistant to 16 bar hy crystalline	stalline slurry o c structures like servior, sewage ared by mixing vater) for vertica ater) for horizon with the help of ified in ACI-212 an 90% company drostatic pressu	f hydrophilic in natu retaining walls of th & amp; water treatm in the ratio of 5 : 2 (al surfaces and 3 : 1 ntal surfaces and app synthetic fiber brush 2-3R-2010 i.e by red red with control condure on negative side.	tre for the basement, thent plant, 5 parts (3 parts lying the the material lucing crete as per The	

Sl No	Specification	Quantity	Rate	Amount
	slurry shall be capable of self-healin shall be carried out all complete as	ng of cracks up per specification	to a width of 0.50mr n and the direction of	n. The work f the
	charge. The product performance sh leakage.For vertical surface two coa	nall carry guaran ats @0.70 kg pe	ntee for 10 years aga er sqm	inst any
	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 & amp; 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			
	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			
	Net Total	486 142sam	@442 30/sam	215020.61
2.019	1371	100111250		210020101
	12 mm cement plaster finished with cement : 3 fine sand)	a floating coat	of neat cement of m	ix:1:3 (1
	Net Total	12976.749sq m	@403.74/sqm	5239232.64
2.020	13.65.1			
	Painting with black anti- corrosive manufacture to give an even shade:	bitumastic paint Two or more co	of approved brand a bats on new work	and
	Net Total	12976.749sq m	@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	1469.202Kilo litre	@185.72/Kilo litre	272860.20
2.022	2.25			
	Filling available excavated earth (ex foundation etc. in layers not exceed layer by ramming and watering, lea	xcluding rock) i ing 20 cm in de d up to 50 m an	n trenches, plinth, si pth, consolidating ea d lift up to 1.5 m.	des of ach deposited

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 t duty) the weight of the cover to be	frame for manhe not less than 10	oles:560 mm diamete 8 kg	er (heavy
	Net Total	347.000each	@8080.96/each	2804093.12
			Heading Total(Rs)	99551310.9 0
3	COLLECTION WELLS, LIFTIN	NG STATIONS	S AND ALLIED WO	ORKS
3.001	100.3.1.1			
	Earthwork in open well excavation all kinds of soil and conveying and lift up to 1.5m including neat banki	(above water) f depositing the s ng.	or wells of diameter spoil within initial lea	up to 2.50m in ad of 50m and
	Net Total	122.719cum	@535.88/cum	65762.66
3.002	100.3.1.2	0.0		
	Earthwork in open well excavation all kinds of soil and conveying and lift from 1.5m to 3.0m including ne	(above water) f depositing the s at banking.	or wells of diameter poil within initial lea	up to 2.50m in ad of 50m and
	Net Total	12 <mark>2.719</mark> cum	@589.48/cum	72340.40
3.003	100.3.1.13			
	Earthwork in open well excavation 2.50m in all kinds of soil and conve 50m and lift from 3.0m to 4.5m inc	(in or under wa eying and depos luding neat ban	ter) for wells of dian iting the spoil within king.	neter up to initial lead of
	Net Total	75.214cum	@771.68/cum	58041.14
3.004	100.3.1.14			
	Earthwork in open well excavation 2.50m in all kinds of soil and conve 50m and lift from 4.5m to 6.0m inc	(in or under wa eying and depos luding neat ban	ter) for wells of dian iting the spoil within king.	neter up to initial lead of
	Net Total	43.544cum	@835.98/cum	36401.91
3.005	100.3.1.15			
	Earthwork in open well excavation 2.50m in all kinds of soil and conve 50m and lift from 6.0m to 7.5m inc	(in or under wa ying and depos luding neat ban	ter) for wells of dian iting the spoil within king.	neter up to initial lead of
	Net Total	43.544cum	@900.29/cum	39202.23
3.006	100.3.3.1			
	Earthwork in open well excavation and up to 3.50m in all kinds of soil initial lead of 50m and lift up to 1.5	(above water) f and conveying m including near	or wells of diameter and depositing the sp at banking.	above 2.5m poil within
	Net Total	68.672cum	@513.78/cum	35282.30
3.007	100.3.3.2			
	Earthwork in open well excavation and up to 3.50m in all kinds of soil	(above water) f and conveying	or wells of diameter and depositing the sp	above 2.5m poil within

Sl No	Specification	Quantity	Rate	Amount
	initial lead of 50m and lift from 1.5	m to 3.0m inclu	ding neat banking.	
	Net Total	68.672cum	@565.16/cum	38810.67
3.008	100.3.3.13			
	Earthwork in open well excavation 2.5m and up to 3.50m in all kinds o within initial lead of 50m and lift fr	(in or under wa f soil and conve om 3.0m to 4.5	ter) for wells of dian eying and depositing m including neat ban	neter above the spoil king.
	Net Total	68.672cum	@739.85/cum	50806.98
3.009	100.3.4.14			
	Earthwork in open well excavation 2.5m and up to 3.50m in ordinary reinitial lead of 50m and lift from 4.5	(in or under wa ock and conveyi m to 6.0m inclu	ter) for wells of dian ing and depositing th ding neat banking.	neter above le spoil within
	Net Total	68.672cum	@2077.53/cum	142668.14
3.010	100.3.4.15			
	Earthwork in open well excavation 2.5m and up to 3.50m in ordinary rethe spoil within initial lead of 50m and 100 methods.	(in or under wa ock in ordinary and lift from 6.(ter) for wells of dian rock and conveying om to 7.5m including	neter above and depositing neat banking.
	Net Total	68.672cum	@2237.34/cum	153642.61
3.011	100.3.4.16		and the second second	
	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, w strutting, shoring and packing cavit (Measurements to be taken of the fa exceeding 3 m	vells, cesspits, m ies (wherever re ace area timbere	anholes and the like equired) etc. complet d).Depth exceeding	including e 1.5 m but not
	Net Total	346.656sqm	@192.50/sqm	66731.28
3.013	100.6.1			
	Providing steel sheet shoring to the but not exceeding 6.00m using 6 m 50 mm x 50mm x 6 mm M.S. angle another in lines and levels with suit maximum depth of 0.50 M below th ground level suitably braced by hor angles on either side at intervals no struts at 1.50M intervals and mainta are completed, dismantling, cleanin hire charges and conveyance for eq complete.	sides of the tren m M.S. sheet 0 s driving down able pile driving he bottom of the izontal walling t exceeding 1.50 aining the shoring g and restacking uipments, tools	nches to depths of ab 50 M wide stiffen on vertically on either s g equipments and acce proposed excavatio pieces at 75 x 150 m 0M and horizontal sc ng till the pipes are la g for reuse including and plants and sundi	ove 4.00 m edges with ide one after cessories to a n 0.5 M above m x 8 mm rew jack type id and works all labour, ries etc.
	Net Total	284.610sqm	@753.79/sqm	214536.17
3.014	100.6.S.1			
	Structural steel work in single section	on, fixed with o	r without connecting	plate,

Sl No	Specification	Quantity	Rate	Amount
	including cutting, hoisting, fixing in steel primer all complete. (excludin	n position and a g cost of materi	pplying a priming co als)	at of approved
	Net Total	85.382kilogra m	@25.38/kilogram	2167.00
3.015	100.7.1			
	Bailing out water with 5HP engine erecting, dismantling and taking bac and other stores pay of staff etc., co	and pump set in ck of engine and mplete.	cluding conveyance d pump, cost of fuel 1	to the site, lubricating oil
	Net Total	477.440Kwh	@37.17/Kwh	17746.44
3.016	100.7.2			
	Bailing out water with engine and p conveyance to the site, erecting, dis cost of fuel lubricating oil and other	oump set above mantling and ta r stores pay of s	5HP up to 10HP incl king back of engine taff etc., complete.	uding and pump,
	Net Total	716.160Kwh	@18.60/Kwh	13320.58
3.017	100.7.3	197		
	Bailing out water with engine and p conveyance to the site, erecting, dis cost of fuel lubricating oil and other	oump set above mantling and ta r stores pay of s	10HP up to 20HP ind king back of engine taff etc., complete.	cluding and pump,
	Net Total	89 <mark>5.200</mark> Kwh	@9.29/Kwh	8316.41
3.018	100.7.4			
	Bailing out water with engine and p conveyance to the site, erecting, dis cost of fuel lubricating oil and other	oump set above mantling and ta r stores pay of s	20HP up to 30HP ind king back of engine taff etc., complete.	cluding and pump,
	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 cer cost of centering and shuttering - A coarse sand : 6 graded stone aggreg	ment concrete o ll work up to pl ate 40 mm nom	f specified grade exc inth level:1:3:6 (1 cc inal size)	luding the ement : 3
	Net Total	19.345cum	@7256.34/cum	140373.90
3.021	5.37.1			
	Providing and laying in position reacement concrete work, using cemer manufactured in fully automatic bat transit mixer for all leads, having co design of specified grade for reinfor R.M.C. from transit mixer to site of finishing and reinforcement includi proportions as per IS: 9103 to accel	ady mixed M-25 at content as per tching plant and ontinuous agitat reed cement con a laying, excludi ng cost of admi erate/ retard set	b grade concrete for r approved design mi l transported to site o ed mixer, manufactu hcrete work including ng the cost of center xtures in recommend ting of concrete, imp	einforced x, f work in red as per mix g pumping of ing, shuttering led prove

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 wat doses by weight of cement as per m	er proofing mat anufacturer's sp	erial in cement conc	rete work in	
	Net Total	67909.220kg	@1.35/kg	91677.45	
3.024	5.9.2	A Store		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	74 <mark>5.060</mark> sqm	@721.70/sqm	537709.80	
3.025	5.9.20				
	Centering and shuttering including floors, roofs, landings, balconies an thick	strutting, etc. ar d access platfor	nd removal of form f rm with water proof	or:Suspended ply 12 mm	
	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	м			
	Providing and applying integral cry waterproofing treatment to the RCC water tanks, roof slabs, podiums, re / subway and bridge deck etc., prep integral crystalline slurry : 2 parts w integral crystalline slurry : 1 part was same from negative (internal) side w shall meet the requirements as spec- permeability of concrete by more th DIN 1048 and resistant to 16 bar hy crystalline slurry shall be capable of self-healin shall be carried out all complete as engineerin- charge. The product performance sh	stalline slurry o C structures like servior, sewage ared by mixing vater) for vertica ater) for horizon with the help of ified in ACI-212 an 90% compar- ydrostatic pressu- ng of cracks up per specification	f hydrophilic in natu retaining walls of th & water treatment p in the ratio of 5 : 2 (al surfaces and 3 : 1 htal surfaces and app synthetic fiber brush 2-3R-2010 i.e by red red with control condu- ire on negative side. to a width of 0.50mm n and the direction of the for 10 years again	re for be basement, blant, tunnels 5 parts (3 parts lying the h. The material lucing crete as per The m. The work f the inst 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 loakeep.				
	Nat Total	61 220sam	@442.30/acm	27082.03	
2 0 2 0	12.7.1	01.230sqIII	@442.30/sqm	27082.03	
5.029	12 mm cement plaster finished with cement : 3 fine sand)	a flo <mark>ating</mark> coat	of neat cement of m	ix:1:3 (1	
	Net Total	830.138sqm	@403.74/sqm	335159.92	
3.030	13.65.1				
	Painting with black anti- corrosive manufacture to give an even shade:	oitumastic paint Two or more co	of approved brand a ats on new work	and	
	Net Total	830.138sqm	@125.61/sqm	104273.63	
3.031	100.41.34				
	Supplying and fixing Rectangular C (low duty) charges including all cos	I. manhole cov t, labour charge	ver 455mm x 610mm es etc., complete.	n with frame	
	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 (ex foundation etc. in layers not exceed layer by ramming and watering, lea	xcluding rock) i ing 20 cm in de d up to 50 m an	n trenches, plinth, si pth, consolidating ea d lift up to 1.5 m.	des of ach deposited	
	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	1960.000metr e	@30.63/metre	60034.80
4.002	15.43.2			
	Dismantling manually / by mechani material and disposal of unserviceal of Engineer -in-Charge:Bituminous	ical means inclu ble material wit road	iding stacking of ser- hin 50 metres lead as	viceable s per direction
	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 wid sockets, and dressing of sides, ram getting out the excavated soil, and t exceeding 20cm in depth, including watering, etc., and disposing of sur m, in Ordinary Rock.	Ith for pipes, ca ning of bottoms hen returning th consolidating e plus excavated s	bles, etc., including , depth up to 1.5m, i ne soil as required, in each deposited layer soil as directed, with	excavation for ncluding layers not by ramming, in a lead of 50
	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, 1.50n tape in vertical casuarina pole (girth	n height with tw n 15cm to 24cm	o rows of 10cm plas) fixed at 2m interva	tic caution ls.
	Net Total	1372.000metr e	@28.15/metre	38621.80
4.006	OD243866/2022-2023			
	Supply of PE Pipe PE 100 (IS 1433	3), 10kg, 140m	m Outer Dia.	
	Net Total	1375.000metr e	@642.15/metre	882956.25
4.007	OD243893/2022-2023			
	Supply of PE Pipe, PE100, PN10, 2	00mm dia, con	forming to IS 14333.	
	Net Total	85.000metre	@1308.61/metre	111231.85
4.008	OD243894/2022-2023			
	Supply of PE Pipe, PE100, PN10, 3	15mm dia, cont	forming to IS 14333.	
	Net Total	350.000metre	@3239.60/metre	1133860.00
4.009	OD248629/2022-2023	States and	GRAF	
	Supply of PE Pipe, PE100, PN10, 5	60mm dia, cont	forming to IS 4984/2	.016.
	Net Total	150 <mark>.000</mark> metre	@13186.35/metr e	1977952.50
4.010	OD248631/2022-2023	ATFORM FOR TH	E KAANLAGERMENT	
	Supply of PE Pipe, PE100, PN10, 6	30mm dia, cont	forming to IS 4984/2	016.
	Net Total	50.000metre	@16700.76/metr e	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	1375.000metr e	@181.34/metre	249342.50
4.012	100.10.7			
	Laying HDPE pipes (IS : 4984) on lead and aligning the pipes, electro- electrofusion machines, testing the working pressure and after testing, into the trenches already made, test before back filling and levelling the appliances etc., complete but exclud Outside Diameter Pipes.	land portion inc fusion welding pipeline thus fal aligning the pip ing the line to su trenches includ ling cost of pipe	luding conveying wi using automatic or s bricated to suit the hy eline, lowering the p uitable pressure with ling all labour charge e and fittings: 200mr	thin initial emi-automatic ydraulic ipe in position potable water e, hire for n Nominal

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 I lead and aligning the pipes, electro- electrofusion machines, testing the working pressure and after testing, a into the trenches already made, testi before back filling and levelling the appliances etc., complete but exclud Outside Diameter Pipes.	land portion inc fusion welding pipeline thus fal aligning the pip ing the line to su trenches incluc ling cost of pipe	luding conveying wi using automatic or s bricated to suit the hy eline, lowering the p uitable pressure with ling all labour charge e and fittings: 560mr	thin initial emi-automatic ydraulic ipe in position potable water e, hire for n Nominal	
	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				
	Net Total	50.000metre	@1102.31/metre	55115.50	
4.016	100.98.471				
	Supply of CI Double Flanged Sluice Valve with Cap PN 1.0, Size 125m	e Valve Confor m.	ming to IS 14846 - 2	000, Sluice	
	Net Total	5.000no	@10243.27/no	51216.35	
4.017	100.98.473				
	Supply of CI Double Flanged Sluice Valve with Cap PN 1.0, Size 200m	e Valve Confor m.	ming to IS 14846 - 2	000, Sluice	
	Net Total	1.000no	@21987.20/no	21987.20	
4.018	100.98.475				
	Supply of CI Double Flanged Sluice Valve with Cap PN 1.0, Size 300m	e Valve Conform.	ming to IS 14846 - 2	000, Sluice	
	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 with Cap PN 1.0, Size 500m	e Valve Confor m.	ming to IS 14846 - 2	000, Sluice	
	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 va insertions etc., complete, but exclud will be paid separately): 200mm dia	lves (with cap) ling the cost of meter, Class II.	by providing bolts, r the valve (tail pieces	uts, rubber , if required,	
	Net Total	1.000no	@1740.29/no	1740.29	
4.023	100.31.2.7				
	Conveying and fixing C.I. sluice va insertions etc., complete, but exclud will be paid separately): 300mm dia	lves (with cap) ling the cost of ameter, Class II.	by providing bolts, r the valve (tail pieces	uts, rubber , if required,	
	Net Total	1.000no	@2974.80/no	2974.80	
4.024	100.31.2.11				
	Conveying and fixing C.I. sluice va insertions etc., complete, but exclud will be paid separately): 500mm dia	lves (with cap) ling the cost of tameter, Class II.	by providing bolts, r the valve (tail pieces	nuts, rubber , if required,	
	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 for:Foundations, footings, bases of	strutting, etc. ar columns, etc for	nd removal of form r 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 2000.000kilo gram @98.92/kilogram 197840.0				
			Heading Total(Rs)	8451039.51	
5	WATER SUPPLY AND SANATO WIRING IN PUMPING STATIO	ORY ARRANO	GEMENTS, ELECT	ſRICAL	
5.001	OD235712/2022-2023				
	Water Supply and Sanatory arrange	ments, Electric	al wiring in pumping	stations	
	Net Total	8.000no	@100000.00/no	800000.00	
		240	Heading Total(Rs)	800000.00	
6	MECHANICAL, ELECTRICAL-PUMPSETS, GRIT CHAMBER SCREEN, GENERATOR, TRANSFORMER & amd: ALLIED WORKS COMPLETE				
6.001	OD252058/2022-2023		DRA		
	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 & amp; 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 & amp; 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				
	Net Total	66.500HP (Horse power)	@35000.00/HP (Horse power)	2327500.00	
6.002	OD235714/2022-2023				
	Supple and erection of Indoor Type Rs 3 Lakhs/Nos. Capacity-25 KVA	Generator Cap - 1 No. @ 10 L	acity-1KVA to 5 KV .akhs/No.	'A - 7 Nos. @	
	Net Total	1.000no	@3100000.15/no	3100000.15	
6.003	OD235715/2022-2023				
	Control Room, Generator Room and	d Compound wa	all with gate		
	Net Total	8.000no	@500000.02/no	400000.16	
6.004	OD235716/2022-2023				

Sl No	Specification	Quantity	Rate	Amount	
	Automatic Control system	0.000			
	Net Total	8.000no	@100000.01/no	800000.08	
6.005	OD235720/2022-2023				
	Supply, delivery and erection of Mu suitable for cleaning the screen chan mm dia hose required for operating	Itistage force P mber,Pumpset d the pump.	ump 600LPM X 301 luring servicing with	M head 16 m of 20	
	Net Total	8.000set	@55000.00/set	440000.00	
6.006	OD235721/2022-2023				
	Supply and delivery of breathing ap	paratus with O	xygen cylinder mask	etc complete.	
	Net Total	2.000set	@75000.01/set	150000.02	
6.007	OD235722/2022-2023				
	Supply and delivery of Diaphragm isolating valves	type pressure ga	uge with necessary	S.S tubes and	
	Net Total	8.000no	@6000.00/no	48000.00	
6.008	OD235723/2022-2023		TAF		
	Supply and delivery of spare parts f	or pumps, motor	rs and starter for mai	ntenance.	
	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				
	Net Total	8.000no	@50000.01/no	400000.08	
6.010	OD235725/2022-2023				
	Supply, delivery and usage of tools end spanners, ring spanners, screw etc.	required for ma drivers,electrica	intenance works inc l megger,Tong teste	luding double rs,hand gloves	
	Net Total	8.000set	@10000.01/set	80000.08	
6.011	OD235726/2022-2023				
	Supply, delivery and erecting of fol Fire extinguisher of 5 Kg capacity (with stand 5no's III. Electr panel boards including starter panel	lowing safety it powder type 2 1 ric quality Rubb s	ems ,including cost (no's) II. Finder mat to be laid in f	of same. I. ire buckets front of all the	
	Net Total	8.000no	@40000.00/no	320000.00	
6.012	OD235730/2022-2023				
	Supply and fixing of stainless steel fixing across the screen chamber ch clear passage of 40 mm solids and s	screen made of annel (fixed typ suitable for man	bars of size 50 mm z be) at 45 degree incl ual cleaning includin	x 10 mm for ination for a ng cost of of	

Sl No	Specification	Quantity	Rate	Amount
	screen ,Grab bucket and lifting arra 1.30m size.	ngement materi	al and fixing charges	s for 1.00m x
	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 commission	ning of solar po	wer system low-capa	acity systems
	Net Total	8.0001 nos	@100000.01/1 nos	800000.08
6.015	OD256926/2022-2023	APR.		
	Wiring & amp; amp; 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
	DE DE DE PO	UBLIC WORKS	Heading Total(Rs)	13885500.7 5
7	LINE EXTENSION, DEPOSIT T	O KSEB, ETC		
7.001	OD235689/2022-2023			
	Line extension, Deposit to KSEB, o	etc		
	Net Total	8.000no	@50000.00/no	400000.00
			Heading Total(Rs)	400000.00
8	SEWERAGE SERVICE CONNE	CTION CHAP	RGES	
8.001	OD235711/2022-2023			
	Sewer service connection charges in and labour charges	ncluding connec	ction deposite fee and	d all materials
	Net Total	690.000no	@40000.00/no	27600000.0 0
			Heading Total(Rs)	27600000.0 0
9	PWD & amp; NH - BM& amp; BC MORTH SPECIFICATION	ROAD REFO	RMATION WORK	K WITH
9.001	4.2.A.1			
	Construction of granular sub-base b layers with a motor grader on a preprotavator at OMC, and compacting	y providing gra pared surface, m with a vibratory	ded material, spread nixing by mix in-plac v roller to achieve the	ing in uniform ce method with e desired

Sl No	Specification	Quantity	Rate	Amount	
	density, complete as per clause 401 Method	. Grading-III -F	or lower sub-base - I	Mix in Place	
	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	0.000			
	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	939 <mark>7.10</mark> 0sqm	@14.03/sqm	131841.31	
9.005	5.3.2.a	ACTERNIA FOR TH	E AGONIOFEDATIONT		
	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				
	Net Total	469.855cum	@8337.93/cum	3917618.10	
9.006	5.2.a				
	Providing and applying tack coat w pressure distributor at the rate of 0.3 surface cleaned with mechanical br	ith bitumen em 20 - 0.30 kg per oom.	ulsion(RS) using em sqm on the prepared	ulsion l bituminous	
	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 category A' made out of ASA conforming to ASTM D 4280, stror when tested in accordance with AS ⁷ D 788, and reflectivity conforming fixing with adhesive etc. with 2 yea performance as per clause 804.7.3& Reflector :-	studs (Raised I /HIPS/ABS mo ig enough to su FM D 4280, ref to clause 804.4. rs warranty for lt;br> Road	Pavement Marker) of ulded body with sha pport a load of more lective panel confirn including installation the road stud as well Markers/Road Stud	f ' nks and than 13.635 T ning to ASTM on, drilling, as for in field with Lense	
	Net Total	1266.000no	@200.84/no	254263.44	
		-dela-	Heading Total(Rs)	17900612.1	
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 co Macadam specification including pr mechanical mix plant carriage of m layers with paver in sub- base / base with vibratory roller to achieve the	mpacting grade remixing the Ma ixed Material b course on well desired density.	d stone aggregate to aterial with water at y tipper to site, layin l prepared surface an	Wet Mix OMC in g in uniform d compacting	
10.002		325.450cum	@3200.02/cum	1001108.78	
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.				
10.004		1301.8008qIII	@01. <i>32</i> /8q111	00000.74	
10.004	Providing and applying tack coat w pressure distributor at the rate of 0.2 Surface cleaned with mechanical br	ith bitumen em 25 - 0.30 kg per oom.	ulsion (RS) using em sqm on the prepared	ulsion I Granular	
	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 stone aggregates of specified size of prepared surface and rolling with 8- 19 mm nominal chipping size	ng as wearing c n a layer of bitu 10 tonne smoot	ourse in single coat u minous binder (VG 2 h wheeled steel rolle	ising crushed 30) laid on the er. Grading I -
	Net Total	1995.400sqm	@107.64/sqm	214784.86
			Heading Total(Rs)	2815816.99
11	MUNICIPALITY (BT) ROAD R SPECIFICATION	EFORMATIO	N WORK WITH M	loRD
11.001	4.1.A.1	DAGAN.		1
	Method Construction of granular s spreading in uniform layers with me place method with rotavator at OM achieve the desired density, comple For Grading I Material Net Total	sub-base by pro- otor grader on p C, and compact te as per Techn 1677.280cum	viding well graded m repared surface, mix ing with smooth whe ical Specification Cla @2988.07/cum	aterial, ing by mix in cel roller to ause 401. (i) 5011830.05
11.002	4.9			
	Wet Mix Macadam Providing, lay aggregate to wet mix macadam spec water at OMC in mechanical mixer site, laying in uniform layers in sub compacting with smooth wheel roll density including lighting, barricadi Tables 400.11 & 400.12 and Techn Means with 1 km lead	ing, spreading a cification incluc (Pug Mill), car -base/base cour er of 80 to 100k ing and mainten ical Specificatio	and compacting grade ling premixing the m riage of mixed mater se on a well prepared N weight to achieve ance of diversion, et on Clause 406. By N	ed stone haterial with ial by tipper to l sub-base and the desired c as per Mechanical
	Net Total	1677.280cum	@3336.88/cum	5596882.09
11.003	5.1.1a			
	Prime Coat :- Low porosity Provid emulsion (SS-1) on prepared surfac surface and spraying primer at the r per Technical Specification Clause	ling and applyir e of granular ba ate of 0.70-1.0 502	ng primer coat with b se including cleaning kg/sqm using mecha	itumen g of road nical means as
	Net Total	8386.400sqm	@74.01/sqm	620677.46
11.004	5.2.3a			
	Tack Coat Providing and applying emulsion distributor at the rate of 0 surfaces treated with primer & clear Specification Clause 503.	tack coat with I .25 to 0.30 kg p ned with Hydra	Bitumen emulsion (R er sqm on the prepar ulic broom as per Te	.S-1) using ed granular chnical

Sl No	Specification	Quantity	Rate	Amount
	Net Total	13838.200sq m	@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	13838.200sq m	@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)			ring seal coat ade and cross lause 510 A.
	Net Total	12850.600sq m	@83.30/sqm	1070454.98
		ATPORM FOR TH	Heading Total(Rs)	15235618.7 1
12	HARBOUR DEPT ROAD REFO SPECIFICATION	RMATION W	ORK WITH MoRI)
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			(A) By Mix ding well ared surface, with smooth pecification 935265.91
12.002	4.9			20020007
	Wet Mix Macadam Prov stone aggregate to wet mix macadan with water at OMC in mechanical m tipper to site, laying in uniform laye base and compacting with smooth v desired density including lighting, b per Tables 400.11 & amp; 400.12 ar By Mechanical Means with 1 km le Net Total	viding, laying, s m specification nixer (Pug Mill) ers in sub-base/k wheel roller of 8 parricading and ad Technical Sp ad 313.000cum	preading and comparison including premixing), carriage of mixed in base course on a well 0 to 100kN weight to maintenance of dive ecification Clause 40 @3336.88/cum	cting graded the material material by l prepared sub- o achieve the rsion, etc as 06. 1044443.44
12.003	5.1.1a			
	Prime Coat :- Low porosity <br&< td=""><td>zgt; Providing a</td><td>nd applying primer c</td><td>coat with</td></br&<>	zgt; Providing a	nd applying primer c	coat with
Sl No	Specification	Quantity	Rate	Amount
--------	---	--	--	--
	bitumen emulsion (SS-1) on prepar- road surface and spraying primer at means as per Technical Specification	ed surface of gr the rate of 0.70 on Clause 502	anular base including -1.0 kg/sqm using m	g cleaning of lechanical
	Net Total	1565.000sqm	@74.01/sqm	115825.65
12.004	5.2.3a			
	Tack Coat Providing and using emulsion distributor at the rat granular surfaces treated with prime Technical Specification Clause 503	applying tack of the of 0.25 to 0.30 er & amp; cleane	coat with Bitumen er 0 kg per sqm on the 2 with Hydraulic bro	nulsion (RS-1) prepared oom as per
	Net Total	2465.450sqm	@15.56/sqm	38362.40
12.005	5.9.1.2a			
	grade/modified bitumen) Binder - E rolling of open-graded premix carpo 5.6 mm aggregates either using pen line, grade and level to serve as wea including mixing in a suitable plant static roller capacity, finished to rec of either Type A or Type B or Type Case - I By Manual Mea	Bitumen S-65 & et of 20 mm thic etration grade b aring course on , laying and roll puired level and c C as per Techr ans (lt;br> Providing, ckness composed of itumen or emulsion a previously prepare ing with a three whe grades to be followe ical Specification C. II) Bitumen (S-65)	laying and 13.2 mm to to required d base, eel 80-100 kN ed by seal coat lause 508.
	Net Total	246 <mark>5.450</mark> sqm	@196.59/sqm	484682.82
12.006	5.12.A.3.2a			
	Seal Coat - Manual Means - Type C seal coat sealing the voids in a bitur and cross fall using Type A, Type F Clause 510 A. By Manu Bitumen (S-65)	C - Bitumen S-6 ninous surface 1 3 and Type C as al Means :- Cas	5 Providi laid to the specified l per Technical Speci e - III : Type C <l< th=""><th>ng and laying levels, grade fication or> (II)</th></l<>	ng and laying levels, grade fication or> (II)
	Net Total	2465.450sqm	@83.30/sqm	205371.99
			Heading Total(Rs)	2823952.21
13	INTERCEPTION AND DIVERS	SION WORK		
13.001	2.8.1			
	Earth work in excavation by mecha in foundation trenches or drains (no including dressing of sides and ram getting out the excavated soil and d within a lead of 50 m.All kinds of s	nical means (Hy at exceeding 1.5 ming of bottom isposal of surplo oil	ydraulic excavator) / m in width or 10 squ s, lift up to 1.5 m, in us excavated soil as o	manual means m on plan), cluding directed,
	Net Total	39.000cum	@298.84/cum	11654.76
13.002	4.1.8			
	Providing and laying in position cer cost of centering and shuttering - A coarse sand : 8 graded stone aggreg	ment concrete o ll work up to pl ate 40 nominal	f specified grade exc inth level:1:4:8 (1 ce size)	cluding the ment : 4
	Net Total	4.500cum	@6857.60/cum	30859.20
13.003	4.1.5			
	Providing and laying in position cen	ment concrete o	f specified grade exc	luding the

Sl No	Specification	Quantity	Rate	Amount
	cost of centering and shuttering - Al coarse sand : 6 graded stone aggreg	ll work up to pl ate 20 mm nom	inth level:1:3:6 (1 ce inal size)	ment : 3
	Net Total	44482.44		
13.004	4.1.3			
	Providing and laying in position cer cost of centering and shuttering - Al sand (zone-III) : 4 graded stone agg	nent concrete o ll work up to pl regate 20 mm n	f specified grade exc inth level:1:2:4 (cem ominal size)	luding the ent : 2 coarse
	Net Total	1.000cum	@8040.94/cum	8040.94
13.005	5.1.2			
	Providing and laying in position spe excluding the cost of centering, shu to plinth level:1:1:5:3 (1 cement 1.5 nominal size	ecified grade of ttering, finishin coarse sand :3	reinforced cement co g and reinforcement graded stone aggreg	oncrete, - All work up ate 20 mm
	Net Total	3.900cum	@9142.08/cum	35654.11
13.006	5.9.2	ANN.		
	Centering and shuttering including thickness) including attached pilaster	strutting, etc. ar ers, butteresses,	nd removal of form for plinth and string cou	or:Walls (any urses etc.
	Net Total	80.000sqm	@721.70/sqm	57736.00
13.007	5.9.3			
	Centering and shuttering including s floors, roofs, landings, balconies an	strutting, etc. ar d access platfor	nd removal of form form	or:Suspended
	Net Total	32.000sqm	@820.86/sqm	26267.52
13.008	5.22.6			
	Steel reinforcement for R.C.C work in position and binding all complete bars of grade Fe-500D or more	including strai	ghtening, cutting, ber elThermo - Mechani	nding, placing cally Treated
	Net Total	331.500kilogr am	@98.92/kilogram	32791.98
13.009	OD264189/2022-2023			
	Supplying and fixing Mechanical ga	ates		
	Net Total	8.000no	@100000.01/no	800000.08
			Heading Total(Rs)	1047487.03
		Tot	al Estimation PAC	304875105.8 3
15	Extra Charges			
	Provision for GST			
14.001		304875105.83	18.00%	54877519.0 5
			Grand Total	0.00
			Round off	0.00

EST No. :WRD/KWA-CESEWA/EST/4856/2023_27_3_2 (Edit Id : 1) (Dsor year : 2018,Cost Index (Place : Malappuram,Value : 136.44),GST : 18%

Sl No	Specification	Quantity	Rate	Amount
			Rounded Total(Rs)	359752624.8 8
	Rupees Thirty Five Crore Ninety S Twenty Four	even Lakh Fift	y Two Thousand Six	Hundred and

itt 10

Sewerage Camp Office Kerala Water Authority Malappuram-676 505

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

Executive Enginee PPD Regional Office Kerele Water Author# Kochi - 682011

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Superintending Engineer PPD Regional Office Kerala Water Authority Kochi - 632011













BBR-2	FC			►D BY: SI	BBR-	
IORITY RISSUR			AE. AEE. EE .			
STEM FO	PR PO	NNANI	SE ALL DIM FILE NO DRAWIN DATE: 16	ENSIONS : SEW/MP G NO : -03-2023	ARE IN MI M/2023/HA HARBOUR	ETERS RBOUR SBM2 R SBM 2 - 4a



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	PREPARED BY: SEWERAG THRISSUR	E CIRCLE
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IRISSUR	AEE.	
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STEM FOR PONNANI	ALL DIMENSIONS ARE IN M	RBOUR SBM2
CDAM	DRAWING NO : HARBOUF	R SBM 2 - 4b
GRAM	DATE: 16-03-2023	

MANHOLES



CLASS -I



CLASS - III



CLASS - II



LIFT MANHOLE





3.5 MLD CAPACITY SEWERAGE SYS MUNCIPALITY (SBM 2 URBAN)

TITLE : TYPICAL MANHOLES&CO

		PREPARED BY: SEWERAG	ECIRCLE
	**	THRISSUR	
IORITY		AE.	
RISSUR		AEE.	
		EE .	
	20002200002200000	SE	
STEM F	OR PONNANI	ALL DIMENSIONS ARE IN M	ETERS
		FILE NO : SEW/MPM/2023/HA	RBOUR SBM2
		DRAWING NO : HARBOUF	R SBM 2 - 5
DLLECI	TON WELLS	DATE: 16-03-2023	







	DILUTION TANK AND RECEIVING CHAMBER									
							PREPARED BY: SEWERAGE CIRCLE			
	PILE DETAILS	ТҮРЕ	SIZE	NO	PILE CAP	KERALA WATER AUTHORITY SEWERAGE CIRCLE THRISSUR	THRISSUR AE. AEE. EE.			
1	Corner pile	single	45 cm Dia.	4	1.1x1.1 x 1.1- 4 Nos.		SE			
2	Exterior	single	45 cm Dia	2	1.1 x1.1 x1.1 - 2 Nos	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: DILUTION TANK & RECIEVING CHAMBER	DRAWING NO : HARBOUR SBM 2 - 6 DATE: 16-03-2023			



	<u>O & G TRAP</u>											
						KERALA WATER AUTHORITY SEWERAGE CIRCLE THRISSUR	PREPARED BY: SEWERAGE CIRCLE THRISSUR AE. AEE. EE.					
	PILE DETAILS	TYPE	SIZE	NO	PILE CAP	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIDALITY (SPM 2 UPPAN)	ALL DIMENSIONS ARE IN METERS					
1	Corner pile	single	45 cm Dia.	14	1.1 x1.1 x 1.0- 14 Nos.	TITLE : RECEIVING CHAMBER,GRIT CHAMBER O &G TRAP	FILE NO : SEW/MPM/2023/HARBOUR SBM2 DRAWING NO : HARBOUR SBM 2 - 7 DATE: 16-03-2023					



		E	CQUAL	IZA'	TION TA	NK	
	PILE DETAILS	ТҮРЕ	SIZE	NO	PILE CAP	KERALA WATER AUTHORITY	PREPARED BY: SEWERAGE CIRCLE THRISSUR AE. AEE.
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1.0- 4 Nos.		EE .
2	Interior pile	double	45cm Dia.	18	1.2 x 1.2 x 1.0- 9 Nos	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)	ALL DIMENSIONS ARE IN METERS
3	Exterior pile	single	60 cm Dia.	12	1.1 x 1.1 x1.0- 12 Nos	TITLE : EQUALIZATION TANK	DRAWING NO : HARBOUR SBM 2-8 DATE: 16-03-2023



MBBR TANK 1

SINo	PILE DETAILS	туре	SIZE	NO	PILE CAP	PREPARED BY: SEWE THRISSUR	RAGE CIRCLE
			SILL	110		KERALA WATER AUTHORITY	
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1.1 - 4 Nos.	SEWERAGE CIRCLE THRISSUR	
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.	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN) ALL DIMENSIONS ARE FILE NO : SEW/MPM/20	IN METERS 23/HARBOUR SBM2
				-		TITLE - MDDD TANK 1	OUR SBM 2 - 9
						DATE: 16-03-2023	



			N	MBBR	TANK 2		
						KERALA WATER AUTHORITY	PREPARED BY: SEWERAGE CIRCLE THRISSUR AE.
	PILE DETAILS	ТҮРЕ	SIZE	NO	PILE CAP	SEWERAGE CIRCLE THRISSUR	AEE.
1	Corner pile	single	45 cm Dia.	4	1.1x1.1 x 1.1- 4 Nos.		SE
2	Exterior	Double	45 cm Dia	16	2.18x1.1x1 - 8 Nos	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)	ALL DIMENSIONS ARE IN METERS FILE NO : SEW/MPM/2023/HARBOUR SBM2
3	Interior	Double	60cm Dia	8	2.17x1.2x1.2 - 4 Nos	TITLE : MBBR TANK 2	DRAWING NO : HARBOUR SBM 2 - 10 DATE: 16-03-2023





		aize	NO		WINTER 12	PREPARED BY: SEWERAGE CIRCLE THRISSUR
PILE DETAILS	TYPE	SIZE	NO	PILE CAP	KERALA WATER AUTHORITY	AE.
Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1.1- 4 Nos.	SEWERAGE CIRCLE THRISSUR	EE .
Exterior pile	single	60 cm Dia.	4	1.2 x 1.2 x1.2 - 4 Nos.	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI	SE ALL DIMENSIONS ARE IN METERS
I	11-1-	45 Die	2	219 - 11 - 11 1 N	MUNCIPALITY (SBM 2 URBAN)	FILE NO : SEW/MPM/2023/HARBOUR SBM2
interior pile	aouble	45 cm D1a.		2.18 x 1.1 x1.1 - 1 Nos.	TITLE : MBBR TANK 3	DRAWING NO : HARBOUR SBM 2 - 11 DATE: 16-03-2023
	PILE DETAILS Corner pile Exterior pile Interior pile	PILE DETAILSTYPECorner pilesingleExterior pilesingleInterior piledouble	PILE DETAILSTYPESIZECorner pilesingle45 cm Dia.Exterior pilesingle60 cm Dia.Interior piledouble45 cm Dia.	PILE DETAILSTYPESIZENOCorner pilesingle45 cm Dia.4Exterior pilesingle60 cm Dia.4Interior piledouble45 cm Dia.2	PILE DETAILSTYPESIZENOPILE CAPCorner pilesingle45 cm Dia.41.1 x1.1 x 1.1 - 4 Nos.Exterior pilesingle60 cm Dia.41.2 x 1.2 x1.2 - 4 Nos.Interior piledouble45 cm Dia.22.18 x 1.1 x1.1 - 1 Nos.	PILE DETAILS TYPE SIZE NO PILE CAP Corner pile single 45 cm Dia. 4 1.1 x1.1 x 1.1-4 Nos. Exterior pile single 60 cm Dia. 4 1.2 x 1.2 x1.2 - 4 Nos. Imerior pile Imerior pile 45 cm Dia. 2 2.18 x 1.1 x1.1 - 1 Nos. Imerior pile Imerior pile 45 cm Dia. 2 2.18 x 1.1 x1.1 - 1 Nos. Imerior pile Imerior pile Imerior pile 45 cm Dia. 2 2 Imerior pile Imerior pile Imerior pile 45 cm Dia. 2 2 Imerior pile Imerior pile Imerior pile Imerior pile 2 Imerior pile Imerior pile Imerior pile Imerior pile 2 Imerior pile Imerior pile Imerior pile Imerior pile Imerior pile 2 Imerior pile Imerior



MBBR TANK 4

						WATER	PREPARED BY: SEWERAGE THRISSUR	E CIRCLE
						KERALA WATER AUTHORITY	AE.	
						SEWERAGE CIRCLE THRISSUR	AEE.	
							SE	
	PILE DETAILS	TYPE	SIZE	NO	PILE CAP	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI	ALL DIMENSIONS ARE IN MI	ETERS
						MUNCIPALITY (SBM 2 URBAN)	FILE NO : SEW/MPM/2023/HA	RBOUR SBM2
1	Corner pile	single	60 cm Dia.	4	1.2 x1.2 x 1.2- 4 Nos.		DRAWING NO : HARBOUR S	SBM 2 - 12
						IIILE : MBBK IANK 4	DATE: 16-03-2023	



						PREPARED BY: SEWERAGE CIRCLE THRISSUR
	PILE DETAILS	ТҮРЕ	SIZE	NO	PILE CAP	KERALA WATER AUTHORITY AE. SEWERAGE CIRCLE THRISSUR AEE. EE. EE.
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.	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN) ALL DIMENSIONS ARE IN METERS FILE NO : SEW/MPM/2023/HARBOUR SBM2
3	Interior	single	45cm Dia	4	1.1x1.1 x 1.1- 4 Nos.	TITLE : SECONDARY CLARIFIER WITH PLATE/ TUBE SETTLER DRAWING NO : HARBOUR SBM 2 - 13 DATE: 16-03-2023 DATE: 16-03-2023



			SI	<u>pl</u> LUDG	<u>an</u> E SUMP		
						KERALA WATER AUTHORITY SEWERAGE CIRCLE THRISSUR	PREPARED BY: SEWERAGE CIRCLE THRISSUR AE. AEE. EE .
	PILE DETAILS	ТҮРЕ	SIZE	NO	PILE CAP	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SRM 2 URBAN)	SE ALL DIMENSIONS ARE IN METERS
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1- 4 Nos.	TITLE : SLUDGE SUMP	HLE NO : SEW/MPM/2023/HARBOUR SBM2 DRAWING NO : HARBOUR SBM 2 - 14 DATE: 16-03-2023







			<u>FIL</u>	TER FE	ED TANK		
						KERALA WATER AUTHORITY	PREPARED BY: SEWERAGE CIRCLE THRISSUR AE.
						SEWERAGE CIRCLE THRISSUR	AEE. EE .
	PILE DETAILS	TYPE	SIZE	NO	PILE CAP	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI	SE ALL DIMENSIONS ARE IN METERS
1	Corner pile s	ingle	45 cm Dia.	4	1.1 x1.1 x 1- 4 Nos.	- MUNCIPALITY (SBM 2 UKBAN)	FILE NO : SEW/MPM/2023/HARBOUR SBM2 DRAWING NO : HARBOUR SBM 2 - 16
						TITLE : FILTER FEED TANK	DATE: 16-03-2023



PRESSURE SAND FILTER

ACTIVATED CARBON FILTER

(INTER)	PREPARED BY: SEWERAGE CIRCLE THRISSUR		
KERALA WATER AUTHORITY	AE.		
	AEE.		
	EE .		
	SE		
3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI	ALL DIMENSIONS ARE IN METERS		
MUNCIPALITY (SBM 2 URBAN)	FILE NO : SEW/MPM/2023/HARBOUR SBM2		
TITLE : PRESSURE SAND FILTER&	DRAWING NO: HARBOUR SBM 2 - 17		
ACTIVATED CARBON FILTER	DATE: 16-03-2023		



						PREPARED BY: SEWERAGE CIRCLI THRISSUR	Æ
						KERALA WATER AUTHORITY AE.	
						SEWERAGE CIRCLE THRISSUR	
	1						
	PILE DETAILS	TYPE	SIZE	NO	PILE CAP	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI All dimensions are in meters	_
						MUNCIPALITY (SBM 2 URBAN) FILE NO : SEW/MPM/2023/HARBOUR S	SBM2
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1- 4 Nos.	TITLE . CHI ODINE CONTACT TANK	18
						DATE: 16-03-2023	





TREATED WATER TANK

						WATER AND	PREPARED BY: SEWERAGE CIRCLE THRISSUR
	PILE DETAILS	TYPE	SIZE	NO	PILE CAP	KERALA WATER AUTHORITY	AE. AEE.
1	Corner pile	single	45 cm Dia.	4	1.1 x1.1 x 1.0- 4 Nos.		EE . SE
2	Interior pile	single	60cm Dia.	1	1.2 x 1.2 x 1.0- 1 Nos	3.5 MLD CAPACITY SEWERAGE SYSTEM FOR PONNANI MUNCIPALITY (SBM 2 URBAN)	ALL DIMENSIONS ARE IN METERS FILE NO : SEW/MPM/2023/HARBOUR SBM2
3	Exterior pile	single	45 cm Dia.	4	1.1 x 1.1 x1.0- 4 Nos	TITLE : TREATED WATER TANK	DRAWING NO : HARBOUR SBM 2 - 19 DATE: 16-03-2023
3	Exterior pile	single	45 cm Dia.	4	1.1 x 1.1 x1.0- 4 Nos	TITLE : TREATED WATER TANK	DRAWING N DATE: 16-03